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Exploitation Strategy for a Project of the 7th European Framework Program

Bachelor Thesis for Attainment of the Academic Degree of Bachelor of Science

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TABLE OF ABBREVIATIONS

AUEB	Athens University Of Economics And Business
EC	European Commission
EPFL	École Polytechnique Fédérale De Lausanne
e-SAVE	Energy Efficiency in the Supply Chain through Collaboration, Advanced Decision Support and Automatic Sensing
FMCG	Fast Moving Consumer Goods
GrSCM	Green Supply Chain Management
ICT	Information and Communication Technology
IPR	Intellectual Property Rights
KPI	Key Performance Indicator
LICP	Computer Aided Design and Production Laboratory
MES	Manufacturing Execution System
NACE	Nomenclature Statistique des Activités Économiques dans la Communauté Européenne
NPD	New Product Development
PRODCOM	Production Communautaire
PUDF	Plan for the Use and Dissemination of the Foreground
R&D	Research and Development
RFID	Radio Frequency Identification
SCM	Supply Chain Management
SCORE	Supply Chain and Demand Management, Collaboration and Electronic Services
SME	Small and Medium-Sized Enterprises
TUDO	Technische Universität Dortmund

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1 INTRODUCTION

Research work can be distinguished between fundamental research and applied research. While the fundamental research aims to develop theoretical frameworks without particular applications in the short-term distance, the applied research aims on the development of particular concepts like products and services resulting from the research activities.

This thesis considers e-SAVE[1], a project funded by the 7th Framework Program of the European Commission, and aims to provide a strategy for the exploitation phase of the project. e-SAVE integrates the aspired CO_2 reduction of transportation in the Fast Moving Consumer Goods (FMCG) Industry in a wider framework: It considers green supply chain management, green life cycle management, green decision support and meeting green customer preferences in the Consumer Goods Industry. With application of state-of-the-art methods data along the supply chain of Fast Moving Consumer Goods will be captured. For instance, with Radio Frequency Identification (RFID) based tagging and smart metering of facilities. An interoperable and expandable data middleware will convert and provide data to processing modules with tools enabling green supply chain simulation, green decision support and possibilities for green consumer services[2].

The so called Exploitation Strategy shall evaluate the capabilities and prospective of the knowledge and technology generated in a research project, the so called foreground. Within this strategy as *Part of the Plan for Use and Dissemination of Foreground* the project content is analyzed and exploitation approaches are evolved to guarantee a proper and successful usage. The building of the strategy is carried out under consideration of the specific circumstances regarding industry, market and general conditions. The total strategy is to be set on a well-founded basis and shall therefore refer to a clear methodology. Hence, existing literature concerning exploitation approaches is considered and if necessary revised and replenished by relevant theoretical aspects and approaches.

In chapter 2 a crucial theoretical overview concerning the topic exploitation in context of Research and Development (R&D) projects is given: This includes a consideration of the exploitation itself, of appropriate recent literature and the embedding of exploitation in matters of stakeholders, time and official regulations. Chapter 3 sums up various relevant techniques and practical background of disciplines applicable to the generation of Exploitation Strategies that will be taken into account in the following chapter. Subsequently, chapter 4 is engaged in creating a general methodology for the building of Exploitation Strategies. For that purpose, the requirements for an Exploitation Strategy are extracted from chapter 2 while approved techniques from chapter 3 are applied in order to create a methodology for the creation of the Exploitation Strategy. In chapter 5 the presented methodology will be applied directly to the considered e-SAVE project and generate a complete Exploitation Strategy. Finally, chapter 6 summarizes the presented approach considering the limitations of the methodology and the particular Exploitation Strategy.

[1] "e-SAVE" stands for Energy Efficiency in the Supply Chain through Collaboration, Advanced Decision Support and Automatic Sensing.

[2] The term "green" refers to Green Supply Chain Management, which indicates the consideration of environmental aspects within Supply Chain Management. In this thesis, the term "green" is applied to other disciplines in the same context.

2 EXPLOITATION AFFAIRS IN RESEARCH AND DEVELOPMENT PROJECTS

2.1 DEFINITION OF EXPLOITATION

"Exploitation occurs when someone or something (e.g. a material resource, an opportunity) is used or taken advantage of" (Ritzer & Kliman, 2007). Although this definition derives from the field of social sciences, it can be transformed directly into the context of Research and Development (R&D) projects: In practice, the project consortium represents the "someone or something", while "material resource" and "opportunity" are represented by various findings generated by research activities conducted within the project.

The European Commission often applies the term "use" as a synonym for exploitation and defines it as "[…] the direct or indirect utilization of knowledge in research activities or for developing, creating and marketing a product or process or for creating and providing a service." (IPR Helpdesk, 2012)

Therefore, exploitation in the context of research projects means the use and application of knowledge generated within the research project. According to Harris (Harris, 2007, p. 127ff.) selected forms of exploitation are the design of new products, the development of new services, the implementation of new processes, the licensing for technologies and knowledge and the creation of new research opportunities:

Both new products and new services may base completely on conducted research activities, or may only represent improvements of already existing products and services. Especially in the case of new processes, existing processes are optimized by the use of results of research projects, for instance, by improving efficiency, capacity or quality.

Technology and knowledge can be licensed project-intern to members of a consortium and project-extern to any other party. Especially for academic institution licensing is an interesting possibility to generate commercial benefit without direct actions on markets. Nevertheless, eventual concerns of Intellectual Property Rights (IPR) have to be considered.

The majority of exploitation activities are driven by enterprises, but there are also exploitations driven by academic institutions. Both aim to create benefits by the distribution of products, processes and services or competitive advantages by conducting further research based on the generated knowledge and technology. Mc Nerney (Mc Nerney, et al., 2010) defines two essential exploitation approaches, the use of foreground in commercial activities like the selling of products on markets, and the use of foreground in further research activities. Selected types of exploitation and their internal and external tendencies are visualized in Figure 1.

Publishing results can also be regarded as a form of exploitation according to Harris (Harris, 2007, p. 128f.). Nevertheless, the European Commission (EC) includes publishing results into the section of dissemination of the results of a research project (European Commission, 2012, p. 24ff.).

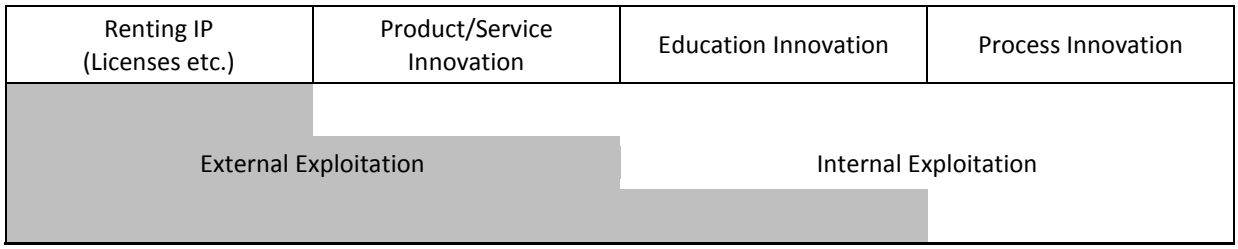

Figure 1: Types of Exploitation, following (Ahmed & Shepherd, 2010, p. 137f.)

2.2 CHRONOLOGY OF EXPLOITATION

Exploitation activities represent the utilization of the foreground generated in a R&D project. Therefore, exploitation activities itself can only take place after the termination of such a project. But this does not imply that all matters concerning exploitation are conducted after the termination of the project, in contrary some matters of exploitation have to be discussed prior to the beginning of a project (Harris, 2007, p. 127).

Harris (Harris, 2007, p. 129ff.) distinguishes three phases concerning exploitation matters that have to be executed in context of a R&D project and are visualized in Figure 2: The business case, developing market understanding and building the exploitation plan and strategy.

The business case "(…) define[s] the justification for carrying out the project." (Harris, 2007, p. 49). This means, the business case elaborates on the motives and intentions for conducting a project and needs to exist, at least partly, prior to the conducted project. Thus, it aligns the project and sets rough estimates for following exploitation enquiries.

As a first step within a business case the qualitative and quantitative objectives are determined. Qualitative objectives are not likely to generate financial benefit, while quantitative objectives are expected to generate financial benefits. Regarding the quantitative objects a business analysis has to be carried out, that means a definition of potential customer and their needs and problems shall be given in a second step. Taking into account the results of these two steps the market opportunities can be predicted. As a following step, the project outcomes can be determined. In a final step potential returns can be calculated. (Harris, 2007, p. 49ff.)

It has to be emphasized that on this early stage no concrete statements, for instance concerning costs or the later on composed exploitation strategy, can be made due to the uncertain project course and project results (Harris, 2007, p. 59f.).

During the project a market understanding has to be evolved. This includes analyzing the market opportunity, understanding the market dynamics and understanding the industrial forces. The marketing gives detailed information concerning which consumer's problem the project will solve, which use cases are possible, how the consumer's behavior may change, who else may be affected, how the current market size is, how it will evolve and which business trends are present. As a last step the industry forces are considered, i.e. how easy is the market entry, the power of supplier and buyer, threats of substitutes and competitors. (Harris, 2007, p. 137ff.)

The third part affiliated with exploitation is the composition of an exploitation plan. The exploitation plan represents a business plan concerned with the marketing of the envisaged products and services. A recommended structure includes a description of the market opportunity, the intended

route to the market, additional development requirements, standards and accreditations and a plan for the future. However, this structure is only a representative draft. If there are more products and services resulting from one project more than one planning issue may be appropriate in order to reduce the complexity. (Harris, 2007, p. 145ff.)

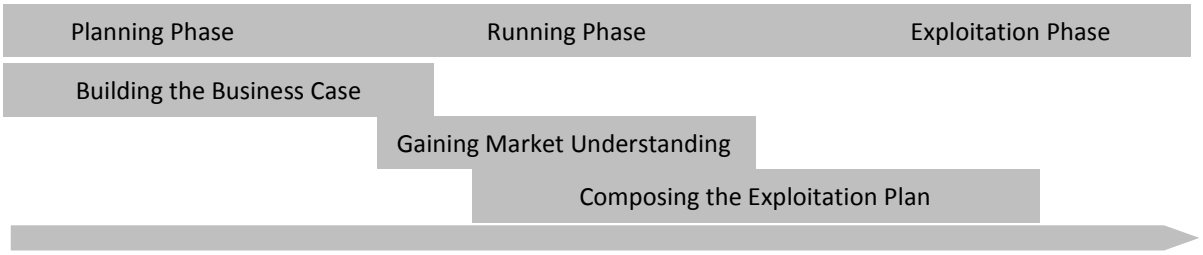

Figure 2: Chronological Integration of Exploitation Matters in a R&D Project, following (Harris, 2007, p. 130).

2.3 GUIDELINES OF THE EUROPEAN COMMISSION

The EC requests the compilation of a "Plan for the Use and Dissemination of the Foreground" (PUDF) as a contractual deliverable of the agreed reporting activities within the funded projects (Mc Nerney, et al., 2010, p. 65). Information on the intended exploitation activities is not only given in the final report, moreover, it is an essential part of the continuous reporting and the project proposal (Mc Nerney, et al., 2010, p. 65). Therefore, the different stages of the PUDF can be seen as a consistent evolution. According to the reporting guidelines of the EC, the exploitation activities are summed up in Section B of the PUDF of a project.

Section B includes a specification of the relevant and exploitable foreground generated in the project and plans for the use of that foreground. This information has to be provided in a specific manner: Firstly, aggregated in a table, secondly with an additional text which ought to explain and expand the information given in the chart before. In detail, the provided text should include information about the foreground, its purpose, how the foreground may be exploited, when and by whom it should be exploited, IPR activities, necessary further R&D as well as potentials and expected impacts (European Commission, 2012, p. 24ff.). In other words, the Section B of the PUDF has to include all information necessary to, both, conduct and evaluate a commercialization of R&D-results, i.e. purpose, main features and benefits of each technology, customer detection, features of the target market and positioning strategy (Mc Nerney, et al., 2010, p. 66f.).

2.4 EXISTING FRAMEWORKS FOR EXPLOITATION ISSUES

Harris (Harris, 2007) lines out a rough framework for the exploitation of R&D projects: According to him, the preparation begins by the design of the business case and is followed by the developing of a market understanding and followed by the creation of the exploitation plan. The chronology integration of these phases has been shown before in chapter 2.2. The mentioned exploitation plan can be seen as the Exploitation Strategy for a R&D project. The aspect of composing the Exploitation Strategy should take place towards the termination of the project as it defines the exploitation actions conducted after the project itself. The components of the exploitation plan are in concrete: (Harris, 2007, p. 145)

- The market opportunity
- The route to market
- Additional development requirements
- Standards and accreditation
- The plan for the future

The exploitation plan starts with determining the market opportunity and is based on experience and investigation conducted parallel to the project. It describes the potential customers and tries to quantify the returns. As a second part the route to the market is to be described, i.e. the approach to reach the relevant market segments and potential customer. Furthermore, additional development requirements have to be identified because often R&D projects do not generate a market ready product or service. Often legal constraints and requirements have to be considered in context of the introduction of new products and services. Therefore, potential products and services have to comply with relevant standards and accreditations that have to be identified. In a final step, the plan for the future is to be defined. The plan shall include a visualization of the envisaged exploitation activities and describe the roles of the partners within the process. (Harris, 2007, p. 145ff.)

The approach of Mc Nerney (Mc Nerney, et al., 2010) depends heavily on the structure of the Plan for Use and Dissemination of Foreground of the EC. He recommends creating a section that describes and explains the exploitable results and related activities. In particular, a list of all applied or registered IPR, a list of all research outcomes that might be applicable for commercial purposes and an identification of the individual owner of the considered foreground shall be attached. (Mc Nerney, et al., 2010, p. 66)

Furthermore, a plan which describes how the foreground is going to be exploited needs to be generated. This shall refer to the different types of exploitation, too. Precisely, the proposed value, features and benefits of products and services developed from the foreground have to be specified, potential customers and potentials markets have to be identified and specified quantitatively and the positioning has to be clarified. (Mc Nerney, et al., 2010, p. 67)

2.5 FACTORS FOR SUCCESSFUL EXPLOITATION

Welck (Welck, et al., 2010) determines several key success factors for successful exploitation activities within European R&D projects. The focus is set on Eco-Innovations which are defined as “All relevant innovative technologies supporting the protection of environment and the sustainability of natural resources with the focus on LifeScience (Biotechnology, Food), Environment and Energy” (Welck, et al., 2010, p. 11).

The key success factors for exploitation activities for SME can be defined as"

1. Innovative project idea and call fitted well to the core business of the SME
2. Well defined work plan for exploitation measures and exploitation plan effectively done
3. Strong experience with technology, strong internationalization attitudes and strong project management experience
4. Well managed IPR (protection/access/share)
5. Well structured consortium and strategic partners involved
6. Initiation of the project and coordinating the project
7. Commercialisation methods/market strategy/market access
8. Training for IPR and assistance for exploitation received

." (Welck, et al., 2010, p. 19)

In detail this means:

The fitting of the call, the project idea and the project objectives to the core business of the participating organization is crucial to the success of envisaged exploitation activities, because "Otherwise the motivation for (…) exploitation is not as high as it needs to be for being successful on the market." (Welck, et al., 2010, p. 19). It shall be emphasized that in this context not only tangible, but also intangible results from the project are to be considered (Welck, et al., 2010, p. 19).
A clear work plan for exploitation affairs is necessary to provide transparency and clarity to the project participants. A plan shall be composed as early as possible within a project; however, at an early stage of a project the composition of such a plan may not be feasible. (Welck, et al., 2010, p. 20)
The involvement of partners with strong experience in technology should be balanced with partners with strong internationalization attitudes and expertise referring to project management. In general, a balance between technical and commercial knowledge is to be achieved, as exploitation needs are to be set at least equally valued to technical needs. (Welck, et al., 2010, p. 20)
Defined regulations concerning IPR enable transparency concerning the clear calculation of individual benefits for the project participants in the context of the exploitation phase (Welck, et al., 2010, p. 20).
The involvement of partners with strategic resources and a proper structure of the consortium is crucial in order to success in the exploitation phase. A well structured consortium can be considered as a mixture of complementary expertises. (Welck, et al., 2010, p. 20f.)
Beside the structure of a consortium, the coordination of a project shall be considered in particular, as it is another crucial success factor (Welck, et al., 2010, p. 21).
As mentioned before, both expertise in the non-technical fields and proper planning approaches for exploitation activities are a necessity for success. Especially for the commercial exploitation of R&D results a strong knowledge and experience in commercialization methods, market strategy and market access is necessary. (Welck, et al., 2010, p. 21)

2.6 ROLES IN RESEARCH AND DEVELOPMENT PROJECTS

Companies acting on competitive markets tend to have other motives to take part in an R&D projects than research institutes. Mc Nerney (Mc Nerney, et al., 2010, p. 13ff.) declares mainly the need for innovating existing products, the creation of competitive advantages resulting from R&D, the accessing of new markets and new customers, the contacting of potential business partners and the enlargement of knowledge and expertise as motives for companies to join research projects. Significant benefits particularly for SME are: increases in productivity, skills and know-how, quality of products and services, new products or services and new markets. To sum up, companies seek to achieve competitive advantages on the markets through their participation in R&D projects. Industrial organizations have the constant intention to generate revenues by conducting R&D activities. R&D has the only target to establish either new ways to gain profit or to optimize existing approaches regarding the profitability. (Porath, 2010, p. 117)

In contrary, research institutes do not focus on the utilization of outcomes of R&D projects in order to gain competitive advantages on the conventional markets. Moreover, they "(…) mainly engage in products innovation for the purpose of applying, testing and usually transferring knowledge or technology." (de Weerd-Nederhof & Fisscher, 2003, p. 65). This means that research institutes usually have no intention to act as a protagonist on the competitive markets but focus on exploring and applying knowledge. Bringing products to the market is usually outsourced through the establishment of appropriate collaborations with companies. (de Weerd-Nederhof & Fisscher, 2003, p. 65)

The two core missions of academic organizations can be specified as the preservation and publishing of existing knowledge and the creation of non-existing knowledge through R&D activities (Porath, 2010, p. 109).

Furthermore, it is obvious that research institutes address other stakeholder than companies on the competitive markets do. Focusing on distribution potentials, companies address mainly customers and potential customers, while the situation considering research institutes is not as clear as it is in case of companies. Research and particularly academic institutes do not have well defined customer relationships, while the definition of the major stakeholder is able to bridge this gap at least partly. According to Kesting (Kesting, 2013) the stakeholders usually are professors, scientific and non-scientific personnel, current, graduated and potential students, other universities, scientific communities, partners from the economy, politics, funders, regional communities and the global community.

The goals for academic organizations can be distinguished into non-commercial and commercial target. The non-commercial targets include the ability to employ students, buy equipment, carry out R&D activities, the ability to succeed in R&D issues and publish results, the acquisition of appropriate means to support the collaboration with former students and the establishment of cooperation with the industry for R&D activities and funding. Commercial goals include the funding of R&D activities, the enhancing of R&D infrastructure and establishing license fees through R&D results. (Porath, 2010, p. 53)

3 REVIEW OF APPLICABLE TECHNIQUES AND CONCEPTS

3.1 NEW PRODUCT DEVELOPMENT FRAMEWORK

Beginning with a few definitions, "(…) a "product" is anything referred to as an external marketplace for sale, use or consumption. This includes physical products as well as services, and combination of services and products." (Cooper, 2011, p. 21). "New" describes either a product that has never been made or sold by a company, or a product that has never been on the market in this configuration. Depending on which case is applicable, the product is either new to the company or new to the market.

The development of successful products within organizations, especially enterprises, is not a totally stochastic and non-deterministic process. It is common sense, that successful product development is enabled and enhanced through structured New Product Development (NPD) frameworks (Cooper, 2000, p. 58).

The presented model represents a "(…) conceptual and operational road map for moving a new-product project from idea to launch (…)" (Cooper, 2000, p. 58) and consists of five action stages with specific tasks. Each stage is followed by a gate with specific requirements to control the product development process and, in case a concept does not meet the requirements, to cancel the process (Cooper, 2000, p. 58).

Especially for innovations, such stage gate models are recommended. For the development of completely new products, the application of a spiral stage gate process is appropriate, while incremental innovation processes demand for a linear stage gate process. (Miller, 2006) The application of the components of NPD frameworks can increase the NPD performance significantly when they are executed appropriately (Ahmed & Shepherd, 2010, p. 176f.).

The stages and gates of the model illustrated in Figure 3 can be specified as follows:

Prior to the first stage, discovery and ideation, i.e. *Idea Generation*, has to take place. New product ideas can arise for instance, from technical research, seeking new technical possibilities, working with customers, market and competitive analysis and brainstorming approaches. (Cooper, 2011, p. 103f.)

The first gate, the *Idea Screen*, reviews the generated idea considering feasibility, strategic alignment and market attractiveness. As there are no detailed reflections yet, a sophisticated appraisal is not possible. (Cooper, 2011, p. 104f.)

The first stage is named *Scoping* and includes a preliminary market assessment and a preliminary technical assessment and is finalized by another gate. The preliminary market assessment targets the identification of potential customers, the determination of the market potential and size and to learn about the market acceptance. The preliminary technical assessment considers the proposed product critically regarding technical feasibility, legal and regulatory risks and roadblocks. (Cooper, 2011, p. 106f.)

The following gate, the *Second Idea Screen*, is similar to the first gate. As more information have been gained during the execution of stage one; the requirements from gate one are applied more rigorously. (Cooper, 2011, p. 106)

Stage two is involved with building the B*usiness Case*. The investigative activities from stage two are intensified and the proposed product is clearly defined. This includes the definition of a target market, a concrete product concept with value propositions and features and a positioning strategy. Furthermore, a competitive analysis is conducted, while a prototype of the product is tested and customer behavior is captured. The investigation of the technical feasibility aims to identify whether customer needs can be satisfied with existing technical means. In a final step, a business and financial analysis is conducted in order to anticipate costs and profit. (Cooper, 2011, p. 107f.)

Gate three, *Go to Development*, is the gate prior to the conduction of development activities and therefore the most cost-intensive part of a New Product Development. The activities in the third gate include a review of the activities of the prior stage checking whether or not they met their targeted statuses and the criteria from the gates one and two are applied again more rigorously. Furthermore, the developed business plan, regarding operations and marketing, is reviewed. (Cooper, 2011, p. 109)

Stage three, *Development*, initializes the physical development and/or detailed mapping of the product, depending on if it is either material or immaterial. For the first time extensive work is conducted to bring the product concept to a status where alpha tests can be conducted. Nevertheless, there are marketing and financial activities to conduct parallel to the technical ones. (Cooper, 2011, p. 109f.)

Gate four is considered as *Go to Testing* and represents an instance of checking of the technical progress and the evolution of the market attractiveness. Furthermore, the outcomes of stage three are compared to the desired outcomes referring to the conception of gate three. (Cooper, 2011, p. 110)

Stage four includes *Testing and Validation* and considers not only the product, but also the production and operation processes, customer acceptance and the economics of the project. In particular, in-house tests are conducted, field trials are executed, pilot production and operations are conducted, market tests are conducted and business and financial analysis are revised. (Cooper, 2011, p. 110f.)

Gate five, named *Go to Launch*, "(…) opens the door to full commercialization." (Cooper, 2011, p. 111) and production and distribution will scale up after this gate. Therefore, this gate represents the last possibility to stop the introduction of a new product to the market. (Cooper, 2011, p. 110)

Stage five, the *Launch*, considers the implementation of the market launch plan and the operations plan. Moreover, production facilities will be equipped, production material will be commissioned and the production and the selling will scale up. (Cooper, 2011, p. 110)

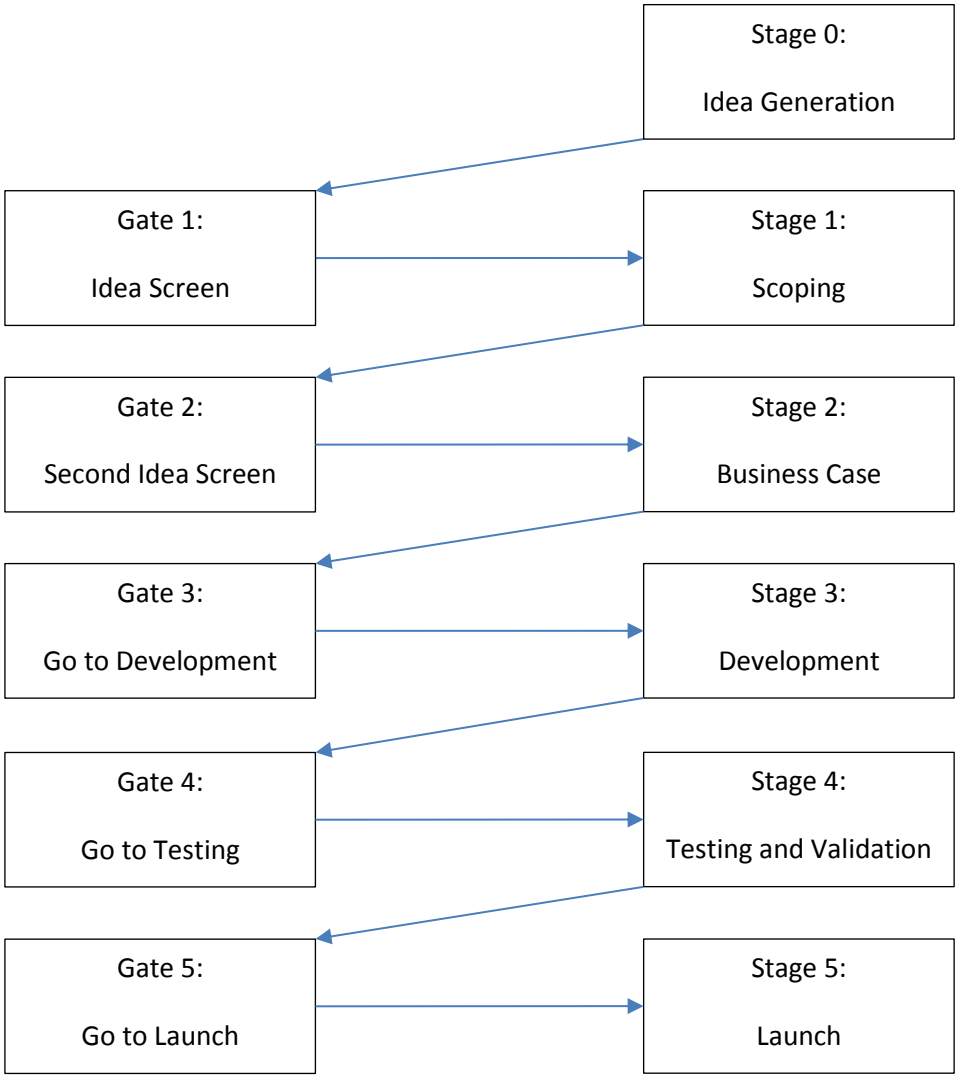

Figure 3: Stage Gate System for NPD, following (Cooper, 2000, p. 102)

3.2 BUSINESS PLANNING APPROACHES

A crucial part of a business plan is the analysis of the industry in which an organization is willing to operate in. Beginning with a definition, the term industry describes "a group of firms producing a similar product or service (…)" (Barringer, 2009, p. 101). The analysis of the industry has to be distinguished from the analysis of the relevant target markets, which represent only a limited share of the whole industry the enterprise addresses. The industry analysis shall lead to a more comprehensive understanding of the industry itself, of its developments, its trends and its future perspectives. A complete analysis includes portrays considering industry definitions, industry characteristics and industry trends. (Barringer, 2009, p. 101)

The industry analysis starts with the Industry Definition, consisting of a brief description of the industry and a categorization according to an international standard scheme: The "International Standard Industrial Classification"-System is approved by the United Nations and provides a clustering of industry activities, while the Statistical Classification of Economic Activities in the

European Community (NACE)[3] provides classifications depending on the schemes of the European Union. Often it is complicated to identify an exact classification, or an enterprise covers more than one business field. In that case the classifications which correspond best with the intended business activities is to be chosen; if necessary more than one (Barringer, 2009, p. 103). This approach prevents disregarding important information.

As a next step, the industry size, growth rate and sales projection as key characteristics are to be collected. By displaying the financial information in a multiyear format, trends can be spotted easily and more information value than with a single expression is provided (Barringer, 2009, p. 105). Furthermore a strong focus on the desired geographical region is to be set. Growth rates should be given on a percentage basis, basing on reliable sources (Barringer, 2009, p. 108f.). Moreover, an Industry Analysis shall always include anticipated sales projections of the industry.

As a second step the Industry Characteristics are to be lined out (Barringer, 2009, p. 109). By considering the industry structure the level of fragmentation within the sector is observed: A large number of small companies - none dominating the market – functions as an indication for a fragmented market. Whereas a concentrate market structure indicates the dominating role of only few companies (Barringer, 2009, p. 109). Furthermore, industries are characterized by the entry barriers which determine the necessary expenditure to enter the market as a new player (Barringer, 2009, p. 113).

In a final step, the Industry Trends have to be identified: After all, they indicate the prospective changes and chances (Barringer, 2009, p. 115). Trends can be distinguished into environmental trends and business trends (Barringer, 2009, p. 116ff.). Environmental trends include the specific trends concerning economics, sociology, technology, politics and regulations. All these factors can have an effect on the industry and its companies both directly or indirectly in a positive or negative direction. Clarifying dependencies is a way to predict impacts on industries caused by environmental changes relatively concrete (Barringer, 2009, p. 117).

Business trends describe trends independent from environmental influences, for instance the evolution of profit margins or the speed of innovation cycles (Barringer, 2009, p. 118).

3.3 LIFE CYCLE THEORY

Granting an ex-post view on the evolution of selected technologies and products, a special pattern concerning the rising and descending can be identified. The life cycle describes four consecutive general stadia: introduction, growth, maturity, and decline. (Baker, 2003, p. 6)

Transformed to technologies the stadia would be: generic research, applied R&D, production scale-up, and technological maturity, illustrated in Figure 4. (Ahmed & Shepherd, 2010, p. 127):

The stadium of the generic research includes fundamental research activities, with no direct commercialization prospects, but from which almost all technologies derive. Nevertheless, given high

[3] The abbreviation derives from the French term “Nomenclature statistique des activités économiques dans la Communauté européenne”

necessity of investments and no guaranteed advantages, generic research is afflicted with high risks and therefore often avoided by enterprises. (Ahmed & Shepherd, 2010, p. 127)

The phase of applied research and development refers to the commercialization and/or exploitation of the results of generic research activities. This stadium includes the conceptualization of generic knowledge to the point of concrete products, services or technologies, further research and the trial and error improvement. In contrary to the generic research, applied research is market-oriented and has therefore lower uncertainties and risks. (Ahmed & Shepherd, 2010, p. 127)

The third stadium, the production scale-up, targets at the development of marketable products and leads to initial versions of future products. It marks the beginning of commercialization. (Ahmed & Shepherd, 2010, p. 127)

In the fourth stadium, the technology maturity, developed products, services or technologies have entered and penetrated the market and the affiliated knowledge spreads to competitors. (Ahmed & Shepherd, 2010, p. 128)

The life cycle technology cannot only be applied to products, services or technologies, but also to markets and the affiliated demands: According to Macdonald and Jinliang (Macdonald & Jinliang, 1994, p. 37f.) the innovation of products is to be timed correctly in order to act successful: An early innovation is able to engrave the market, while a too early innovation faces markets that are not ready to adopt it. Therefore, the evaluation of the maturity of a product, service or technology cannot be seen within in isolated approach, moreover three axes have to be taken into account in order to identify the correct maturity and therefore derive the correct implications: The status of the technical change, the demand and the evolution of the competitive arena. Considering the relationship between technology and market evolution, three possible ratios can be identified which determine predominantly the vendors' behaviors: Precocious market, precocious technology and synchronized market and technology.

In case of a precocious market, large companies dominating the market are to be expected due to high costs affiliated with research and development activities in order to satisfy markets. The early market entry enables relatively reliable predictions considering revenues and costs. (Macdonald & Jinliang, 1994, p. 49)

In case of precocious technology a large number of small companies are to be expected. Due to the delayed markets, a reliable prediction of revenues and costs is hindered and therefore strongly afflicted with uncertainty. (Macdonald & Jinliang, 1994, p. 49)

In case of synchronized markets and technology evolution, a simultaneous development of those is to be discovered. No special conclusion can be stated for that case. Nevertheless, this situation is likely to be a most presumed status in literature, thus, common life cycle conclusion apply. (Macdonald & Jinliang, 1994, p. 49)

The concept of the life cycle cannot be applied to all products and technologies, as it is a theory and therefore natural, that real data are likely to deviate from expectations. Furthermore, the technology life cycle has time-based restrictions: In contrary to the ex-post consideration, an ex-ante prediction of an exact trend cannot be given. (Baker, 2003, p. 7) (Baker, 2003, p. 69)

Furthermore, it has to be emphasized that the technology life cycle describes the status of a generic technology, not the status of the development of a technology within a certain organization.

Nevertheless, the definition of the affiliated current stadium in the technology life cycle helps to give a brief orientation considering the necessary input for further R&D, the competitor behavior, the next phases of the evolutionary process and the current position of the technology.

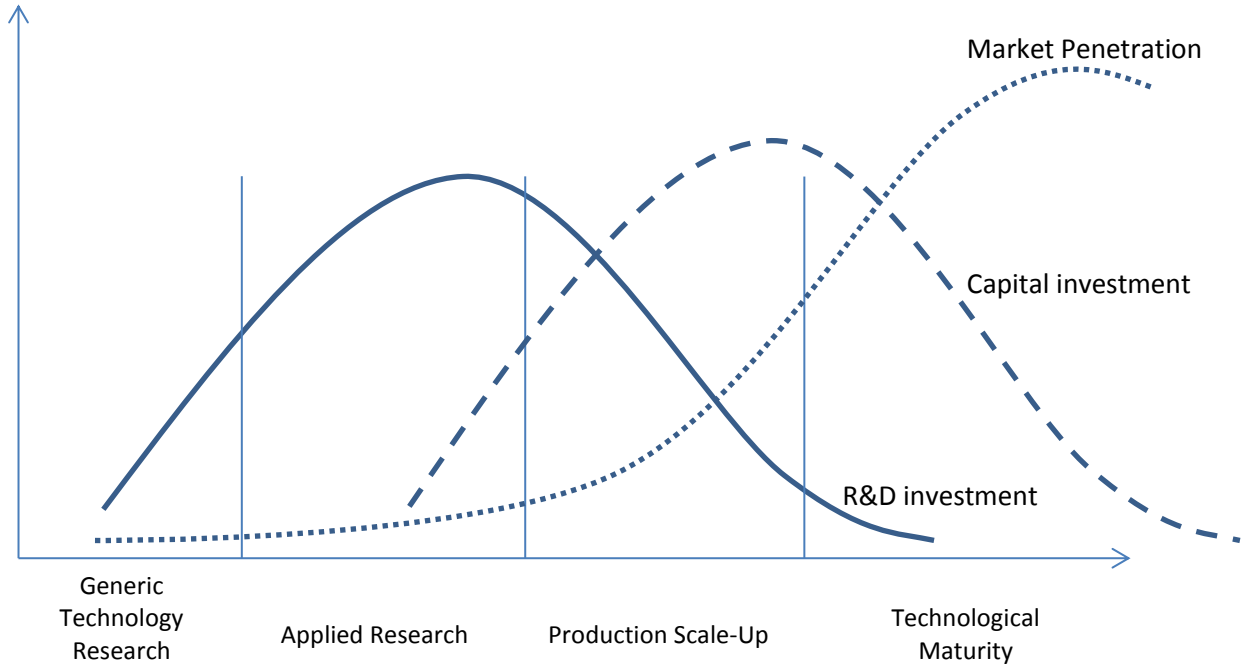

Figure 4: Technology Lifecycle, following (Ahmed & Shepherd, 2010, p. 129)

3.4 BUSINESS MODEL GENERATION

The process of *business model* generation is taken into account in order to meet the call for a simple, understandable but at the same time, well-structured and applicable planning approach.

The chosen business model describes the logic and strategy of a business by using nine blocks (i.e. Customer Segments, Value Propositions, Channels, Customer Relationship, Revenue Streams, Key Resources, Key Activities, Key Partnerships) which, all together cover four main areas, respectively categories (in detail: customers, offer, infrastructure, financial viability). (Osterwalder & Pigneur, 2010, p. 15ff.)

<table>
<tr><td rowspan="2">Key Partners</td><td>Key Activities</td><td rowspan="2">Value Propositions</td><td>Customer Relationships</td><td rowspan="2">Customer Segments</td></tr>
<tr><td>Key Resources</td><td>Channels</td></tr>
<tr><td colspan="3">Cost Structure</td><td colspan="2">Revenue Streams</td></tr>
</table>

Figure 5: Visualization Structure of the Business Model, following (Osterwalder & Pigneur, 2010, p. 44)

The optional visualization shown in Figure 5 provides well-arranged tables including the nine essential blocks. By this mean, both presentation and clearness is assured. Furthermore, it is emphasized that the model is suitable for beyond-profit models: Even if such concepts are not profit-driven, there is the necessity to create value to cover expenses. In cases of third-party funded models, product or service customers are not necessarily paying direct compensations to the provider. (Osterwalder & Pigneur, 2010, p. 264)

"The *Customer Segments* Building Block defines the different groups of people or organizations an enterprise aims to reach and serve" (Osterwalder & Pigneur, 2010, p. 20). At the center of enterprises' attention should always be the customers' needs in order to meet its expectations. Without that focus success is hardly possible, respectively not on the long run. One business model can contain several Customer Segments, separated by their needs, Distribution Channels, types of relationship, profitability and abilities to afford price limits and therefore, have to be handled individually. (Osterwalder & Pigneur, 2010, p. 20)

Customer Segments can be summarized in different types:

The Mass Market represents a large group of customers with similar needs and requirements and does not differentiate segments. The Niche Market has a strong focus on just one specialized segment with its individual needs and requirements. The Segmented Market represents several Customer Segments which are not completely the same, but tend to be very similar in requirements and needs. Often there are only few separating characteristics to be identified. Diversified markets are categorized by completely different Customer Segments with different needs and requirements. A Multi-sided platform seeks to serve several Customer Segments with different needs and requirements. (Osterwalder & Pigneur, 2010, p. 22)

"The *Value Proposition* Building Block describes the bundle of products and services that create value for a specific Customer Segments." (Osterwalder & Pigneur, 2010, p. 22). Thus, the proposed value is the major reason for a customer to acquire a product or service according to his expectation towards the product or service and according to his specific needs and requirements. Proposed Values can be categorized either quantitatively or qualitatively. Furthermore, the distinction can be made between Newness, which describes the satisfaction of former unknown needs or requirements, between performance, which describes the improved satisfaction of needs or requirements compared to currently available products and services, and Customization, which describes the more targeted satisfaction of needs and requirements of specific customer segments.

“The *Channels* Building Block describes how a company communicates with and reaches its Customer Segments to deliver a Value Proposition” (Osterwalder & Pigneur, 2010, p. 26). Once an organization has chosen its Value Proposition, the channels to transport the proposition to the targeted Customer Segments have to be specified. Due to specific communicational behaviors, most Customer Segments have to be informed by separate und individual Channels. Communication in this context includes the five channel phases: Awareness, Evaluation, Purchase, Delivery and After Sales. Channels can be owned by the organization or by partners and act direct or indirect. (Osterwalder & Pigneur, 2010, p. 26f.)

“The *Customer Relationship* Building Block describes the types of relationship a company establishes with specific Customer Segments” (Osterwalder & Pigneur, 2010, p. 28). Disregarding the reason for communication, e.g. customer acquisition, customer retention or boosting sales, the type of relationship with a customer can be classified by the level of personalization, which determines among others the costs for maintaining relationships (Osterwalder & Pigneur, 2010, p. 28f.). The “dedicated personal assistance” is the most personal occurrence of relationship whereas, in contrast to the “personal assistance”, a specific customer representative is assigned to a specific customer. “Self service” and “automated services” involve no personal assistance from the provider, while “Communities” promote the interaction between customers. (Osterwalder & Pigneur, 2010, p. 29)

“The *Revenue Streams* Building Block represents the cash a company generates from each Customer Segment (costs must be subtracted from revenues to create earnings)” (Osterwalder & Pigneur, 2010, p. 30).

Revenues can be accounted on a transactional basis with a single customer payment or on a recurring basis with ongoing payments. The latter can result from ongoing value proposition or customer support. (Osterwalder & Pigneur, 2010, p. 30)

Popular ways to generate revenue streams are asset sales, usage fees, subscription fees, lending/renting/leasing fees, licensing fees, brokerage fees and advertising fees (Osterwalder & Pigneur, 2010, p. 31f.). The described ways may involve different pricing mechanism, they can be categorized in fixed menu pricing with predefined prices, and dynamic pricing with market based price changes. Fixed Menu Pricing can be represented by list prices, product-feature-dependent prices, customer-segment-dependent prices and volume-dependent prices. Dynamic Pricing is represented by negotiation-based pricing, yield management pricing, real-time-market pricing and auctions. (Osterwalder & Pigneur, 2010, p. 33)

“The *Key Resources* Building Block describes the most important asset required to make a business model work” (Osterwalder & Pigneur, 2010, p. 34). Key Resources can occur in a great variety, e.g. in a physical manner as facilities and systems, in a financial manner as cash or guarantees, in an intellectual manner as brands, knowledge, databases and IPR or in a human manner as involved personnel. They can be located within the acting organization or acquired from key partners. (Osterwalder & Pigneur, 2010, p. 34f.)

“The *Key Activities* Building Block describes the most important things a company must do to make its business model work” (Osterwalder & Pigneur, 2010, p. 36). Key Activities are not only essential to conduct the intended business operations successfully – mostly they represent the core business field (Osterwalder & Pigneur, 2010, p. 36). They can be categorized to be production in order to fulfill all necessary operations from designing to manufacturing, problem solving in order to cope with

customers' problems and issues and platform/network in order to operate platform services in multiple patterns. (Osterwalder & Pigneur, 2010, p. 37)

"The *Key Partnerships* Building Block describes the network of suppliers and partners that make the business model work" (Osterwalder & Pigneur, 2010, p. 38). Partnerships can be distinguished into the four kinds of strategic alliances: buyer-supplier relationships, joint ventures and coopetition, whilst only the latter is established between competitors (Osterwalder & Pigneur, 2010, p. 38). Partnerships are established with the intention to achieve effects of optimization and economy of scale, reduction of risk and uncertainty and the acquisition of particular resources and activities (Osterwalder & Pigneur, 2010, p. 39).

"The *Cost Structure* describes all costs incurred to operate a business model" (Osterwalder & Pigneur, 2010, p. 40).They result mainly from the cost determined by the prior mentioned blocks (Osterwalder & Pigneur, 2010, p. 40).

Cost structures can by distinguish by the strategy an organization pursues: Cost-driven structures target to minimize the incurring costs, whilst value-driven structures focus on the proposition of high value products (Osterwalder & Pigneur, 2010, p. 41).

3.5 SOFTWARE PRODUCTS

Pricing models for software products may differ from the models for conventional, material products: In contrary to material products, variable costs for the production of software can be neglected. Predominant costs of software products are determined by their development and maintenance. These principles are clarified in the following.

Software products can be distinguished in individualized software products and standardized software products: Individualized software is built to the individual needs of a client, while standardized software is developed generically and is not altered to comply with the needs of an individual client. There are software products with hybrid characteristics, e.g. widely standardized software that is tailored partly to individual needs. As individualized software development requires high resources it is affiliated with high cost, while standardized software products causes significantly less costs. The mentioned hybrid forms of software are approaches to combine cost reduction of standardized software development and complying with individual needs. (Buxmann, et al., 2011, p. 5ff.)
Within the value chain of software products, four roles can be identified: creators, distributors, lessors and broker. Creators design and develop new products, while distributors hold property rights and products, either self-developed or acquired. Lessors do not sell products but rights for the usage, e.g. licenses, broker act as intermediates between offers and demands. Nevertheless, distinctions are not always as clear as they are described in this definition. (Malone, et al., 2006, p. 7)

As software products are immaterial products, software companies generate revenue streams through licenses and services. In particular maintenance services generate high periodical revenue streams up to 20% of license fees per year, while licenses itself generate only non-periodical revenue streams. Nevertheless, license fees create higher profit margins. (Buxmann, et al., 2011, p. 20f.) Software products can be distributed directly or indirectly, i.e. either in-house or outsourced. Especially for complex products with a high demand for personal assistance direct distribution

channels are convenient, while standardized software products are likely to be distributed indirect. While the direct distribution shows advantages considering companies with only a few customers, indirect distribution methods are likely to be more efficient in cases of companies with numerous customers. (Buxmann, et al., 2011, p. 89)

4 METHODOLOGY FOR EXPLOITATION STRATEGY GENERATION

4.1 GENRAL PROCEDURE

The scope of this chapter will be to determine a complete methodology for the generation of an exploitation strategy. Due to its structured design the methodology then can be applied on various kinds of projects. Prior to the concrete arrangement of such a methodology it is necessary to explicitly define the involved components. For that purpose the consideration will refer to a deterministic process based view, i.e. the connection of two or more static states by dynamic sequences of action. States are represented by information including no actions, while sequences represent actions to be carried out.[4]

So far it can be defined that a process includes an initial state and a desired target state, respectively a number of intermediate states. Therefore, in a first step an initial state and a target state are to be defined. Subsequently, theses states have to be connected by a concrete sequence in a second step. Depending on the occurrence of intermediate states, this has to be repeated until the first and last states are completely connected. Figure 6 shows a process of an initial state, a final state, an intermediate state and two connecting sequences.

The desired methodology includes the proper definition of all static states as well as it defines the connecting sequences.

Nevertheless, it shall be emphasized that all states and sequences are considered under reference to the structure of R&D projects, especially those funded by the EC.

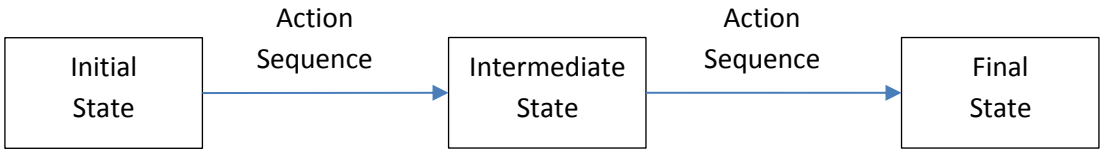

Figure 6: Process of 3 states and connecting sequences

4.2 DEFINITION OF PROCESSES

As it has been already stated, the methodology to be developed shall be roughly aligned to the regulatory provided by the EC: Besides its functions as coordination and planning instrument for the utilization of outcomes of R&D projects, the Exploitation Strategy represents a crucial deliverable within such projects funded by the EC. Therefore, it appears logically to align the general structure of the Exploitation Strategy and therefore the one of the methodology to the guidelines of the EC presented in chapter 2.3. Hence, the general structure of the Exploitation Strategy will include two major sections: One section deals with the identification of exploitable foreground, the other section

[4] The described process based view refers to the critical path method that is used in the field of project management (Corsten, et al., 2008, p. 120ff.).

deals with the provision of a plan for the exploitation of the mentioned foreground. The first section predominantly focuses on the project internal affairs, i.e. without the consideration of circumstances outside the project. The project characteristics will be analyzed in order to identify the relevant foreground.

In a second step, the following section takes external affairs into account. This is necessary when it comes to defining the plan for the use of the foreground since exploitation addresses certain entities, and therefore their behavior has to be considered. Emphasize is to be set on the first section which contains relevant foreground as initial point for proceeding to section two. Due to the sequential nature of these two sections – information generated in the first section is taken into account to generate content for the second section – an alignment as a sequence is reasonable. Therefore, referring to the mentioned process based view, the identified exploitable foreground shall be an initial state, and its final state is the plan for the exploitation of the mentioned foreground. The connecting process will be a planning sequence as shown in Figure 7.

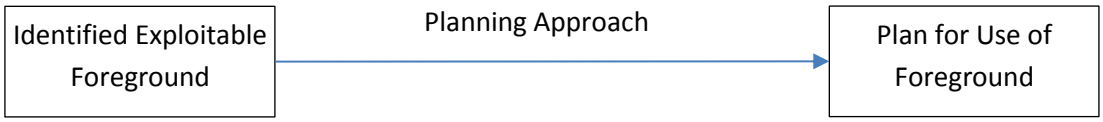

Figure 7: First approach of the methodology

Considering the identification of exploitable foreground it seems obvious that this state is not existent without further actions: Although the exploitable foreground results directly from a R&D project, it is just a subset of the whole outcome of a project. Coming from the project documentation, which is representing the aggregated information about a R&D project, an approach about how to identify the relevant foreground, i.e. exploitable, has to be implemented. Taking a process based view into account, the project documentation represents the initial state and the identified exploitable foreground represents the final state. Both are connected by an identification approach as shown in Figure 8.

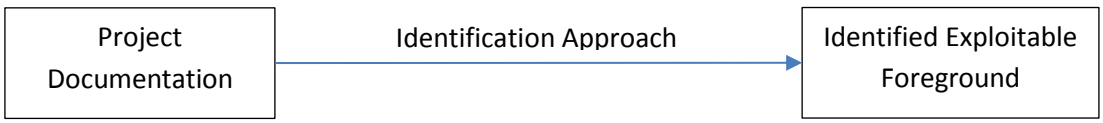

Figure 8: Second approach of the methodology

As it was intended to provide one proper approach for a methodology the two presented processes shall be joined together. As a matter of fact, it is helpful that the final state of the second process matches with the initial state of the first process and the connection of both can be easily realized. During the joint the connecting state is downgraded to an intermediate state. The resulting process

shown in Figure 9 already represents the structure of the methodology and therefore determines the procedure for generating an exploitation strategy.

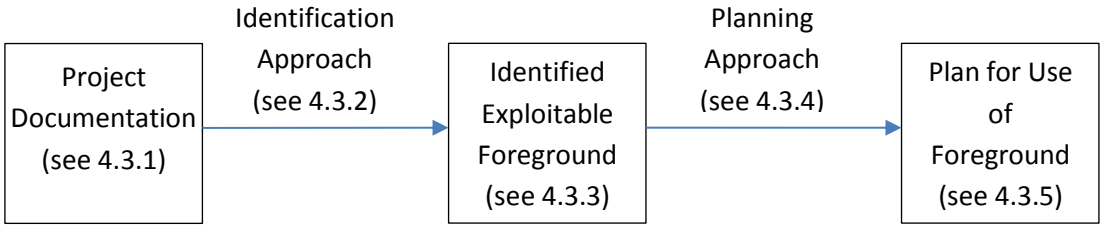

Figure 9: Final approach of the methodology

4.3 DEFINITION OF STATES AND SEQUENCES

4.3.1 INITIAL STATE: PROJECT DOCUMENTATION

R&D projects are accompanied by extensive documentation; a subset regarding guidelines of the EC was mentioned earlier in chapter 2.3. Knowledge that has been generated within projects funded by the EC is indexed according to a structured approach: Actions are categorized in work packages, the outcomes of such work packages are represented by deliverables. Furthermore, the project scope, course, consortium and rough estimates for exploitation activities are already defined in documentations as they all had to be declared during the application for funding of the EC. Therefore, the extensive information about the project represents the initial state and starting point for the actions described in the first sequence.

4.3.2 SEQUENCE ONE: IDENTIFICATION APPROACH

The first sequence is ought to connect the initial state (represented by the project documentation) with the intermediate state (represented by the identified exploitable foreground). The sequence focuses on the consideration of the project internal documents, identifying relevant information and providing structured approaches to extract and illustrate the desired information. For that purpose, this part of the sequence is split into two parts: In a first step, the project itself is being analyzed, while in a second step the project consortium is analyzed.

Furthermore, this sequence finally provides an approach of how to identify exploitable foreground from the project documentation. Prior to that, the relevancy of foreground is defined.

4.3.2.1 ANALYSIS OF THE PROJECT

The need to analyze the project in order to extract the foreground generated from the project is essential. However, this is not the only reason why the project shall be considered in detail.

Exploitation activities are based directly on the foreground generated in the considered R&D project. Therefore, it is inevitable to gain insight in the project, i.e. its objectives, the plan how to achieve

objectives and the plan to manage issues, the intended outcomes of the project and the affiliated technologies.

As IPR have a special relevancy for the success of R&D projects, particular focus is to be set on them: Research considered in chapter 2.5 shows that a well-managed IPR (protection/access/share) represents a key success factor for effective exploitation: Within R&D projects, IPR aim to mark which foreground belong to what participant and therefore, which project participants can benefit from it. Furthermore, IPR manage the use of background, joint ownership, transfer of ownership etc.

As a second step, it is to be clarified if there are yet plans for exploitation activities. Chapter 2.5 shows that a well-defined work plan for exploitation measures and exploitation plan effectively done is a key success factor: Both a structured plan and specific tasks of the individual project participants for exploitation activities shall be provided as soon as possible. By analyzing existent plans and strategies, prospective strategies and plans can rely on the affiliated facts and prevent inconsistencies.

Furthermore, an analysis of the project scope helps to understand the objectives of the project, the applied technologies and the considered circumstances. All that together will enable a better and more holistic view on the project and affect directly the decisions made regarding exploitable foreground and the respective plans for the use of foreground.

4.3.2.2 ANALYSIS OF THE CONSORTIUM

A basic knowledge about the project partner is to be acquired as a preliminary step, since this knowledge will become necessary in further stages. Besides a list of all project participants it also includes the individual motivation and objectives for each participant to join the R&D project. On this basis it can be anticipated in which kinds of exploitation mentioned in chapter 2.1 the individual project participants are interested in and which ones are convenient. Chapter 2.5 shows that the congruency of existing business field and aspire exploitation fields is crucial for the success of exploitation activities.

In particular the exploitation intentions of companies have to be distinguished from those of research and academic facilities. As companies always aim to generate competitive advantages, whether directly through the creation of new products or services, or indirectly through further research towards innovation and optimization, research and academic facilities do not so. As a first reference, intentions of such organizations can be partly derived from the stakeholder group presented in chapter 2.6. Therefore, it can be stated that research and academic institutes are not interested in the commercial exploitation of the foreground, but are gaining possibilities for further research and funding and to build networks.

Furthermore, it has to be clarified which specific in- and output the individual participants are able and willing to give and, on the other hand, expecting to resume. Input considers those resources a participant brings into the project; for instance, expertize, knowledge, IPR, existing products and services and contacts. Whereas output represents the advantages a participant expects, for instance, commercial benefits, competitive advantages, or knowledge as initial point for further knowledge. Particular attention needs to be paid to commercial project partners and their individual business segment. Both the determining of individual input factors and specific business field shall secure a

balanced expertize and competence portfolio and as this is according to chapter 2.5 necessary to conduct successful exploitation activities

4.3.2.3 IDENTIFICATION OF RELEVANT DELIVERABLES

As a first step, is has to be clarified how foreground can be made describable and quantifiable: As a matter of fact, foreground describes the knowledge generated within a specific R&D project and is therefore on the first sight intangible. Due to the nature of intangible knowledge a further treatment is hardly feasible and can only made possible by an externalization of the knowledge. Fortunately, this is an essential part of the documentary that is accompanying R&D projects funded by the EC. Foreground is generated structured within the work packages of a project and represented by the outcomes of them. These outcomes are precised and recapitulated in so called deliverables. Therefore, the identification of relevant foreground will happen through the identification of relevant deliverables.

Still, the question which deliverables should be considered as relevant remains. It seems reasonable to orientate the relevance of a deliverables according to its level of usefulness for exploitation activities. As there are no definite exploitation activities defined yet, a reference to the possible types of exploitation will suffice. Referring to chapter 2.1 exploitation activities are mainly represented by the development of new products, services and processes and the conduction of further research activities.
It is reasonable, to emphasize on those deliverables that offer real innovation, no matter in what kind that may be:

As a first step, all deliverables affiliated with management and organization tasks concerning the project can be deleted. The importance of such tasks for the course of a R&D project may be indisputable while they have no relevance in context of exploiting their results.

Furthermore, the majority of all research processes are accompanied by not only one deliverable, for instance, initial versions of documents that already exist. In context of exploitation only the definite outcomes of the project are relevant, not the course, therefore initial versions can be excluded.

Moreover, documentations and related documents may not always be relevant for exploitation issues, in case they are just describing the knowledge contained in research issues and represent an undesired redundancy.

These three factors determine the relevance of a deliverable: Only if a considered deliverable is affiliated with real research activities, represents not just an initial version and does not illustrate redundant knowledge, it is to be considered in the further proceeding.

4.3.3 INTERMEDIATE STATE: IDENTIFIED EXPLOITABLE FOREGROUND

The intermediate state is the direct result of the prior conducted identification sequence: It specifies the exploitable foreground of the considered R&D project represented by the according deliverables. Additionally, the foreground is presented and explained in detail.

The intermediate state has two functions within the Exploitation Strategy: On the one hand, the intermediate state terminates the first process and represents one crucial deliverable resulting from the requirements for project reporting, on the other hand, the intermediate state starts the second process and therefore marks the initial process for the generation of the final state, the plan for the use of foreground.

4.3.4 SEQUENCE TWO: PLANNING APPROACH

4.3.4.1 GENERAL PROCEDURE

The exploitation framework of Harris presented in chapter 2.4 seems not to be suitable to compose an entire exploitation strategy. The mentioned framework is to be regarded more as a definition of the content of an exploitation strategy, rather than a manual of how to catch and generate this content. The concept of Mc Nerney, also explained in chapter 2.4, is afflicted with the same problems as it offers just a listing of necessary content of the plan for the use of foreground without providing applicable approaches.

Moreover, both concepts neglect one important step that is necessary to conduct before a plan for the use of foreground can be composed: Based on the outcomes of the prior process (i.e. the exploitable foreground) certain concepts, e.g. in the following products, services or issues for further research, have to be defined. Only if those concepts are defined properly with sophisticated methods, a further plan can be composed. Unfortunately, this important step gains no attention in the mentioned literature as the evaluation in chapter 2.4 shows: There are no further structured concepts on how to generate exploitation strategies that offer an applicable framework for the instant issue. Nevertheless, an appropriate solution for this problem has to be found.
For that purpose, the process of the definition of a new concept shall be treated like a new product development as it is applied in companies: Since the ability to innovate and introduce new products has always been essential to them, the new product development is a matter that has been discussed intensively by the scientific community. One of these outcomes, the stage gate process presented in chapter 3.1, will be applied in this thesis in order to generate concepts for exploitation content.
For that purpose, the first two stages of the stage gate model will be taken into account as a general proceeding, as the following stages and gates go beyond terms of planning but handle the concrete realization of new products. Although this will not be considered in this methodology, the neglected parts may serve as an instrument for further conduction of exploitation activities that go beyond planning.
The tasks resulting from the considered structure will be conducted under utilization of other sophisticated methods and tools coming from the fields of business planning. Therefore, the proceeding begins with an industry analysis based on the outcomes of the project analysis from chapter 4.3.2.1. A sophisticated and structures scheme was given in chapter 3.2 and will be taken into account. Bringing together industry trends from the analysis and relevant foreground from the prior chapter, concrete concepts arise. These concepts are analyzed regarding their maturity referring to the theories presented in chapter 3.3. In a next step the concepts are assigned to the project participants who may be most suitable for the exploitation conduction.

Of course the applicability of the concept is somehow limited wherever non-commercial aspects. This might apply, for instance, regarding exploitation intentions and activities with internal characterization. Nevertheless, the general structure can be used in such cases, too, even if not all aspects can be specified.

4.3.4.2 INDUSTRY ANALYSIS

As already mentioned, the first stage of the stage gate process includes a preliminary market assessment and a preliminary technical assessment. Since the latter represents a review of the technical possibilities, it shall be set equal to the identification of exploitable foreground declared in the intermediate state described in chapter 4.3.3.

The market assessment still has to be carried out: The scope of the industry analysis is to gain an insight into the relevant market. Since the definition of relevant markets is a crucial part of the project documentation, they have been already assessed within the analysis of the consortium described in chapter 4.3.2.2. More on, the proposed structure in chapter 3.2 begins with a clear definition of the relevant markets and industries. As a next step, these industries are described in detail considering their qualitative and quantitative characteristics as well as their current and prospective trends.

The outcomes of the industry analysis show on the one hand, in which industry potential customers could be found and quantify the potential market, and on the other hand the analysis identifies business trends, enables prediction concerning the needs of the market and the concept acceptance in the following.

4.3.4.3 CONCEPT DEFINITION

The definition of concrete concepts corresponds with the second stage of the applied stage gate process. Within the stage gate process, this stage is called *building the business case* and includes a clear definition of a product based on the results of the prior actions. Therefore, the process of concept definition functions as the joining of the evaluated demands of the market and the society resulting from the industry analysis from chapter 4.3.4.2, and the outcomes of the project, represented by the relevant deliverables identified in chapter 4.3.2.3 and specified in the intermediate state described in chapter 4.3.3.

In contrast to development activities conducted in companies, on which the NPD framework focuses, the direction for the described definition of products in this thesis cannot be chosen freely and independently: A rough direction for the definition of concepts is already given since the products and services (being defined in the further procedure) derive directly from the results of the R&D work, represented by the exploitable foreground. Therefore, it seems reasonable to adapt the proposed proceeding as shown in Figure 10:

In a first step, possible products and services, that could be elaborated from the exploitable foreground, shall be defined. In a second step, the defined concepts will be compared with the aggregated industry trends to assess whether they are able to satisfy the market needs. This comparison determines the concept quality and ensures that the developed concepts fit to the

market needs and whether they are in principle able to success on the market. Concepts that do not fit to the market shall be terminated.

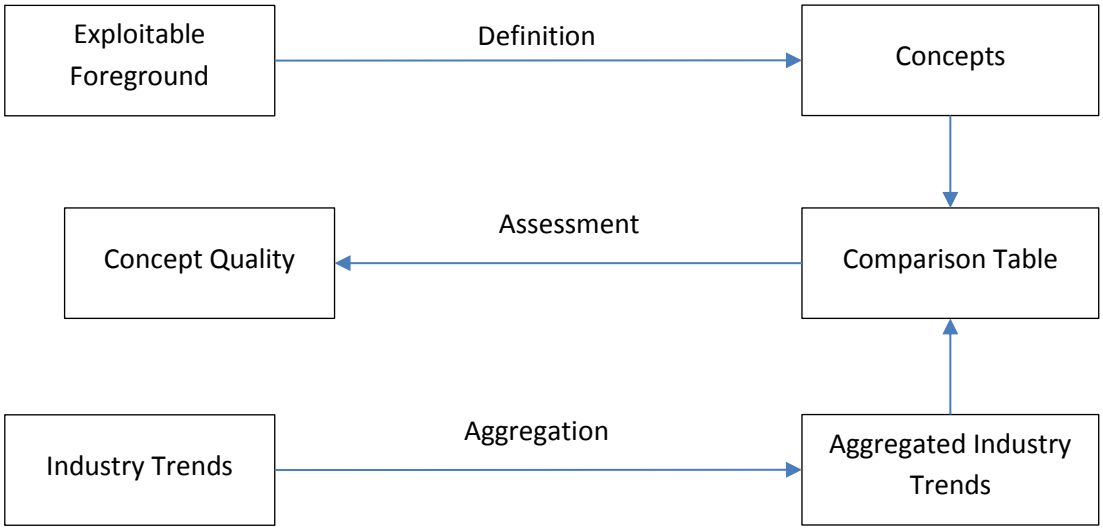

Figure 10: Process of the Concept Definition

4.3.4.4 MATURITY ASSESSMENT

During the maturity evaluation, the status both of the technology affiliated with the proposed concepts and the related market are assessed. For this purpose, the life cycle theory presented in chapter 3.3 will be taken into account. As already mentioned, the lifecycle theory shall not be misunderstood as an exact predictive tool for the prospective evolution of products or markets. Nevertheless, the theory enables a rough classification of the status of a product and technology in the context of its life cycle. By this, elementary predictions about the qualitative evolution of the considered product or technology can be made. This gives evidence about the amount of necessary further research.

The maturity evaluation of products and technologies is particularly useful in context of the maturity evaluation of markets. The market evaluation itself gives evidence about the prospective acceptance of the new technology or product. As shown in chapter 3.3 the relation between these two maturity levels gives evidence about the structure of the market and enables further conclusion about the market evolution.

4.3.4.5 ASSIGNMENT OF CONCEPTS TO PROJECT PARTNERS

Organizations have different intentions for participating in R&D projects, depending on the business they conduct. Research and academic institutes pursue other objectives than competing companies do. A brief summary of a few roles of project partners was given in chapter 2.6. Consequently to the different roles, project partner pursue different intentions regarding exploitation. Furthermore, the

congruency between the conducted business fields of an organization and the success in exploitation activities was explained in chapter 2.5.

These two facts have to be taken into account in order to find a reasonable approach in order to assign specific products and services to the individual project partners. Therefore, project partners should conduct the exploitation activity, which fits best to their core business field. This means, that organizations affiliated with educational and research activities shall take over such activities and avoid acting as competitive players on the regular market. Instead, they should focus on competitiveness concerning performance in research and educational matters. Actions on the regular markets, like the introduction and selling of new products and services, shall be taken over by organization that are familiar with such actions and have certain experiences. Furthermore, as the described activities represent common business to such organization, they can revert to formerly established contacts and have already available necessary resources. Precisely, the mentioned process is illustrated in Figure 11: The defined concepts have been generated in a prior step. Depending on their exploitation character the individual requirements to successfully exploit them have to be specified. The competencies of the consortium have already been specified within the first sequence of the methodology in chapter 4.3.2.2. By comparing these two data within a comparison table, the abilities for the respective subset of the consortium to operate a defined concept can be assessed. In a last step, the concepts are assigned to the partner of the consortium with the highest probability to operate best.

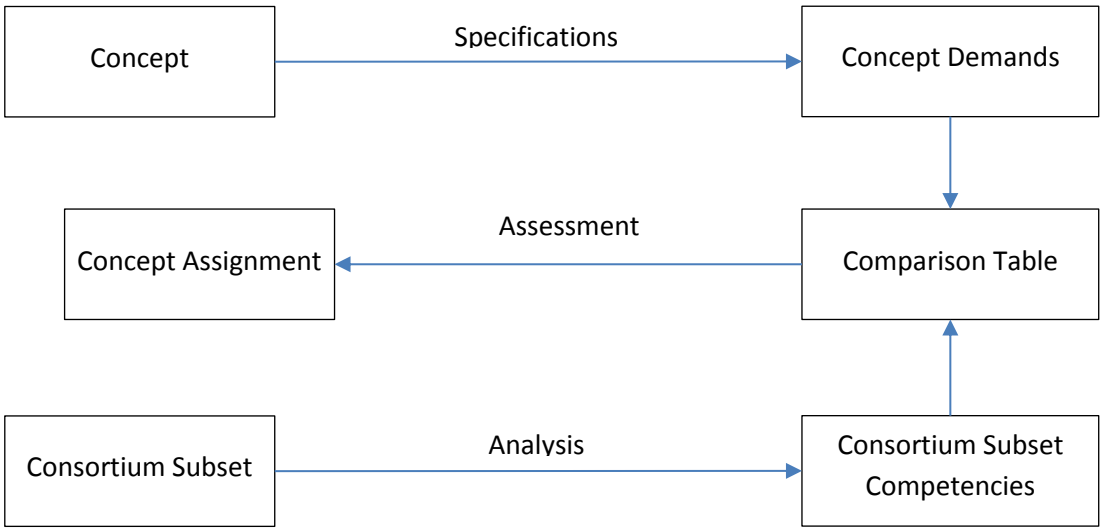

Figure 11: Process of the Assignment of Concepts

4.3.5 FINAL STATE: PLAN FOR THE USE OF FOREGROUND

The plan for the use of foreground marks, as final state, the termination of the given process, i.e. it ends the methodology for the generation of an exploitation strategy. Within this state, an aggregated view on the information gathered from the second sequence is to be provided, as the EC does not define the art of presentation of the plan for the use of foreground in detail. Referring to the reporting guidelines mentioned in chapter 2.3 the EC demands, based on the identification of the foreground, a declaration of the use and purpose, necessary further research, IPR exploitable

measures and potential and expected impacts. Summing up these requirements, the EC demands for a kind of business plan referring to the project outcomes.
The business model approach presented in chapter 3.4 offers an aggregated and structured framework for the presentation of such a plan. As the level of specificity regarding the information given through the model is flexible it complies with the requirements for its utilization: Since the exploitation strategy depends on the current project development, it is likely to elaborate and change during the project course. Thus, the flexible presentation eases updating and adjusting the information given in the model. In the following, the mentioned business model is adjusted to the given use case, as it has not been originally developed for the use in context of R&D projects. In particular this means, contents of the building blocks are specified appropriately and altered respectively expanded where necessary. Furthermore, it is determined, from which part of the proceeding sequence the information is resulting from.

The model for the exploitation approaches refers to the model presented in chapter 3.4. However, the term business model suggest that an exploitation is always affiliated to the conduction of a business which is certainly not true: The variety of possible types of exploitation activities have been described in chapter 2.1 showing that exploitation does not necessarily lead to concrete business approaches. Therefore, the business model illustrated in Figure 12 shall be named *Exploitation Model* from here.

The customer segments define certain groups that are expected to consume the proposed values. The term “consume” leads again to the misunderstanding that in case of exploitation a business will be conducted. However, the term exploitation is just describing the fact that someone uses foreground to create benefits from it. As shown in chapter 2.1, this does not necessarily mean the distribution of products and services. Therefore, the alternated model will specify *Value Beneficiaries* in order to describe the segments benefiting from the value proposition. In particular this means, it defines for whom the organization is creating the proposed value.
Moreover, the customer segments presented within the business model in chapter 3.4 have to be expanded as the set of customers do not always comply with conventional concepts of product and service allocation: There are organizations engaged in R&D projects, such as educational and scientific institutes; they do not address conventional sets of customers. Nevertheless, these segments are crucial to consider. Additionally, the set of possible customers resulting from the industry analysis are described in chapter 4.3.4.2.

The *Value Proposition* sums up what an organization is offering to a potential customers, i.e. which customer needs and problems it is satisfying, respectively solving. The proposed value is a direct result from the combination of the identified industry trends that shall be responded, the competencies of the consortium and the project outcomes, i.e. it is resulting from the concept definition mentioned in chapter 4.3.4.3. Deviating from conventional view, potential customers can also be found within the organizations that are offering value propositions.

Through *Channels* potential beneficiaries are addresses and made aware of the proposed value and may evaluate and purchase it. This refers directly to one type of potential customer described in the value beneficiaries.

Value Beneficiaries Relationships describe the type of interaction between an organization and its beneficiaries that is intended to be established. The type of relationship results from the type of

exploitation that is conducted, i.e. the concept definition from chapter 4.3.4.3, and the addressed value beneficiaries.

Revenue Streams actually describe the paying-related behavior of customers. As already mentioned, value beneficiaries in the considered matters differ from conventional cases. So does the occurrence and range of revenues streams: Especially for non-profit and third party funded business models the revenue streams are not always as obviously as they are in cases of the commercial distribution of products and services.

The *Key Resources* describe required resources to realize the proposed value and to realize the mentioned distribution channels, customer relationships and revenue streams. Therefore, they depend directly on the mentioned aspects.

Key Activities define further actions that need to be conducted in order to realize the mentioned value propositions, distribution channels, customer relationships and revenue streams. Therefore, they depend directly on the mentioned aspects.

Key Partnerships are represented by other organizations that provide required resources or competencies. The majority of these dependencies are inside the project: In context of the development of products and services based on the outcomes of R&D projects this focuses on the relevant IPR-Holder within the project and is affected by the IPR arrangements. Furthermore, there might be more dependencies in the further project course, e.g. for testing and validating. Additionally there may be partners outside the consortium that offer resources and competencies that are required or desired, especially for the market exploitation. In cases of IPR issues, relevant arrangements can be extracted from the relevant contracts accompanying the project, aggregated by the approach of chapter 4.3.2.1, and the competencies and expertizes of the partners, analyzed by the approach presented in chapter 4.3.2.2.

The *Cost Structure* gives a first overview concerning the relevant cost driver of an intended product or service and is therefore directly related to the kind of business that is intended. In particular, this refers to the processes that are necessary to generate the proposed value and is therefore dependent on the defined concept from chapter 4.3.4.3.

Furthermore, the presented business model shall be enhances by one additional component: Since the original business model is designed to aggregate the characteristics of the business conducted by one organization, it has no further relation to the business model driver. In contrary to this situation, the designed concepts for the exploitation of a R&D project refer to the whole consortium, although not the whole consortium will necessarily conduct the business. Therefore, it is necessary to indicate the *Operator* of the business model.

<table>
<tr><td colspan="5">Operator</td></tr>
<tr><td rowspan="2">Key Partners</td><td>Key Activities</td><td rowspan="2">Value Propositions</td><td>Value Beneficiaries Relationships</td><td rowspan="2">Value Beneficiaries</td></tr>
<tr><td>Key Resources</td><td>Channels</td></tr>
<tr><td colspan="2">Cost Structure</td><td colspan="3">Revenue Streams</td></tr>
</table>

Figure 12: Visualization of the Structure of the modified Business Model

5 EXPLOITATION STRATEGY FOR E-SAVE

5.1 IDENTIFICATION OF EXPLOITABLE FOREGROUND

5.1.1 ANALYZIS OF THE PROJECT

The global climate change and the effects on the environment have been observed and acknowledged not only by scientists, but throughout the society. Nowadays, environmental issues gain growing attention among the business world, as well. By considering the environmental impact of supply chains of the fast moving consumer goods (FMCG) – industry, the e-SAVE project contributes to rectifying the problem. The general objective of the project is to achieve a significant reduction of energy consumption and therefore, a significant reduction of carbon emissions along the supply chain regarding the specific attributes of the FMCG industry. (e-SAVE Consortium, 2011, p. 5)

To manage the arising issues, the project follows a holistic approach and includes all steps of the optimization process chronologically: Data capture, data transformation, transmission and allocation, data processing, data interpretation and action recommendation:

In detail, a data middleware will be developed, which connects selected physical and logical components of the supply chain. Furthermore, a XML standard is to be deployed to enable barrier-free communication among the participants of the platform system, which allocates captured information and is to be developed, too. Carbon footprint and Life-Cycle-Assessment tools will be extended to communicate with the introduced platform and will enable them to process data within ERP and supply chain management systems automatically. Finally, a toolset will be developed which allows the simulation of alternative supply chain configurations regarding environmental and other business Key Performance Indicators (KPIs) and is additionally able to evaluate concepts regarding inventory management, logistics and distribution planning and vehicle routing. In addition, there will be the possibility to inform consumers about footprints and energy-profiles of products by establishing eco-labels and interrogation services based on the evolved framework. (e-SAVE Consortium, 2011, p. 5f.)

Constructing a modular and extensible infrastructure will be emphasized right from the beginning. Hence, interoperability between existing and future standards and systems, and flexibility for prospective upgrades and developments is provided. The latter could be, for instance, an expansion of the functional range in order to include other environmental and business KPIs, or to collaborate with additional external systems. (e-SAVE Consortium, 2011, p. 6)

First drafts regarding exploitation activities include the development of an e-SAVE software with a range of services similar to the tools developed within the project. Furthermore, the project results shall be utilized within teaching and consulting services. Moreover, exploitation potentials have been identified in the business service provision market and software development companies market. (e-SAVE Consortium, 2011, p. 67f.)

Considering IPR issues, the consortium agreed on a joint ownership model. Thus, a non-discriminative access to knowledge protected by IPR is granted to every project partner. (e-SAVE Consortium, 2011, p. 16f.)

5.1.2 ANALYZIS OF THE CONSORTIUM

5.1.2.1 INTRASOFT INTERNATIONAL SA (COORDINATOR)

Intrasoft International S.A. (INTRASOFT) is operating its business from Luxembourg. The company offers solutions in a broad range of Information and Communication Technology and specializes in information portals, communication services and application development & integration services.[5]

Intrasoft International S.A. is a subsidiary of the INTRACOM Group, the "largest manufacturing industry and provider of systems, products and services in the area of Telecommunication, Information Technology and Defense Electronics in Greece. As parent company, INTRACOM Group has multiple business relations in more than 55 countries. (e-SAVE Consortium, 2011, p. 36)

According to its expertise, interoperability and information sharing, data communication technologies and protocols, supply chain collaboration practices, services for enterprise management systems, development of supply chain collaboration solutions, systems integration, pilot deployment and dissemination Intrasoft International S.A. will assume responsibilities for the application development and system integration, provide support for the trial executions and evaluate the services and systems within the project. (e-SAVE Consortium, 2011, p. 47ff.)

With the participation in the e-SAVE project the company seeks to enrich its solution portfolio by offering innovative and specialized applications and services based on the achieved results and experiences and therefore, strengthen its ability to compete on the market. Relevant and valuable products and service shall be used in a commercial approach, either individually or in cooperation with partners of the consortium and can be considered as a starting-point for further research activities. (e-SAVE Consortium, 2011, p. 68)

5.1.2.2 ATHENS UNIVERSITY OF ECONOMICS AND BUSINESS-RESEARCH CENTRE

The Athens University of Economics and Business (AUEB) is an institution for higher education and offers courses both on undergraduate and postgraduate levels focusing mainly on Economics. The division Supply Chain and Demand Management, Collaboration and Electronic Services (SCORE), of the ELTRUN[6], sets its focus on research activities concerning innovative electronic services, radio frequency identification and the *Internet of Things*, retail management and environmental sustainability of supply chains[7].

[5] cf. http://www.intrasoft-intl.com/

[6] ELTRUN is the E-Business Research Centre of the AUEB

[7] cf. http://www.eltrun.gr/research-areas-2/demand-supply-consumer-goods-retailing

Within the projects, the AUEB offers competencies in the fields of interoperability and information sharing, data communication technologies and protocols, supply chain collaboration practices, analytic models for operations management systems, automatic data capturing, development of supply chain collaboration solutions, pilot deployment, evaluation and validation of R&D and pilot results and dissemination and exploitation. Due to its broad range of competencies, the AUEB will carry out, inter alia, activities concerning supply chain modeling and decision support, supply chain collaboration, information exchange, standards ontologies and Radio Frequency Identification (RFID)/sensors. (e-SAVE Consortium, 2011, p. 47ff.)

Concerning exploitation, the AUEB sees potentials in teaching and consultation services on energy efficiency in supply chains, eco-efficient information systems and green supply chain collaboration and in designing services to transport eco-profile information to end-customers. (e-SAVE Consortium, 2011, p. 68f.)

5.1.2.3 BARILLA G. E R. FRATELLI SPA

Barilla G. e R. Fratelli SPA (BARILLA) is offering a wide range of foods and is a leading Italian food company, in case of pasta, one the leading food companies worldwide. The company already conducts research activities to reduce carbon emissions related to the distributed foods. (e-SAVE Consortium, 2011, p. 38)

Within the e-SAVE project, Barilla G. e R. Fratelli SPA will take place in the execution of several trials of the developed services. Including the raw-material suppliers, who corresponds best with the expertise of life cycle assessment and environmental footprint, environment performance management, process modeling, supply collaboration practices, development of supply chain collaboration solutions, pilot deployment, evaluation of R&D and pilot results and dissemination and exploitation. (e-SAVE Consortium, 2011, p. 47ff.)

Barilla G. e R. Fratelli SPA's exploitation strategy focuses on the enlargement of knowledge in the management of carbon footprints and other environmental KPIs to gain competitive advantages and growing market shares by offering innovative end-user services and to optimize energy consumption. (e-SAVE Consortium, 2011, p. 69)

5.1.2.4 BOC ASSET MANAGEMENT GMBH

The BOC Asset Management GmbH (BOC), founded as a spin-off from the University of Vienna, provides software development and consultant services in the application of information technology in management approaches, covering modeling, meta modeling, semantics, agents and knowledge management. The portfolio includes tools for strategic management, business process management, logistics and IT-infrastructure and IT-architecture management. (e-SAVE Consortium, 2011, p. 41)

The BOC Asset Management GmbH provides expertise in process modeling, supply chain collaboration practices, services for enterprise management services, development of supply chain collaboration solutions and dissemination and exploitation. In the e-SAVE project, BOC Asset Management GmbH will take part in the task supply chain modeling and decision support, application development and system integration. (e-SAVE Consortium, 2011, p. 47ff.)

BOC Asset Management GmbH intends to exploit the project results to enrich its competencies and expertise regarding energy-efficiency-relevant aspects. Hereby, both conceptual and technical knowledge is considered relevant. The activities shall lead to the improvement of the offered products and services. (e-SAVE Consortium, 2011, p. 69)

5.1.2.5 ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE

The École Polytechnique Fédérale de Lausanne (EPFL) is an educational institution involved both in considerably education and research activities. The Computer Aided Design and Production Laboratory (LICP) of the Institute of Mechanical Engineering of the EPFL has extensive experiences in sustainable manufacturing technologies, i.e. closes-loop lifecycle management, semantic modeling and reasoning for lifecycle engineering applications. (e-SAVE Consortium, 2011, p. 40)

With expertise in the field of life cycle assessment and environmental footprint, environmental performance management, process modeling, analytic models for operations management, automatic data capture, evaluation and validation of R&D and pilot results and dissemination and exploitation, the École Polytechnique Fédérale de Lausanne will take part in the life cycle assessment and supply chain collaboration, information exchange standards, ontologies activities. Furthermore, the EPFL will support the execution of trials and the business planning and market validation in cases of a supply chain partner adoption study. (e-SAVE Consortium, 2011, p. 47ff.)

Possible exploitation approaches are: the adoption of life cycle methodologies for the special requirements of the FMCG sector and providing teaching and consultation services on life cycle assessment methods and tools. (e-SAVE Consortium, 2011, p. 69)

5.1.2.6 ECR EUROPE ASBL

As a joint trade and industry body ECR Europe (ECR) represents both manufacturers and retailers of FMCG, standards organization and local ECR organizations. With its activities, new approaches in the FMCG sector shall be explored, e.g. cost reductions and the optimized fulfillment of consumer need, and transferred to its members. (e-SAVE Consortium, 2011, p. 45)

The ECR Europe provides expertise in the field life cycle assessment and environmental footprint, environmental performance management, supply chain collaboration practices, pilot deployment, evaluation and validation of R&D and pilot results and dissemination and exploitation. Within the e-SAVE project, ECR Europe will concentrate on the horizontal support during the trial executions and supports the standardization activities as part of the business planning and market validation. (e-SAVE Consortium, 2011, p. 47ff.)

ECR Europe intends to exploit the project results to increase the awareness among its membership organizations regarding supply chain operations and energy efficiency, to support the adoption of best practices in these fields, to contribute the establishment of new standards and to collaborate with global organizations to support the adoption of best-practices on a global level. (e-SAVE Consortium, 2011, p. 70)

5.1.2.7 INTELEN SERVICES LIMITED

Intelen Services Ltd. (INTELEN) develops applied IT solutions, including internet technologies and advanced algorithms applications, for the energy and Information and Communication Technology (ICT)-sector. Thus, services like smart metering, meta data management, green ICT and smart grids are provided. (e-SAVE Consortium, 2011, p. 44)

With its expertise in energy efficiency monitoring, automatic data capturing, systems integration, pilot deployment, evaluation and validation of R&D and pilot results and dissemination and exploitation, Intelen Services Ltd. will take place in energy monitoring and sensor technology within the system and service development of the e-SAVE project. (e-SAVE Consortium, 2011, p. 47ff.)

Intelen Services Limited targets to enrich its existing portfolio und tools by innovative and specialized applications and services for energy monitoring and management with collaborative features, not only but with strong focus on the FMCG sector, and gain therefore competitive advantages. (e-SAVE Consortium, 2011, p. 70)

5.1.2.8 METRO SA

METRO SA (METRO) is one of the top five retail chains in Greece and runs the retail stores “My Market” and the “METRO Cash & Carry” markets. The different business models address either private or professional customers, whilst the private sector will expand in future. (e-SAVE Consortium, 2011, p. 46)

In the e-SAVE project, METRO SA is contributing expertise in the field of life cycle assessment and environmental footprint, environmental performance management, supply chain collaboration practice, pilot deployment, evaluation and validation of R&D and pilot results, dissemination and exploitation and will take part mainly in the trial execution. (e-SAVE Consortium, 2011, p. 47ff.)

METRO SA intends to exploit the project results to improve the assessment of environmental KPIs in order to reduce costs and enhance the environmental and social behavior of the company. Together with the provision of green consumer services this shall lead to an increased competitiveness.

5.1.2.9 QUANTIS SÀRL

As a spin-off from the École Polytechnique Fédérale de Lausanne (EPFL) QUANTIS sàrl (QUANTIS) is providing tools, knowledge and guidance for mastering, assessing and reducing environmental life cycle impacts both to businesses and governments. QUANTIS sàrl has a broad experience in life cycle assessments in the food and beverage sector and uses self-developed tools for that purpose. (e-SAVE Consortium, 2011, p. 39)

Within the e-SAVE project, QUANTIS sàrl shares its expertise in the field of energy efficiency monitoring, life cycle assessment and environmental footprint, environmental performance management, process modeling, simulation and decisions support tools, analytic models for operations management, pilot deployment, evaluation and validation of R&D and pilot results and dissemination and exploitation. QUANTIS sàrl also takes part in the energy monitoring, life cycle assessment, application development and system integration. (e-SAVE Consortium, 2011, p. 47ff.)

Possible exploitation approaches are: the adoption of life cycle assessment tools for the special requirements of the FMCG sector within a collaborative context and providing interface to the e-SAVE data infrastructure for existing tools. (e-SAVE Consortium, 2011, p. 69)

5.1.2.10 SIMPLAN AG

SimPlan AG (SIMPLAN) focuses on the full range of simulation services, including the conduction of complete simulation studies, development of simulation software and tools, trainings, support and maintenance. Furthermore, applications for manufacturing system control as part of Manufacturing Execution System (MES) systems, round off the portfolio. (e-SAVE Consortium, 2011, p. 43)

In the e-SAVE project, SimPlan AG contributes expertise in the field of process modeling, simulation and decisions support tools, services for enterprise management systems, pilot deployment and dissemination and exploitation and will act therefore in the simulation modeling in the system and service development. (e-SAVE Consortium, 2011, p. 47ff.)

In the context of exploitation, SimPlan AG intends to enrich existing simulation and manufacturing control software with environmental features to enable green decision support. Hence, through transferring research result to non FMCG-related business sectors, competitive advantages shall be achieved. (e-SAVE Consortium, 2011, p. 70)

5.1.2.11 TECHNISCHE UNIVERSITÄT DORTMUND

The Technical University Dortmund (TUDO) is an educational institute offering courses both to undergraduate and postgraduate students and conducts a wide range of research activities.

The chair of “IT in production and logistics” of the faculty mechanical engineering emphasizes the application and combination of innovative concepts of information technology in the areas of production and logistics.

The Technische Universität Dortmund provides expertise in interoperability and information sharing, process modeling, simulation and decisions support tools, data communication technologies and protocols, analytic models for operations management, evaluation and validation of R&D and pilot results and dissemination and exploitation. Therefore, it is involved in the tasks simulation modeling, trial support in cases of the trial execution and supply chain partners adoption study, business planning, and support to standardization activities in cases of business planning and market validation. (e-SAVE Consortium, 2011, p. 47ff.)

The Technische Universität Dortmund sees exploitation possibilities in the enrichment of modeling and simulation tools with environmental features, the usage and extension of ERP solutions by decision support systems on an environmental basis and teaching and consultation services on optimizing processes and products based on environmental KPIs. (e-SAVE Consortium, 2011, p. 70)

5.1.2.12 CONCLUSION AND IMPLICATIONS

Considering the individual characteristic of the project participants shows, that there are various levels of similarity taking into account the conducted business and the intentions for the use of the

generated foreground. Summing up, three major classes can be identified referring to their intended exploitation activities: Using the foreground directly in the conducted business to gain competitive advantages, using the foreground for business exploitation by bringing products and services to the markets and using the foreground for further research.

The major group will use the foreground resulting from the project for business exploitation: They intend either to enhance offered products and services to gain competitive advantages or to develop and introduce new products and services to the market. Considering the included members INTRASOFT, BOC, INTELEN, QUANTIS and SIMPLAN, this group has a clear focus on the development of profit-oriented services.

The group intending the direct use of foreground includes BARILLA, ECR and METRO. It is characterizing that these organizations are engaged somehow in the FMCG industry and are willing to use the generated foreground directly in that sector, either in case of BARILLA to generate individual competitive advantages for their supply chain and offered products, or in case of ECR to offer sophisticated knowledge and know how regarding affiliated methods in the FMCG industry to its members or in case of METRO, that is willing to improve knowledge and methods regarding supply chain operations.

However, there are certain facts that distinguish the three members: While BARILLA and METRO act as independent companies directly on the market and are therefore interested in creating competitive advantages, ECR acts as association representing a whole bunch of different companies and has therefore fewer interests in generating competitive advantages itself but in offering knowledge and solutions to its members. However, this knowledge will be made available to its members as ECR represents an intermediate in the information chain and the final use of that knowledge will be similar to the utilization in case of BARILLA and METRO. Therefore, the three described partners will be classified in one group not regarding their different legal construction as they have congruent intentions concerning the use of generated foreground and the final utilization will be equal. These activities can be categorized as internal exploitation, since they target to improve processes within the organization, respective its members. This is underlined by the fact that among the mentioned partners there are no intentions to sell the foreground itself in any type.

The group intending to use the foreground for further research activities includes TUDO, EPFL and AUEB. All of them are not intending to bring products or services to the market as a major exploitation content, moreover they are planning to use the foreground of e-SAVE to conduct further related research. Furthermore they are intending to use expertise and knowledge gained from the project for educational activities. Summing up, these activities can be categorized as predominantly internal exploitation.

Table 1 illustrates the defined groups with similar exploitation intentions and its individual members.

Business driven Exploitation	Utilization driven Exploitation	Research driven Exploitation
INTRASOFT BOC INTELEN QUANTIS SIMPLAN	BARILLA ECR METRO	AUEB EPFL TUDO

Table 1: Groups of Organizations with similar Intentions for Exploitation Activities

5.1.3 IDENTIFICATION OF RELEVANT DELIVERABLES

The procedure for the identification of relevant deliverables refers to the documentation of the e-SAVE project, listing all deliverables and categorizing them subsequently. As described in chapter 4.3.2.3, all deliverables that are representing initial versions, reports or documentations or are affiliated with administrative or management tasks, can be neglected. Based on the table provided in ANNEX A:, the relevant deliverables can specified as the following:

D1.2: Requirements, Service Definition and Data Infrastructure – Final Version
D1.3: Ontologies for Energy Efficiency
D2.4: Energy Efficiency and Life Cycle Assessment Tools Description – Final Version
D2.5: Energy Efficiency and Life Cycle Assessment Tools – Final Version
D3.3: Operations and Supply Chain Management Tools Description Document - Final Version
D3.4: Prototype of Operations and Supply Chain Management Tools - Final Version
D4.4: Simulation Tools Description - Final Version
D4.5: Simulation Tools - Final Version
D5.3: Collaboration Infrastructure Design Document - Final Version
D5.5: Integrated System - Final Version

5.1.4 EXPLOITABLE FOREGROUND

5.1.4.1 D1.2: REQUIREMENTS, SERVICE DEFINITION AND DATA INFRASTRUCTURE – FINAL VERSION

The deliverable 1.2 aggregates the outcomes of the first work package which is affiliated with fundamentals for the whole project. Prior to the implementation of further methods, the basic principles for the intended services and algorithms are defined. This includes methods and a definition of how the data that shall be captured and processed in the following. Thus, processes and possibilities to catch these data have to be evaluated and defined, while data structures and system architectures have to be deployed. As the described data structures and system architectures will be responsible for the linkage of further system modules, they represent the crucial interface for e-SAVE. (e-SAVE Consortium, 2011, p. 8f.)

Although this deliverable does not include foreground that can be exploited directly external, knowledge concerning the identification of relevant data, the capture of data and the technical infrastructure is gained. This fundamental knowledge is not limited to the considered project.

Therefore, it is likely to be exploited internally, as it provides basic and fundamental knowledge for green processes in supply chains.

5.1.4.2 D1.3: ONTOLOGIES FOR ENERGY EFFICIENCY

R&D activities in the context of e-SAVE are supposed to generate remarkable knowledge of green supply chain management. In order to enable automated processing and application of that knowledge, among other, it will be conceptualized and formalized by using ontologies. Semantic and syntactic concept will be taken into account in order to process knowledge regarding the monitoring of energy efficiency in context of products, supply chain operations and processes, sensors, measurements and stakeholders. (e-SAVE Consortium, 2011, p. 9)

Again, this deliverable does not include foreground that can be exploited directly external without further processing. Nevertheless, the ontologies include considerable sets of information referring to green supply chain management (GrSCM) and offer therefore a wide variety of possible application, e.g. for further research issues. This underlines the character of internal exploitation.

5.1.4.3 D2.5: ENERGY EFFICIENCY AND LIFE CYCLE ASSESSMENT TOOLS – FINAL VERSION & D2.4: ENERGY EFFICIENCY AND LIFE CYCLE ASSESSMENT TOOLS DESCRIPTION – FINAL VERSION

Within these deliverables, a final version of a tool enabling the measurement of energy efficiency and assessing the life cycle of products is developed and described. This includes the formulation of concrete requirements and design approaches enabling a proper functioning of the tool, since a seamless integration into the remaining e-SAVE structure is pursued. Furthermore, a first connection to companies running e-SAVE external systems is to be established. Finally, the tool enables the automated Energy Efficiency and Life Cycle Assessment of various products including the calculation of environmental footprints. (e-SAVE Consortium, 2011, p. 12)

The described deliverables include the complete development of an executable module with the described abilities. Since the generic character of this deliverable is very low, an extended application seems possible and qualifies this deliverable for both internal and external exploitation.

5.1.4.4 D3.4: PROTOTYPE OF OPERATIONS AND SUPPLY CHAIN MANAGEMENT TOOLS - FINAL VERSION & D3.3: OPERATIONS AND SUPPLY CHAIN MANAGEMENT TOOLS DESCRIPTION DOCUMENT - FINAL VERSION

These deliverables aim at the development and description of a tool that is optimizing supply chain operations regarding their environmental impact, focused on energy efficiency. Therefore, appropriate algorithms have to be evaluated and implemented to enable optimization actions und support connectivity to other e-SAVE modules as well as to e-SAVE external systems in companies. (e-SAVE Consortium, 2011, p. 16)

Since the outcome of this deliverable is a tool that is offering support for operational decision making processes, the applied utilization is given and argues for the ability to exploit this foreground externally.

5.1.4.5 D4.5: SIMULATION TOOLS - FINAL VERSION & D4.4: SIMULATION TOOLS DESCRIPTION - FINAL VERSION

These deliverables include the development and description of an executable simulation tool.

Therefore, a reference model is developed, defining the level of abstraction, the structure, in-/output data and the KPI for the simulation model. Finally, the simulation tool shall provide decision support for balancing operational effectiveness and environmental performance. Again, interfaces to the e-SAVE structure and external systems are to be implemented. (e-SAVE Consortium, 2011, p. 20)

By offering an executable tool which offers support for strategic decision making processes, an external application seems possible and reasonable.

5.1.4.6 D5.5: INTEGRATED SYSTEM - FINAL VERSION & D5.3: COLLABORATION INFRASTRUCTURE DESIGN DOCUMENT - FINAL VERSION

These deliverables will define the design of the e-SAVE collaboration infrastructure, which represents an interoperable and integrated platform with affiliated services. This includes rules and logic of collaboration and information sharing as well as communication with existing external systems. (e-SAVE Consortium, 2011, p. 24)

Although this deliverable is specifically designed to operate with other e-SAVE systems, an externally exploitability is crucially given. Especially the dependencies for exploitation have to be considered in detail.

5.2 GENERATION OF THE PLAN FOR THE USE OF FOREGROUND

5.2.1 INDUSTRY ANALYSIS

As mentioned in the project analysis in chapter 5.1.1, the e-SAVE project aims to achieve significant improvements in the FMCG industry. Therefore, the FMCG industry shall be defined as the target market of intended exploitation activities. This does not necessarily mean that the potential exploitability is limited to this target market, but the transformation to other markets may require further analysis and efforts and is therefore not considered in this thesis. In this context the characteristics of the FMCG industry are relevant. Since the mentioned analysis of the e-SAVE project lined out the targets of the research work, it seems clear that a further distinction of the target of the analysis is necessary: On the one hand, the project examines the possibilities to enable competitive advantages through the proposition of modern consumer services, which would refer to the FMCG industry itself. On the other hand, the project examines the possibilities of optimizations within the supply chain which refers to transportation issues within the FMCG industry.

5.2.1.1 INDUSTRY DEFINITION

The consumer goods industry can be defined as the totality of all companies that produce consumer goods (Meinhardt, et al., 2010, p. 3).

Consumer goods are products that are built to be consumed by end consumers and can be distinguished in Fast Moving Consumer Goods (FMCG) and Slow Moving Consumer Goods (SMCG). Fast Moving Consumer Goods are characterized by a short lifetime and usually ought to be eliminated through conventional usage, for instance food products and cosmetics, while Slow Moving Consumer Goods are characterized by an extended lifetime and no elimination through conventional usage, for instance household appliances and furniture. (Gablers Wirtschaftslexikon, 2012)

Due to the broad variety of products, the FMCG industry is characterized by a high level a diversification. Table 2 specifies the branches of the FMCG industry and provides information about the sub branches of the Foodstuffs, Drinks and Tobacco industry branch. As the logistics of many products of this branch is temperature controlled and therefore energy-intensive, this branch will be a matter of special interest for further consideration.

Fast Moving Consumer Goods Industries								
Foodstuff, Drinks and Tobacco	Physical Health, Personal Hygiene and Cosmetics	Apparel, Textile and Leather	Books, Newspapers and Periodicals	Toys	Sound, Film and Data Carrier	Cleaning Equipment	Pharma-ceuticals	Sports Equipment

Foodstuff, Drinks and Tobacco							
Meat and Sausages	Fish	Dairy Products	Bakery Products	Processed Produce	Baby Food	Spreads Commodity	Cereals
Spices	Soups and Sauces	Sugar	Spreads Nutriment	Coffee and Tea	Vegetable Oils and Fats	Pasta	Vinegar & Mustard
Beverages	Tobaccos	Candy	Margarine and Vegetable Fats	Ice Cream	Gourmets		

Table 2: Branches of the FMCG Industry, following: (Meinhardt, et al., 2010, p. 4)

According to NACE, the FMCG industry is classified as a manufacturing sector and there classified in group *C.* The sub branches foodstuff, drinks and tobacco can be classified in the sub groups *10, 11* and *12*. (Eurostat, 2012)

5.2.1.2 INDUSTRY SIZE

The industry size is expressed by the volume of the produced goods in the European Union (EU) in one year expressed in their monetary value. This approach does neither include the amount of imported products nor the amount of exported products. However, this will not affect the validity of the considerations, since the focus of this analysis is set on companies of the FMCG located in the EU. Therefore, imported products can be neglected while exported products are produced by those companies, too.

The relevant data are obtained from Eurostat, in particular of the statistics of the production communautaire (PRODCOM) surveys. Since the sales volumes are relevant, the value of production

during a certain survey period is relevant and considered. Table 3 shows the annual volumes of produced goods in the relevant NACE categories and the annual percentage change. Unfortunately, the time series can neither be expanded to current dates since the relevant dates are not yet available nor be expanded to earlier data, since the respective collected data are based on the prior NACE revision and are thus not compatible to the new data.

Year	2008	2009	2010	2011
Business Volume in thousands EUR[8]	877,610,588	807,927,251	834,155,476	888,665,086
Annual percentage change	-	-8 %	+3 %	+7 %

Table 3: Annual Sales Volume of the FMCG Industry, following (Eurostat, 2013)

Parts of the e-SAVE project have more focused targets, in particular those parts trying to achieve optimization regarding the supply chain. For that purpose, the value of the transport activities within that industry sector can be specified:

8% of the total costs of companies in the relevant sector are caused by logistics (Straube, 2005, p. 29). 40% of these costs are caused by transportation (Buer, 2012, p. 14). The anticipation of the total costs of those companies is not easy, since most of them do not make such data publically available. Nevertheless, the EBITDA-margin[9] of a few companies was made available, for instance Nestlé, Kraft Foods, Campbell Soup Company and Pernod-Ricard, and can be specified between 14% and 24 %. This means an average of 19% (Karkowski, 2010). Applying these facts to the business volume of the considered industry, the total costs volume for transportation can be anticipated. Taking into account the business volumes for the defined industries in Table 3, there are resulting logistic costs of approximately 70,000,000 thousands EUR per year in the considered time series. The transportation costs can be declared approximately 28,000,000 thousands EUR per year. Nevertheless, this procedure can only give a rough estimation of the transportation costs as it is afflicted with many simplifications and inaccuracies: The calculation of the average EBITDA-margin is not representative, since the data from only 4 companies is taken into account, and the EBITDA as initial value for the calculation of costs may be also afflicted with inaccuracies. Furthermore, the described shares of 8% and 40% that determines the share of transportation costs may be afflicted with inaccuracies, too. Nevertheless, the described method enables at least a rough overview over the amount of transportation costs within the FMCG industry.

[8] The business volumes result from own calculation based on tables provided by Eurostat (Eurostat, 2009)

[9] EBITDA stands for Earnings Before Interests and Taxes Depreciation and Amortization and equals the profit ratio of a company.

5.2.1.3 GROWTH RATE

The calculation of the future growth rates of the FMCG industry, depending on the values given in Table 3, is not possible due to the limited time series. Furthermore, the global crisis during the described time frame influenced to annual percentage change, thus an extrapolation depending on these data will not provide reliable data.

5.2.1.4 SALES PROJECTION

Due to the limitations mentioned in the prior chapter and the not yet existing business model, a concrete sales projection cannot be provided.

5.2.1.5 INDUSTRY CHARACTERISTICS

Due to the high number of different business models, i.e. different products and services within the FMCG industry, the industry can be described as highly fragmented. Within the sub branches there are different levels of fragmentation: While some sub branches like the tobacco industry have a very low fragmentation with only a few dominating companies, the food branches for instance are characterized by a very high level of fragmentation. (Meinhardt, et al., 2010, p. 18f.)

5.2.1.6 INDUSTRY TRENDS

5.2.1.6.1 ECONOMICAL TRENDS

Companies act on the assumption that there will be significant costs and administrative challenges for the accurately measuring of the carbon footprint (PriceWaterhouseCoopers, 2012, p. 16).

Companies consider the minimization of energy consumption as a paramount criterion in context of prospective supply chain design (PriceWaterhouseCoopers, 2012, p. 30). Furthermore, the “Decision where to set up production sites will increasingly be influenced by transport cost (..)” (PriceWaterhouseCoopers, 2012, p. 31) and therefore by the consumed energy and emitted CO_2 affiliated with the transportation.

Researches identify chances for so called Eco-Consultants, i.e. companies acting as an innovator in the green logistics and supply chain management, to enlarge their expertise and pass it on to other companies as eco-consultancy services, especially in context with sophisticated IT tools (PriceWaterhouseCoopers, 2012, p. 50).

The reduction of CO_2 in supply chains will not only lead to a minimization of emitted greenhouse gases but will also lead to a reduction of energy consumption and costs (PriceWaterhouseCoopers, 2012, p. 52). More than 75% of FMCG shippers are already applying methods to redesign supply chain networks in order to reduce logistic cost (Langley & Capgemini, 2010, p. 7).

The enhancement of processes will not be achievable with an isolated view and focus on only one company. In fact, research cooperation along complete supply chains will be necessary to achieve significant results (PriceWaterhouseCoopers, 2012, p. 52).

More than 80% of FMCG manufacturers are aware of the fact that sustainability in supply chains has an increasing relevance and that green process design should be applied in a naturally manner (Langley & Capgemini, 2010, p. 4).

Researchers found out that supplier show tendencies towards an increased integration of supply chains in order to reduce costs and improve consumer service. Furthermore, stricter regulatory and demand for environmental accountability lead to an intrinsic sight on environmental issues in context of strategic planning (Rao & Holt, 2005, p. 901).

Furthermore, case studies demonstrated that greening supply chains resulted in increased competitiveness and better economic performance by achieving cost savings and enhancing sales and market share (Rao & Holt, 2005, p. 911f.).

Karbassi (Karbassi, et al., 2011, p. 37) recommends technical assistance and collaborative approaches in order to engage suppliers for green-aware behavior.

5.2.1.6.2 SOCIAL TRENDS

Researches recognize signals that costs, caused by the CO_2 emissions of transportation of goods, are passed on to the consumer in order to account the cost of the carbon emission to those who cause it (PriceWaterhouseCoopers, 2012, p. 16).

Consumers show the tendency to demand detailed information concerning the environmental impact of supply chains on consumed goods (PriceWaterhouseCoopers, 2012, p. 17). Some companies are already applying so called CO_2 Ticker in which CO_2 emissions affiliated with the production und logistics of goods are displayed in order to gain competitive advantages (PriceWaterhouseCoopers, 2012, p. 51).

Parallel to the development of more and more sophisticated IT-services, the application of high tech services in the context of logistics will increase, too: In a future perspective, logistic providers will "(…) offer almost every possible ITC interface (…)" (PriceWaterhouseCoopers, 2012, p. 53) to interact with multiple users. Thus, a high level of interoperability will be obligatory (PriceWaterhouseCoopers, 2012, p. 53).

First initiatives to label green products have already started, e.g. the Community Ecolabel Scheme. This accreditation scheme sets credibility standards for environmental aspects for products. Paired with a rising consumer competency through education this will support an increased consumer attention on green products (Hitchcock, 2012, p. 100f.).

Companies with reckless attitude concerning ecologically compatible behavior might suffer from a bad reputation from the consumer's point of view, in particular by the possibilities of information allocation by modern ICT (Karbassi, et al., 2011, p. 20).

Using empirical methods, Lee (Lee, 2008) found out, that buyers are crucial for the decisions of suppliers on whether or not to participate in supply chain collaborations.

5.2.1.6.3 TECHNOLOGICAL TRENDS

The technology to monitor CO_2 emission may be expanded in the future to be able to measure and calculate all emissions, such as nitrogen oxides (PriceWaterhouseCoopers, 2012, p. 51). This could result in the Total Emission Management and lead to competitive advantages (PriceWaterhouseCoopers, 2012, p. 52).

5.2.1.6.4 POLITICAL AND REGULATORIAL TRENDS

Although no particular regulations have been approved, researches determine signs that individual governments may take measures of emitted greenhouse gases, such as CO_2, in order to reduce them into account (PriceWaterhouseCoopers, 2012, p. 16).

It is recognized that "Tracking carbon emissions may only be the first step though. In the more distant future, logistic providers will need to document all types of emissions, such as (…) nitrogen oxide, and the use of resources (…)." (PriceWaterhouseCoopers, 2012, p. 17)

Whilst the governmental monitoring of greenhouse gas consumption focused in early days on very-large scale heavy industry, less energy-intensive industries are likely to be taken in to account nowadays (Karbassi, et al., 2011, p. 19).

The ongoing climate change will force public authorities to formulate stricter regulatory rules concerning the consumption of resources, which will itself force companies to adapt to the altered circumstances (Karbassi, et al., 2011, p. 19).

5.2.1.6.5 CONCLUSION OF TRENDS

The described industry trends can be aggregated in a manageable number of major tracks:

Consumer behavior changes and consumers show an increasing interested in green product characteristics. Especially companies of the FMCG sector will be forced to adapt their attitude, and hence personnel, processes, services and products, in order to compete on the market.

Constrained resources, increasing costs for resources, particularly energy sources, and stricter regulations demand for a focus on energy efficient processes. Therefore, companies are forced to adapt and improve both, their strategic and operational decision making processes for green and efficiency relevant concerns.

Market and competitive circumstances force companies to increase their overall efficiency and create new competitive advantages. Since conventional optimization methods, based on one company only, are likely to be used up, it is inevitable to find approaches towards an increasing IT-based interaction of the companies along the supply chain. Therefore, companies will have to introduce and run platform systems covering the whole supply chain on an interoperable approach.

5.2.2 CONCEPT DEFINITION

Resulting from the identified exploitable foreground described in chapter 5.1.4, that foreground can be classified as following:

On the one hand, there are systems and methods, for instance algorithms, tools and programs; on the other hand there is conceptual knowledge, for instance ontologies, requirements and definitions. For a first draft of concepts it seems reasonable, to continue with this distinction:

- The subset of the foreground including systems and methods shall be elaborated to a concept bundling software offered to customers with the described range of services of the e-SAVE developments.
- The other subset, i.e. the one covering conceptual knowledge, shall be used for a concept of qualitative utilization, i.e. to teach environmentally relevant facts and conduct further research in related fields.
- The third possible concept considers that the systems and methods can be used to provide consulting activities, for instance by non-recurring applications of the range of service of the software systems and methods.
- A fourth possible concept represents the application of the conceptualized knowledge to provide consulting activities to companies regarding qualitative questions.
- A fifth possible concept is the utilization of e-SAVE foreground to improve processes within the organizations of the consortium.

The aggregated business trends show that currently five major issues exist, i.e. needs and problems that need to be solved:

- Companies will have to respond to the shifted customer behavior concerning a growing demand for green aware products and an increasing demand for information through modern ICT regarding the purchasable products and service. These two facts will create a whole new dimension of selling arguments for products and services offered to consumers. Furthermore, modern consumer's demand for knowledge through education in order to enable them to evaluate green aspects on their own arises.
- The possibilities to optimize the value creation process within isolated companies are decreasing and almost fully exploited. New optimization approaches will have to consider the whole supply chain and the interaction among its members. Therefore, companies have to put efforts in intensifying their collaboration within the supply chain.
- Energy prices have continuously increased during the last decades. Since the shortage of resources is still proceeding and will cause further cost increases, companies will have to deploy methods, to cope with that development by reducing their energy consumption by increasing their energy efficiency.
- Companies detect their responsibility towards environmental issues, not regarding whether this results from real social commitment or competitive restraints. For that purpose, they need to enlarge the awareness and knowledge within their organization concerning green facts.
- The last few decades have shown that regulations concerning environmental issues become more and more prominent for public authorities. It is therefore likely, that regulations regarding environmental pollution and energy consumption will be tightened. Furthermore, public authorities have to be supported regarding the appropriate designing and (technical) feasibility of prospective regulations.

Table 4 marks the aggregated industry trends horizontally, while the possible concepts are marked vertically. The intercepting cells of the particular columns and rows specify if the respective concept is suitable to form a respond to the respective industry trends.

		Aggregated Industry Trends				
		Shifted Consumer Behavior	Intensifying Cooperation through Supply Chain	Improving Energy Efficiency	Rising Green Company Awareness	Stricter Regulations
e-SAVE Concepts	e-SAVE Software Bundle	o	+	+	-	o
	e-SAVE Research and Teaching	+	-	o	+	o
	e-SAVE Qualitative Consulting	o	-	+	+	+
	e-SAVE Quantitative Consulting	-	-	+	-	+
	e-SAVE Internal Application	+	+	+	+	+

Table 4: Aggregated Industry Trends and the Applicability of Concepts

Table 4 illustrates the adequacy of concept to respond to the aggregated industry trends. Positive correlations are marked by a +, negative by a -. Correlations with no explicit conclusion are marked by an o. It shows that all concepts possess potentials to succeed. Nevertheless, a certain modification of the concept to fit the market even better is reasonable: The distinction between Qualitative and Quantitative Consulting seems not reasonable. A wider range of service can be offered to potential customers through their joint. Furthermore, the e-SAVE Software Bundle, and thus the underlying methods and systems, seem to fit quite well to the aggregated industry trends. Therefore, the underlying methods and concepts can be sold not only as completed product and service, but as license-based contracted knowledge, too. Finally, there is the internal application of foreground within the organization of the consortium. Furthermore, the growing demand for relevant green education on an academic level shall be considered.

The adapted concepts are described in detail in the following.

5.2.2.1 E-SAVE SOFTWARE SUITE

The e-SAVE Software Suite shall include all software tools that have been developed in the course of the project. Precisely, these are tools for the life cycle assessment, tools for the supply chain management and operations support, simulation tools and integrated systems. The latter module is to be considered in particular as it takes on a special position: The integrated systems module represents the major interface between the different e-SAVE modules and between the e-SAVE platform and external systems. Thus, it is crucial for the application of the other e-SAVE modules and

therefore indispensable for the operating of the other modules. Furthermore, green consumer services, e.g. related to gamification matters, will communicate with the integrated systems module. This collides with the suggestion to implement the modular concept to all tools of the e-SAVE Software Suite. Therefore, the ability for connections regarding green consumer services shall be excluded from the integrated systems module, respectively only activated if the functionality is demanded by the customer and rewarded appropriately.

To sum up, the e-SAVE Software Suite shown in Figure 13 consists of one basic module (eBASE), providing interoperability and platform services, which can be enhanced by additional modules: Green Supply Chain Management (eSCM), Green Supply Chain Simulation (eSIM), Green Lifecycle Assessment (eLCA) and an interface for Green Consumer Services (eCON).

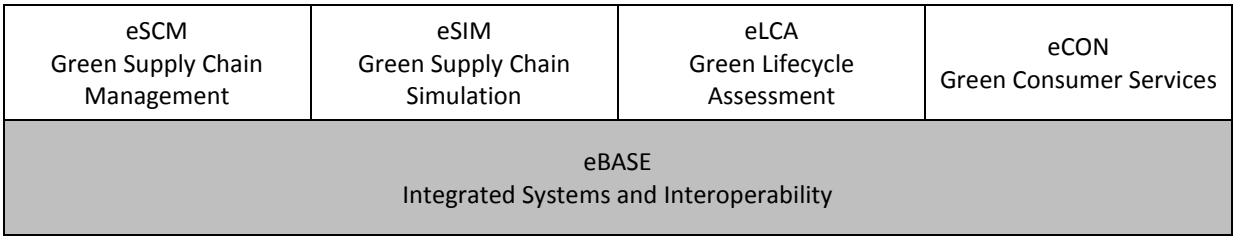

Figure 13: Structure of the modular e-SAVE Suite

Since the e-SAVE Suite shall be distributed on the market to gain profits, this type of exploitation complies with the development and introduction of new products and services and is therefore classified as external.

5.2.2.2 E-SAVE LICENSES

As shown in the future prospects in chapter 5.2.1.6, the market for green supply chain management and green lifecycle assessment related products will increase significantly. The prior mentioned e-SAVE Software Suite is designed to respond to that trend and to fit the altering demand of supply chain managers perfectly. Nevertheless, it seems not realistic to expect a total market penetration of the e-SAVE Software Suite for several reasons:

It is to be assumed, that the majority of supply chains are already managed by appropriate supply chain tools, even if they are not likely to offer the range of services of the e-SAVE Suite regarding green aspects. Nevertheless, even if such green aspects are desired supply chain managers will hesitate to introduce totally new software products, as their introduction causes high investments, not only regarding financial matters, but also regarding matters as staff training.
The e-SAVE consortium focuses highly on the markets of the European Union, while supply chains are driven worldwide. Both in developed and in emerging markets the market potential for supply chain management solution is likely to rise within the next decades, nevertheless, due to geographical, cultural and economic differences it is to be doubted that a successful worldwide distribution is achievable.
Finally, the nature of the markets will avoid a complete market penetration: Even if the e-SAVE consortium will force the market penetration under the conduction of a pioneer strategy, followers will arise and compete with similar products.

Therefore, it seems reasonable, that the e-SAVE consortium tries to benefit from the described situation by licensing its know-how to other organizations. To maximize the benefits affiliated to a

pioneer strategy, the according e-SAVE licenses shall be granted after the e-SAVE Software Suite was introduced, establishing a certain delay.

Furthermore, the holistic character of the e-SAVE Suite as its unique feature shall be preserved by not licensing all e-SAVE modules to the same organization. By that means, the e-SAVE consortium benefits from compensations of other companies that are enabled to enrich their portfolio based on e-SAVE algorithms and knowledge without enabling them to evolve to fully-fledged competitors.

Since the e-SAVE licenses shall be distributed on the market to gain profits, this type of exploitation complies with the offering of products and services and is therefore classified totally external. Since even the development of new products and services takes not place inside an e-SAVE organization, this exploitation concept has the strongest external character.

5.2.2.3 E-SAVE ADVISORY SERVICES

Within the project course, the e-SAVE consortium gained knowledge not only condensed in algorithms and technical routines: Prior to the development of such methods, extensive background knowledge about the mechanisms and theories that are at the bottom of the IT-based implementation has to be determined. This knowledge is preserved, structured and partly even conceptualized and therefore both types of knowledge can easily be applied for quantitative and qualitative questions in the context of green supply chains.
The type of the advised entities is almost unlimited: Besides cooperations with organizations acting on the conventional markets with need for counseling in the fields of supply chain design and operation, supply chain simulation, life cycle assessment and platform design regarding green aspects a cooperation with public authorities is also imaginable: In particular for upcoming regulations concerning stricter environmental criteria special competencies in the fields of measuring energy efficiency and resource consumption are expected to be in special demand.

Since the fields that the e-SAVE Advisory Services cover are partly congruent to those of the e-SAVE Suite, a more detailed classification is advised: It has to be emphasized, that none of the products shall jeopardize the market with regard to opportunities. Therefore, the focus of the e-SAVE Suite shall be, as described, the continuous operation integrated in a company's IT infrastructure in the supply chain surrounding. The e-SAVE Advisory Services shall be distinguished from that since their operational areas will be temporary and case-related, e.g. for the nonrecurring assessment or design of supply chains, assessment of life cycles or qualitative consultancies in the relevant fields.

Since the e-SAVE Advisory Services are an offer to the market in order to gain profits, this type of exploitation complies with the offering of services and is therefore classified solely external.

5.2.2.4 E-SAVE ACADEMIC

E-SAVE Academic represent a concept that complies with tasks that can described in the broadest sense academic: teaching and further research.

The e-SAVE consortium entered with its project uncharted waters and will not sufficiently deal with all possible questions. Taking into account the identified industry trends it can be anticipated that the demands of the industry will exceed the abilities of the results from the e-SAVE project. Imaginable

enhancements could be broadening, refining and improving of energy monitoring, the measuring of other substances than CO_2 or the raising of the level of integration in SCM-systems and SC-infrastructures and more sophisticated SC operating methods.

Furthermore, the quantitative knowledge, i.e. background knowledge for development and ontologies etc., gained from e-SAVE has still unique character and can therefore represent an unique feature for academic teaching. The qualitative methods, i.e. the e-SAVE modules, are able to enhance academic teaching by providing practical impulses. In addition, the academic teaching will respond to the identified industry trend of the rising demand for employees qualified in the field of green supply chain issues.

E-SAVE Academic includes both the intention for further research and academic teaching. The intention for further research is clearly an internal exploitation, while the academic teaching is an intermediate exploitation: Although the service, i.e. the teaching, is offered to entities outside the conducting organization, the organization is not rewarded directly for these actions and may follow internal intentions that could be declared in the ongoing.

5.2.2.5 E-SAVE Process Improvement

E-SAVE Process Improvement is a concept that envisages the application of foreground within the consortium.
Within the project course, extensive methods to optimize energy efficiency, green supply chain management, green lifecycle assessment and green consumer services are developed. These methods are aligned to the general circumstances of the industry but also especially to the circumstances of the participating organization. Especially for applied tests and validation sets, for instance trials and pilots, the methods and systems have to be set in an operational state and integrated into the system of the involved organizations. This means, that by the end of the project the developed methods and system are perfectly customized for the participating organizations. Therefore, it seems reasonable to evaluate further application within these organizations.

E-SAVE Process Improvement will only contribute to the improvement of processes respectively enable new processes, within organizations that are part of the consortium. Therefore, this exploitation can be declared as totally internal.

5.2.2.6 CONCLUSION

Summing up, there are five concrete concepts for exploitation content shown in Figure 14 : e-SAVE Licenses, e-SAVE Software Suite, e-SAVE Advisory Services, e-SAVE Academics and e-SAVE Process Improvement. All of them have been explained in details in the prior remarks, including their classification considering the type of exploitation. It is obviously, that the foreground generated from e-SAVE offers a wide range of possible exploitation plans.

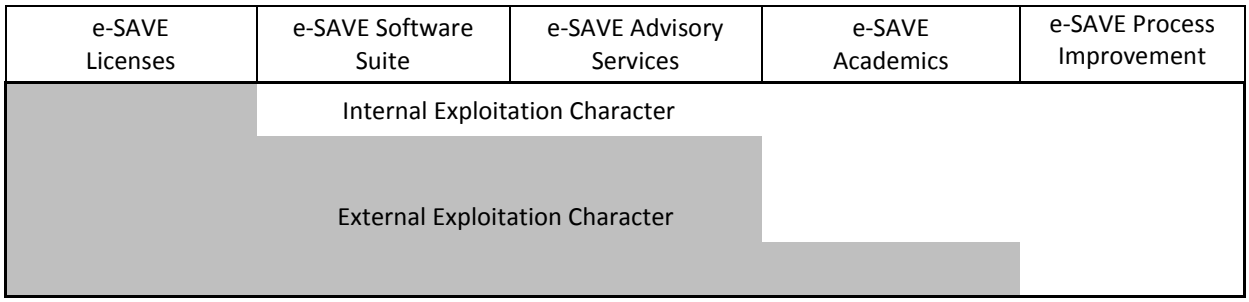

Figure 14: Exploitation Concepts and Characterizations

5.2.3 MATURITY ASSESSMENT

In a first step, the maturity of the e-SAVE technology is assessed; in a second step the maturity of the market is assessed. Both assessments will be carried out in reference to the life cycle theory.

The e-SAVE related concepts include applications that are designed to lead to improvements within the FMCG industry. At the point of the realization of the defined concepts the profitability of the project scope should have been already proven by R&D work carried out within the e-SAVE project. This means, even during the further R&D activities towards the generation of the mentioned concepts there is a clear focus on both the future application of the technologies and the expected benefits. This distinguishes the applied research from fundamental and generic technology research that would have represented the technology stadium during the project course. At that point the technology would have represented an emerging technology that is at the beginning of its market penetration. However, at the stage of the concept realization, the technology will already have the state of a pacing technology. This means, within the predictive limitations of the life cycle theory, the technology faces an estimated rising market penetration connected with increasing demand and revenues.
There are numerous approaches regarding green supply chain operations and design. Nevertheless, an approach like the e-SAVE related technology does not exist. This emphasizes on the one hand the innovative character of the e-SAVE concepts and on the other hand the market demand for solutions for such issues. (Srivastva, 2007)

The trends of the industry analysis conducted in chapter 5.2.1.6 already showed the growing demand regarding green supply chain technologies:

The lifecycle assessment of products regarding green aspects is already recommended within publications designed for applied utilization within companies (ECR Europe, 2009, p. 26). Furthermore, within such publications the importance of product packaging regarding the efficiency of transports in the context of distribution and supply chain operations is emphasized (ECR Europe, 2009, p. 9). Moreover, the growing regulations considering these facts are underlined (ECR Europe, 2009, p. 16). This clearly indicates that the market for life cycle assessment of products is rising. The demand for technologies in the context of an increasing integration of the supply chain, i.e. platform and integrated system, is exemplary shown in case studies with companies acting in the FMCG industry: Representatives of the companies emphasized the importance of new computer

systems, although they criticize the willingness of some supply chain partners to integrate such systems. (Siemieniuch, et al., 1999)

The assessment of the market and the technology shows that both are close to vanquish the initial states at the beginning of the life cycles with clearly indications for further proceeding. Hence, both life cycles are synchronal. Both the synchronism and the early state within the life cycle indicate a pioneer strategy to be applied to the exploitation of the defined concepts. This leads to a value-emphasized exploitation.

5.2.4 CONCEPT ASSIGNMENT

The members of consortium have been analyzed and grouped according to their characterization concerning exploitation matters in chapter 5.1.2. Table 5 illustrates the groups of the consortium, the individual members and their exploitation suitability.

	Business driven Exploitation	Utilization driven Exploitation	Research driven Exploitation
	INTRASOFT BOC INTELEN QUANTIS SIMPLAN	BARILLA ECR METRO	AUEB EPFL TUDO
Exploitation Suitability	Mainly external Exploitation	Internal Exploitation	Mainly internal Exploitation

Table 5: Groups of the Consortium and their Exploitation Suitability

The concepts for the exploitation of foreground resulting from e-SAVE have been specified in chapter 5.2.2. Additionally, their characterization regarding the type of exploitation has already been assessed and is summed up in Table 6.

Concept	e-SAVE Software Suite	e-SAVE Licenses	e-SAVE Advisory	e-SAVE Academic	e-SAVE Process Improvement
Exploitation Characterization	External Exploitation	External Exploitation	External Exploitation	Internal and External Exploitation	Internal Exploitation

Table 6: Exploitation Concepts and their Characterization

Integrating this information into the comparison table described in chapter 4.3.4.5 leads to the individual suitability in the interception cells as shown in Table 7. Positive correlations are marked by a +, negative by a -. Correlations with no explicit conclusion are marked by an o.

		Concepts				
		e-SAVE Software Suite	e-SAVE Licenses	e-SAVE Advisory	e-SAVE Academic	e-SAVE Process Improvement
Consortium Member Groups	Business driven Exploitation	+	+	+	-	-
	Utilization driven Exploitation	-	-	-	-	+
	Research driven Exploitation	-	-	o	+	-

Table 7: Assignment of Concepts

The comparison in Table 7 shows, that the group with business driven exploitation intentions will exploit the external exploitation tracks, i.e. the e-SAVE Software Suite, the e-SAVE Licenses and the e-SAVE Advisory by bringing them to the market. The group of utilization driven exploitation is interested in the internal utilization of the e-SAVE foreground related to the improvement of processes. Therefore, they will exploit the internal track e-SAVE Process Improvement. The e-SAVE Academic track will be exploited by the research driven group.

5.2.5 EXPLOITATION MODELS

5.2.5.1 E-SAVE SOFTWARE SUITE

5.2.5.1.1 OPERATOR

The e-SAVE Software Suite will be exploited by business driven project partners.

5.2.5.1.2 VALUE BENEFICIARIES

The e-SAVE Software Suite focuses on a niche market represented by companies of the FMCG sector that are willing to enrich their competencies regarding green aspects. Some parts of the e-SAVE Software Suite focus on operators of supply chains, others focus on designers of product packaging. In a first step, a penetration of food based FMCG industry is pursued, since these industries operate large and energy intensive supply chains. In a second step, further industries with supply chains may be addressed.

5.2.5.1.3 VALUE PROPOSITIONS

The e-SAVE Software Suite is designed to offer a collaboration platform with supply chain decision support, life cycle assessment and simulation tools, all considering green aspects and energy efficiency. Additionally, green consumer services are enabled.

These functions are designed to create competitive advantages by enabling the user to react on the current and prospective industry trends of green consumer awareness, and both to reduce costs and to enhance performance in the supply chain by enabling the user to establish coordination and

communication beyond company borders, to optimize supply chain planning and operating and to assess the environmental impact of products.

5.2.5.1.4 CHANNELS

The awareness of potential customers shall be raised through the appearance in (scientific) publications, as for instance Food logistics Magazine, EURO Journal of Transportation and Logistics, International Journal of Applied Logistics, International Journal of Logistics Management, Journal of Business Logistics, Logistics Information Management, Logistics Today, ICFAI Journal of Supply Chain Management, International Journal of Business Performance and Supply Chain Modeling, International Journal of Information Systems and Supply Chain Management and Supply Chain Europe. Furthermore, presentations may raise awareness, particularly in the context of relevant trade fairs and scientific conferences, as for instance LogiMat (Stuttgart, Germany), Hamburger Logistiktage (Hamburg, Germany), Handelslogistik Kongress (Köln, Germany), Transport Logistic (München, Germany), SITL Logistics Solutions (Paris, France), Supply Chain Event (Paris, France), Österreichischer Logistik-Tag (Linz, Austria), CSCMP Europe Conference (Amsterdam, Netherlands), Supply Chain Management Conference for Retail & FMCG (Amsterdam, Netherlands) and Olympus International Conference on Supply Chains (Katerini, Greece). Moreover, personal contacts to existing business partners and a website may raise awareness. The potential customers may evaluate the value proposition of the e-SAVE Suite business model through the website, print media and personal consulting. The purchase process will be personal. The delivery is carried out through conventional or electronic media or personal, latter especially if the customer wishes the distributor to bring the system into service.

The after-sales support is mainly provided through electronic media and if necessary by personal assistance.

5.2.5.1.5 VALUE BENEFICIARIES RELATIONSHIPS

Once a customer gets in touch with the operator of the e-SAVE Software Suite exploitation model, the relationship to that customer will be a dedicated personal assistance. This can be deduced from the high value of the distributed products and services and the limited customer segments.

5.2.5.1.6 REVENUE STREAMS

The structure of the revenue streams of the e-SAVE Software Suite are aligned to the conventional charging approaches of the software industry, described in chapter 3.5: The purchasing of the e-SAVE Software Suite is charged with a single payment, the continuous maintenance is charged on a recurring basis.

As already described in the concept, the purchase of the eBASE module is obligatory, while additional modules like eSCM, eSIM, eLCA and eCON can be acquired separately. By a scaled discount the potential customer is encouraged to buy a bundle of modules.

Furthermore, the functionality of the eBASE module regarding the communication with supply chain partners could be limited to a defined number of connections. An upgrade of the number of available connections would be charged appropriately.

The described charging model enables the potential customer an easy and affordable access by purchasing only the demanded range of services. In case of growing needs, the customer is able to enhance its systems accordingly, while the e-SAVE Software Suite distributor will financially participate in the system's enhancement.

However, a specification of the quantitative revenue streams cannot be provided at the current state of the project: The price a potential customer is willing to pay for a product or service is calculated based on the merit the customers anticipates from the application of the acquired product or service. The targeted benefits of the e-SAVE software Suite are, from a monetary point of view, cost reductions in the supply chain and profit increases through competitive advantages regarding green preferences of consumers.

Unfortunately, the generated merits cannot be specified yet, as the business validation will specify the possible cost reductions and the consumer acceptance investigation will specify the competitive advantages at a later point of time.[10]

Nevertheless, the market volumes of the FMCG industry and the affiliated transportation costs have been estimated in chapter 5.2.1.2. The data from the business validation and consumer acceptance test (D6.3 and 6.4) will show the possible benefits which can be achieved by the application of e-SAVE technology. Transferring this relative benefit to the data of the market volumes indicates the possible savings that can be realized within the FMCG industry. This in turn specifies the value of the e-SAVE Software Suite to the customers and determines the price he is willing to pay for it.

5.2.5.1.7 KEY RESOURCES

The e-SAVE Software Suite model is based on the utilization of the e-SAVE knowledge. Therefore, the key resources for the conduction of that model are manageable and envelop mainly the IPR that have to be in the possession of the business model operator. Furthermore, human and financial resources are required to conduct the key activities.

5.2.5.1.8 KEY ACTIVITIES

Key activities for the e-SAVE Software Suite are determined by appropriate R&D activities to develop a marketable product, marketing activities to stimulate the distribution, and customizing and maintenance activities to secure the performance and reliability of running products.

[10] The business validation represents the project deliverable 6.3, the consumer acceptance investigation represents the project deliverable 6.4.

5.2.5.1.9 KEY PARTNERS

In order to stimulate the distribution and provide easy ways to purchase the product cooperation's with experienced and well known distributors is reasonable. Further critical partnerships, just like suppliers of critical resources, do not exist.

5.2.5.1.10 COST STRUCTURE

The cost structure can be describes as value-driven since the value proposition is not to provide low prices but outstanding performance. Furthermore, fixed costs for R&D, marketing, customizing and maintenance activities are dominating the cost structure since variable costs for software products are very low and can be neglected.

5.2.5.2 E-SAVE LICENSES

5.2.5.2.1 OPERATOR

The e-SAVE Licenses will be exploited by business driven project partners.

5.2.5.2.2 VALUE BENEFICIARIES

The e-SAVE Licenses model focuses on a niche market represented by software developers that are willing to enrich their portfolio with green knowledge. In particular, software developers regarding the wider context of supply chain management, production planning and control or enterprise resource planning systems are addressed.

5.2.5.2.3 VALUE PROPOSITIONS

The e-SAVE Licenses includes algorithms, methods and libraries that are designed to offer a collaboration methods and structures with supply chain decision support, life cycle assessment and simulation tools, all considering green aspects and energy efficiency. Additionally, green consumer services are enabled.
These functions are able to create competitive advantages, reducing costs and enhancing performance within the companies they are applied.
The licenses enable contractors to develop own services based on the e-SAVE knowledge. Therefore, the proposed value is the ability to gain the licenses for offering customer the described advantages.

5.2.5.2.4 CHANNELS

The awareness of potential customers shall be raised through the appearance in patent pools, (scientific) publications, presentations, personal contacts to existing business partners and a website. Concrete suggestions regarding possible publication and presentation media are equal to the enumeration of the channels of the e-SAVE Software Suite model. The potential customers may evaluate the value proposition of the e-SAVE Suite business model through the website, print media and personal consulting. The order process will be personal, since the scope of the respective

transactions has to be specified. An after sales support will not be provided, since the customer only receives algorithms, methods and libraries and is on his own responsible for his further procedure.

5.2.5.2.5 VALUE BENEFICIARIES RELATIONSHIPS

After ordering the e-SAVE Advisory Services the relationship to that customer will be a personal assistance. This can be deduced from the usually non-recurring service but high value character of the business that legitimate a personal assistance, but no dedicated personal assistance.

5.2.5.2.6 REVENUE STREAMS

The revenue streams of this business model will be realized through license fees: The permission for the utilization and implementation of knowledge based on the generated e-SAVE foreground is granted to an organization that is paying appropriate rewards. The rewards can be based on the sales figures of the product or service the contractor is creating.

An approach to quantify the license fees will suffer from the same limitations like the quantifying approach of the e-SAVE Software Suite does. Therefore, a reliable projection of quantitative revenue streams cannot be provided at the current state of the project.

5.2.5.2.7 KEY RESOURCES

The e-SAVE License model is based on licensing e-SAVE knowledge. Therefore, the key resources for the conduction of that model are very few ones and envelop mainly the IPR that have to be in the possession of the business model operator. Furthermore, human and financial resources are required to conduct the key activities.

5.2.5.2.8 KEY ACTIVITIES

Since the business model is only affiliated with the selling of licenses, the major activity will be marketing-related. Depending on the structure of the e-SAVE foreground, the licensed knowledge has to be prepared and documented properly for the market transfer.

5.2.5.2.9 KEY PARTNERS

The business model demands for no key partnerships.

5.2.5.2.10 COST STRUCTURE

The cost structure can be describes as value-driven, since the value proposition is not to provide low prices but outstanding algorithms, structures and libraries. Furthermore, fixed costs for preparing and documenting the foreground and marketing are dominating the cost structure, since variable costs for the transactions are very low and can be neglected.

5.2.5.3 E-SAVE ADVISORY SERVICES

5.2.5.3.1 OPERATOR

The e-SAVE Software Suite will be exploited by business driven project partners.

5.2.5.3.2 VALUE BENEFICIARIES

The e-SAVE Advisory Services focuses on a niche market represented by companies of the FMCG sector that are willing to enrich their portfolio of expertize regarding green aspects or want to improve specified parts of their company or their business regarding to green aspects. The whole FMCG industry is addressed.

Furthermore, public authorities are entities that have the need for advisory in the related field to decide over, and form when indicated, further regulations concerning the field of green performance of supply chains and companies in general.

5.2.5.3.3 VALUE PROPOSITIONS

The e-SAVE Advisory Services are designed to offer consultation services regarding collaboration platform design, supply chain design, simulation and management, consumer services and life cycle assessment, all considering green aspects and energy efficiency.

The users are instructed on how to create competitive advantages by reacting on the current and prospective industry trends of green consumer awareness, and both to reduce costs and to enhance performance in the supply chains by establishing coordination and communication beyond company borders, optimizing supply chain planning and operating and assessing the environmental impact of products.
Furthermore, the e-SAVE Advisory Services offer training activities to the customer's personnel in the context of green supply chain management, environmental aspects and environmental awareness.

Additionally, the e-SAVE Advisory Services provide extensive knowledge regarding ontologies of energy efficiency and measuring, calculating and monitoring of harming substances. Thus, the e-SAVE Advisory Services may assist in the forming of further regulations concerning energy efficiency.

5.2.5.3.4 CHANNELS

The awareness of potential customers shall be raised through the appearance in (scientific) publications, presentations, personal contacts to existing business partners and a website. Concrete suggestions regarding possible publication and presentation in media are equal to the enumeration of the channels of the e-SAVE Software Suite model. The potential customers may evaluate the value proposition of the e-SAVE Suite business model through the website, print media and personal consulting. The order process will be personal, since matter and volume of the advisory services have to be specified. An after-sales support will not be provided, since no continuous product is distributed.

5.2.5.3.5 VALUE BENEFICIARIES RELATIONSHIPS

After ordering the e-SAVE Advisory Services: the relationship to that customer will be on the basis of a personal assistance. This can be deduced from the usually non-recurring service but with high value character of the executed services that legitimate a personal assistance, but no dedicated personal assistance.

5.2.5.3.6 REVENUE STREAMS

The revenue Streams are non-recurring payments for carried out advisory services. As it is common for advisory services, the revenues are charged based on the hours of work. The rate per hour will be geared to those of management consultants.

5.2.5.3.7 KEY RESOURCES

The e-SAVE Advisory Services model is based on the utilization of e-SAVE knowledge. Therefore, the key resources for the conduction of that model are manageable and envelop mainly the IPR that have to be in the possession of the business model operator. Furthermore, human and financial resources are required to conduct the key activities.

5.2.5.3.8 KEY ACTIVITIES

Key activities for the e-SAVE Advisory Services are determined by appropriate editing activities to transform the knowledge into applicable forms, marketing activities to stimulate the distribution, and the advisory activities itself.

5.2.5.3.9 KEY PARTNERS

There are no key partnerships in this model.

5.2.5.3.10 COST STRUCTURE

The cost structure can be describes as value-driven, since the value proposition is not to provide low prices but outstanding services. Furthermore, fixed costs for editing knowledge and marketing dominate the cost structure. Nevertheless, variable costs for carrying out advisory activities, precisely for human resources, are significant, too.

5.2.5.4 E-SAVE ACADEMICS

5.2.5.4.1 OPERATOR

The e-SAVE Software Suite will be exploited by research driven project partners.

5.2.5.4.2 VALUE BENEFICIARIES

The e-SAVE Academics model focuses on two niche markets: One the one hand, students who are willing to acquire competencies in the e-SAVE related disciplines, i.e. green supply chain design, simulation and operation, green life cycle assessment, collaboration infrastructure design. On the other hand, funding authorities are addressed that offer the operator the possibility for further funding and the affiliated scientific work including scientific staff.

5.2.5.4.3 VALUE PROPOSITIONS

e-SAVE Academics is offering education covering the complete spectrum of knowledge that is gained from the e-SAVE project. This includes both conceptual knowledge represented by background knowledge, and applied knowledge condensed in the systems developed within the e-SAVE project.

5.2.5.4.4 CHANNELS

The awareness among potential students will be raised primarily through web content and printed media, whereby the web content will be both provided by the individual operator and by the relevant universities, respective faculties. Printed media are likely to be operated by the relevant universities. The student's evaluation whether or not the offered value fits his demands will be driven either by the operator's website or by personal assistance. The delivery of the services, if the potential student decided to consume it, will be delivered personal through lectures and tutorials.

Funding authorities usually have to be contacted in predetermined manner, often by structured proposals.

5.2.5.4.5 VALUE BENEFICIARIES RELATIONSHIPS

The relationship to students will include both personal assistance, for instance lectures, and automated services, for instance electronic education environments.

The relation to funding entities is mainly by automated services, like web portals defined by the respective entity.

5.2.5.4.6 REVENUE STREAMS

E-SAVE Academics teaching activities will not generate direct revenues; nevertheless the respective operator may receive revenues in return for educational duties. These duties can be carried out by the mentioned teaching activities. Moreover, the operator has the ability to recruit potential employees within educational events, which might not be called revenue, but is more of compensation.

Further funding create revenue streams that can be formed in multiple manners, for instance recurring and non-recurring funding, funding for human or technical resources. A precise revenue stream cannot be defined due to the multiple possibilities.

5.2.5.4.7 KEY RESOURCES

The e-SAVE Software Suite model is based on the utilization of e-SAVE knowledge. Therefore, the key resources for the conduction of that model are limited and envelop mainly the IPR that have to be in the possession of the business model operator. Furthermore, human resources are required to conduct the key activities.

5.2.5.4.8 KEY ACTIVITIES

The key activities result from the proposed values therefore they include the conduction of education activities and the necessary preparations. Additionally, the key activities include the evaluation of potential funders and funding programs and the respective composition of proposals. In case of success, the R&D activities within the proposal have to be carried out.

5.2.5.4.9 KEY PARTNERS

It is reasonable to find correspondent partners for funding opportunities. Chances will rise to succeed in the proposal proceedings and to conduct successful R&D projects through such cooperation's.

5.2.5.4.10 COST STRUCTURE

Variable Cost for education activities can be neglected, fixed costs are determined by human resources to conduct and prepare lectures and tutorials and other resources, for instance facilities.

For funding opportunities, proposals have to be worked out, and in case of success relevant R&D activities have to be carried out. This leads to high variable costs, since they are dependent on the number of proposals and R&D projects. Fixed costs are determined by other resources, e.g. facilities.

5.2.5.5 E-SAVE PROCESS IMPROVEMENT

5.2.5.5.1 OPERATOR

The e-SAVE Software Suite will be exploited by utilization driven project partners.

5.2.5.5.2 VALUE BENEFICIARIES

The e-SAVE Process Improvement model focuses on a niche market represented by the relevant division of the companies participating in the e-SAVE project. In particular those divisions are entities that are willing to enrich their competencies regarding green aspects. The e-SAVE Process Improvement model focuses both on operators of supply chains and on designers of product packaging.

5.2.5.5.3 VALUE PROPOSITIONS

The e-SAVE Process Improvement is meant to offer knowledge regarding collaboration platform design, supply chain design, simulation and management, consumer services and life cycle assessment, all considering green aspects and energy efficiency.
The users may create competitive advantages by reacting on the current and prospective industry trends of green consumer awareness, and both to reduce costs and to enhance performance in the supply chain by establishing coordination and communication beyond company borders, optimizing supply chain planning and operating and assessing the environmental impact of products. Furthermore, the e-SAVE Process Improvement enables training activities to the user's personnel in the context of green supply chain management, environmental aspects and environmental awareness. Additionally, the e-SAVE Process Improvement provides extensive knowledge regarding ontologies of energy efficiency and measuring, calculating and monitoring of harming substances.

5.2.5.5.4 CHANNELS

The awareness among potential users will be raised primarily through the participation in the project e-SAVE. The possibility to evaluate whether the e-SAVE Process Improvement is suitable for the need of an organization is given by the ongoing documentation of the project and personal experience of project partners. An after-sales support will not be provided, since the value beneficiary will implement and operate e-SAVE Process Improvement on his own.

5.2.5.5.5 VALUE BENEFICIARIES RELATIONSHIPS

Value beneficiaries' relationships are not specified explicitly.

5.2.5.5.6 REVENUE STREAMS

E-SAVE Process Improvement will not create revenues, since the relevant foreground is utilized within the consortium and not charged.

5.2.5.5.7 KEY RESOURCES

The e-SAVE Process Improvement model is based on the utilization of e-SAVE knowledge. Therefore, the key resources for the conduction of that model are very limited and envelop mainly the IPR that have to be in the possession of the business model operator and the relevant system, structures and methods. Furthermore, human resources are required to conduct the key activities.

5.2.5.5.8 KEY ACTIVITIES

The key activities result from the proposed values therefore they include the implementation of the e-SAVE Process Improvement techniques into the beneficiary's systems.

5.2.5.5.9 KEY PARTNERS

There are no key partnerships in this model.

5.2.5.5.10 COST STRUCTURE

The e-SAVE Process Improvement model causes costs resulting from the key activities. Therefore, mainly costs for the implementation into the beneficiary's systems occur.

6 CONCLUSION

This thesis began with the task to generate an exploitation strategy for the e-SAVE project. Through the evaluation of existing literature it became apparent that there are no structured approaches to develop such strategies, a fortiori in cases of projects funded by the 7th Framework Program of the EC: Literature has been analyzed and existent limitations have been pointed out, not only regarding the frameworks for Exploitation Strategies.

In order to overcome the mentioned limitations, an innovative methodology has been created: For that purpose the starting base and the final requirements of a complete exploitation strategy have been lined out in a first step. Based on the identified starting base and requirements, techniques from related fields, which were able to contribute, have been identified. Thus, a process based methodology, starting at the project documentation and finishing at the plan for the use of foreground, was introduced. The identification of exploitable foreground represents additionally an intermediate state. The states have been connected by sequences, while the first sequence focuses on project characteristics and the second sequence focuses on a wider context: Taking the NPD framework into account, a structure was formed and filled with several well-founded approaches, for instance from the fields of business planning. Finally, the plan for the use of foreground is presented appropriately.

In a next step, the developed methodology was applied to the EC-funded project e-SAVE in order to provide an expandable initial version of the plan for the use of foreground. Coming from the project documentation, the exploitable foreground was identified and developed to five different exploitation models.

Nevertheless, the two major limitations shall be pointed out:

Firstly, it has to be emphasized, that this thesis focused on the building of a plan for the use of the foreground generated from a R&D project. It does not provide further implications for the upcoming course this means the realization of the planned matters. Nevertheless, the mentioned NPD framework gives concrete clues concerning the further procedure: Referring to the stages, the next step includes the development of the concrete products and services, followed by a step afflicted with testing and validating issues. As a last step, the launch of the developed products and services is to be conducted. Especially for the upcoming stages a comparison to the project course is reasonable, as it already includes a few of the described activities and therefore redundancies between the considered innovations considered in the actual project course and the intended products and services may exist and ease the further proceeding.

Secondly, this thesis is set up on project information resulting from the corresponding documentation and is therefore suffering the same limitations: The project documentation is developed prior to the execution of the project itself and hence, represents a projection of the estimated future progress. Especially because R&D activities are in uncharted waters, their progress is affected by uncertainty and current states are likely to deviate from the targeted ones. As the project course possibly alternates, the initial position for the planned Exploitation Strategy may alternate. In this case, the developed Exploitation Strategy may have to be revised, too. Summing up, the presented Exploitation Strategy represents an initial state and does not claim completeness or finality, but has to be adapted if necessary.

ANNEX A: DELIVERABLES OF THE E-SAVE PROJECT

Deliverables of e-SAVE, following (E-SAVE Consortium, 2011, p. 2ff.):

Number of Deliver-able	Name of Deliverable	Deliverable represents initial version	Deliverable affiliated with administra-tive / manage-ment tasks	Deliverable represents reports or document-ations	Relevant for exploitation
D1.1	Requirements, Service Definition and Data Infrastructure – Initial Version	Yes	No	No	No
D1.2	Requirements, Service Definition and Data Infrastructure – Final Version	No	No	No	Yes
D1.3	Ontologies for Energy Efficiency	No	No	No	Yes
D2.1	Product Lifecycle Modeling and Assessment Report	No	No	Yes	No
D2.2	Energy Efficiency and Life Cycle Assessment Tools Description - Initial Version	Yes	No	Yes	No
D2.3	Energy Efficiency and Life Cycle Assessment Tools – Initial Version	Yes	No	No	No
D2.4	Energy Efficiency and Life Cycle Assessment Tools Description – Final Version	No	No	No	Yes
D2.5	Energy Efficiency and Life Cycle Assessment Tools – Final Version	No	No	No	Yes
D3.1	Operations and Supply Chain Management Tools Description - Initial Version	Yes	No	Yes	No
D3.2	Prototype of Operations and Supply Chain Management	Yes	No	No	No

	Tools - Initial Version				
D3.3	Operations and Supply Chain Management Tools Description Document - Final Version	No	No	No	Yes
D3.4	Prototype of Operations and Supply Chain Management Tools - Final Version	No	No	No	Yes
D4.1	Simulation Tools Description - Initial Version	Yes	No	Yes	No
D4.2	Simulation Tools - Initial Version	Yes	No	No	No
D4.3	Simulation Experimentation and Impact Assessment Report – Initial Version	Yes	No	Yes	No
D4.4	Simulation Tools Description - Final Version	No	No	No	Yes
D4.5	Simulation Tools - Final Version	No	No	No	Yes
D4.6	Simulation Experimentation and Impact Assessment Report - Final Version	No	No	Yes	No
D5.1	e-SAVE Architecture & High-Level Design Document	No	No	Yes	No
D5.2	Collaboration Infrastructure Design Document - Initial Version	Yes	No	Yes	No
D5.3	Collaboration Infrastructure Design Document - Final Version	No	No	No	Yes
D5.4	Integrated System - Initial Version	Yes	No	No	No
D5.5	Integrated System - Final Version	No	No	No	Yes
D5.6	Integrated System Testing	Yes	No	Yes	No

	Report - Initial Version				
D5.7	Integrated System Testing Report - Final Version	No	No	Yes	No
D6.1	First Pilot Report	No	No	Yes	No
D6.2	Second Pilot Report	No	No	Yes	No
D6.3	Overall Assessment and Business Validation - Initial Version	Yes	No	Yes	No
D6.4	Overall Assessment and Business Validation - Final Version	No	No	Yes	No
D7.1	Project Website	No	Yes	No	No
D7.2	e-SAVE Exploitation Strategy - Initial Version	Yes	Yes	No	No
D7.3	e-SAVE Exploitation Strategy - Final Version	No	Yes	No	No
D7.4	e-SAVE XML Schema Definition for Information Sharing	No	No	Yes	No
D8.1	First periodic Activity and Management Report	No	Yes	No	No
D8.2	Second Periodic Activity and Management Report	No	Yes	No	No
D8.3	Third Periodic Activity and Management Report	No	Yes	No	No
D8.4	Final Report	No	No	No	No

ANNEX B: E-SAVE SOFTWARE SUITE EXPLOITATION MODEL

<table>
<tr><td colspan="5">Operator

BUSINESS DRIVEN PROJECT PARTNER</td></tr>
<tr><td rowspan="2">Key Partners

DISTRIBUTORS</td><td>Key Activities

R&D, MARKETING, CUSTOMIZING & MAINTENANCE</td><td rowspan="2">Value Propositions

SOFTWARE FOR GREEN SUPPLY CHAIN DESIGN, OPERATION AND SIMULATION; GREEN LIFE CYCLE ASSESSMENT; GREEN CONSUMER SERVICES</td><td>Value Beneficiaries Relationships

DEDICATED PERSONAL ASSISTANCE</td><td rowspan="2">Value Beneficiaries

SELECTED COMPANIES OF THE FMCG SECTOR WITH DEMAND FOR RECURRING AND CONSTANT GREEN SOLUTIONS</td></tr>
<tr><td>Key Resources

IPR, HUMAN AND FINANCIAL RESSOURCES</td><td>Channels

SCIENTIFIC PUBLICATIONS, TRADE FAIRS, PERSONAL CONTACTS, WEB AND PRINT MEDIA</td></tr>
<tr><td colspan="2">Cost Structure

VALUE DRIVEN; DETERMINED BY R&D, MARKETING, CUSTOMIZING & MAINTENANCE</td><td colspan="3">Revenue Streams

CHARGES THROUGH PRODUCT DISTRIBUTION AND MAINTENANCE</td></tr>
</table>

ANNEX C: E-SAVE LICENSES EXPLOITATION MODEL

<table>
<tr><td colspan="5">Operator

BUSINESS DRIVEN PROJECT PARTNER</td></tr>
<tr><td rowspan="2">Key Partners

NONE</td><td>Key Activities

PREPARATION & DOCUMENTATION, MARKETING</td><td rowspan="2">Value Propositions

ALGORITHMS FOR GREEN SUPPLY CHAIN DESIGN, OPERATION AND SIMULATION; GREEN LIFE CYCLE ASSESSMENT; GREEN CONSUMER SERVICES</td><td>Value Beneficiaries Relationships

PERSONAL ASSISTANCE</td><td rowspan="2">Value Beneficiaries

SOFTWARE COMPANIES WITH DEMAND FOR GREEN SCM AND LCA EXPERTIZE</td></tr>
<tr><td>Key Resources

IPR, HUMAN AND FINANCIAL RESSOURCES</td><td>Channels

SCIENTIFIC PUBLICATIONS, TRADE FAIRS, PERSONAL CONTACTS, WEB AND PRINT MEDIA</td></tr>
<tr><td colspan="2">Cost Structure

VALUE DRIVEN; DETERMINED BY PREPARATION & DOCUMENTATION, MARKETING</td><td colspan="3">Revenue Streams

LICENSE FEES</td></tr>
</table>

ANNEX D: E-SAVE ADVISORY EXPLOITATION MODEL

<table>
<tr><td colspan="5">Operator

BUSINESS DRIVEN PROJECT PARTNER</td></tr>
<tr><td rowspan="2">Key Partners

NONE</td><td>Key Activities

TRANSFORMING KNOWLEDGE, MARKETING, ADVISORY</td><td rowspan="2">Value Propositions

CONSULTING AND TRAINING REGARDING GREEN SUPPLY CHAIN DESIGN, OPERATION AND SIMULATION; GREEN LIFE CYCLE ASSESSMENT; GREEN CONSUMER SERVICES; ASSESSMENT OF ENVIRONMENTAL IMPACTS</td><td>Value Beneficiaries Relationships

PERSONAL ASSISTANCE</td><td rowspan="2">Value Beneficiaries

SELECTED COMPANIES OF THE FMCG SECTOR WITH DEMAND FOR NON-RECURRING GREEN SOLUTIONS; PUBLIC AUTHORITIES WITH DEMAND FOR RELEVANT ENVIRONMENTAL EXPERTIZE</td></tr>
<tr><td>Key Resources

IPR, HUMAN AND FINANCIAL RESSOURCES</td><td>Channels

SCIENTIFIC PUBLICATIONS, TRADE FAIRS, PERSONAL CONTACTS, WEB AND PRINT MEDIA</td></tr>
<tr><td colspan="3">Cost Structure

VALUE DRIVEN; DETERMINED BY TRANSFORMING KNOWLEDGE, MARKETING, ADVISORY</td><td colspan="2">Revenue Streams

NON-RECURRING EARNINGS</td></tr>
</table>

ANNEX E: E-SAVE ACADEMIC EXPLOITATION MODEL

<table>
<tr><td colspan="5">Operator

RESEARCH DRIVEN PROJECT PARTNER</td></tr>
<tr><td rowspan="2">Key Partners

POTENTIAL RESEARCH PARTNERS</td><td>Key Activities

MARKETING; TEACHING; EVALUATION OF POTENTIAL FUNDERS; APPLYING; R&D</td><td rowspan="2">Value Propositions

COMPLETE KNOWLEDGE RESULTING FROM THE E-SAVE PROJECT (CONCEPTUAL AND APPLIED KNOWLEDGE)</td><td>Value Beneficiaries Relationships

PERSONAL ASSISTANCE; AUTOMATED</td><td rowspan="2">Value Beneficiaries

STUDENTS; SCIENTIFIC STAFF; FUNDING AUTHORITIES</td></tr>
<tr><td>Key Resources

IPR, HUMAN RESSOURCES</td><td>Channels

WEB AND PRINT MEDIA; STRUCTURES PROPOSALS</td></tr>
<tr><td colspan="3">Cost Structure

DETERMINED MARKETING; TEACHING; EVALUATION OF POTENTIAL FUNDERS; APPLYING; R&D</td><td colspan="2">Revenue Streams

EARNIGS FOR EDUCATIONAL SERVICES; FUNDING</td></tr>
</table>

ANNEX F: E-SAVE PROCESS IMPROVEMENT EXPLOITATION MODEL

<table>
<tr><td colspan="5">Operator

UTILIZATION DRIVEN PROJECT PARTNER</td></tr>
<tr><td rowspan="2">Key Partners

NONE</td><td>Key Activities

IMPLEMENATION</td><td rowspan="2">Value Propositions

KNOWLEDGE AND TOOLS REGARDING GREEN SUPPLY CHAIN DESIGN, OPERATION AND SIMULATION; GREEN LIFE CYCLE ASSESSMENT; GREEN CONSUMER SERVICES</td><td>Value Beneficiaries Relationships

NONE</td><td rowspan="2">Value Beneficiaries

RELEVANT DIVISIONS WITHIN THE COMPANIES PARTICIPATING IN E-SAVE, PARTICULARLY IN CONTEXT TO SUPPLY CHAINS AND PRODUCT PACKAGING</td></tr>
<tr><td>Key Resources

IPR, HUMAN RESSOURCES</td><td>Channels

E-SAVE PROJECT PARTICIPATION, DOCUMENTATION AND EVALUATION</td></tr>
<tr><td colspan="3">Cost Structure

DETERMINED BY IMPLEMENATION</td><td colspan="2">Revenue Streams

NONE</td></tr>
</table>

7 LITERATURE

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