Profitable business model for an open source, freeware

Author:
Franck Emmerich
SUMMARY

Title: Profitable business model for an open source, freeware

Author: Franck Emmerich

Supervisor: Klaus Solberg Söilen

Department: School of Management, Blekinge Institute of Technology

Course: Bachelor’s thesis in Business Administration, 10 credits

Purpose: The purpose of this work has been to understand how to finance a General Public License (GPL) software for a non-mass market product. I have constructed 2 questions, which will help me fulfill my purpose:

1. Is it possible to finance GPL software for a non-mass market product?
2. What are the possibilities to provide a sustainable business model for the software consortium based on GPL?

Method: By using Porters 5 Forces analysis, Ansoffs Product/Market matrix, SWOT analysis and Leitneritz open source business models, I try to explain and reach a solution to the initial question. A survey has been done to form a base for the business case and prove if profitability is at all possible.

Results: The solution is licensed under GPL and is given out for free. GPL is a license that forces the user to share the source code and freely distribute this.

The outcome of the SWOT analysis shows strengths and possible opportunities that can serve as an income base for EuMoS. The results from the survey are used to calculate the possible sales, net profit and gross margin. Both the net profit and gross margin are positive which indicates a possibility to generate a sustainable business model for EuMoS.

Based on this, I draw the conclusion that there is a possibility to finance GPL software for a non-mass market product. Nevertheless, this is under restrictions that it is marketed to companies and not individuals. The marketing of the GPL software needs to be carefully handled and all opportunities to create additional sales must be taken.

In this work I also discuss what strategy EuMoS should follow according to Porters 3 generic strategies. I propose aspera to follow the differentiation strategy, due to the already existing correlation between the strengths as outcome of the SWOT analysis and the requirements according to Porter.

In this work I also recommend some actions to be taken in the case of EuMoS, to make the most out of the opportunities shown in the SWOT analysis.
REFERENCES ........................................................................................................... 46

APPENDIX ............................................................................................................... 49

9.1 ACTIVITY PLANS ........................................................................................................... 49
9.2 AVAILABLE SOLUTIONS FOR GHG MONITORING AND REPORTING .......................... 50
9.3 SURVEY TO EUMoS USERGROUP .............................................................................. 51
  9.3.1 Survey to EuMoS User group, page 1 .................................................................. 51
  9.3.2 Survey to EuMoS User group, page 2 .................................................................. 52
  9.3.3 Results of the Survey to EuMoS User group .................................................. 54
9.4 TIME SCHEDULE IN EU IN GENERAL FOR MONITORING ...................................... 56
9.5 ACTUAL SITUATION FOR GHG EMISSION IN THE EU COUNTRIES ........................... 57
9.6 DISTANCE-TO-TARGET INDICATORS FOR THE KYOTO PROTOCOL AND BURDEN SHARING TARGETS OF EU MEMBER STATES ........................................................................... 58
9.7 NUMBER OF IMPACTED PLANTS IN THE EUROPEAN UNION ................................ 59
9.8 ADDITIONAL INFO ....................................................................................................... 59
FIGURES

Figure 2.1-1: An action research Model for Organizational Development .................................................. 13
Figure 2.1-2: Ansoff Product/Market matrix .......................................................................................... 18
Figure 2.1-3: Checklist for SWOT analysis ............................................................................................. 19
Figure 2.1-4: Porters Value Chain ........................................................................................................ 21
Figure 2.1-5: Porters 5 competitive forces ............................................................................................. 22
Figure 2.1-6: Hedman and Kalling's combined business model ............................................................... 26
Figure 2.1-7: Model for value chain for open source .............................................................................. 27
Figure 2.1-8: Resource focus for product distributors ............................................................................. 27
Figure 2.1-9: Value chain for OSS application producers ........................................................................ 28
Figure 2.1-10: Resource focus for service providers .............................................................................. 29
Figure 2.1-11: Interest model .................................................................................................................. 30
Figure 2.1-13: EuMoS Primary and Secondary OSS business model ..................................................... 34
Figure 2.1-14: EuMoS business model ................................................................................................... 34
Figure 2.1-15: SWOT analysis ................................................................................................................. 39
Figure 2.1-16: EuMoS projected sales development 2004-2010 .............................................................. 42
TABELS

Table 1-1: Requirements and risks with the generic strategies.................................................................24
Table 1-2: Correlation table between SWOT analysis and Porters Differentiation strategy requirements ..........40
Table 1-3: EuMoS in Ansoff Product/Market matrix .................................................................................41
Table 1-4, Available solutions for GHG monitoring and reporting..............................................................50
Table 1-5, Annual process of submission and review of MS inventories and compilation of the EC inventory 1) 56
Table 1-6: Greenhouse gas emission trends and Kyoto Protocol targets for 2008-2012 ..............................57
Table 1-7, Distance-to-target indicators (in index points = percent) for the Kyoto Protocol and burden sharing  
  targets of EU Member States ................................................................................................................58
Table 1-8, Number of impacted plants in the European Union .....................................................................59
1 BACKGROUND

At the end of the 20th century the Kyoto treaty for greenhouse gases was regulated to reduce the negative effects they have on the environment.

European Union governments have signed the United Nations' Kyoto treaty on climate change, and thereby promised to reduce emissions of greenhouse gases, during 2008-12, to on average, 8% below what they were in 1990. Each EU country has agreed to a national emission target and will issue carbon-dioxide allocations to every big industrial facility--in essence, granting them formal rights to emit the leading greenhouse gas, carbon dioxide. Firms unable to meet its target will be able to purchase additional carbon credits in a pan-EU market, which is scheduled for opening in January 2005.

Each country's plan is due to be submitted to the European Commission on a yearly basis. The software development company aspera has developed a solution for companies to monitor and report the amount of greenhouse gases produced. The solution is at the moment under the General Public License (GPL), which means that the program can be freely distributed under certain circumstances.

The EuMoS-System is delivered with a ready configured system environment installed with a Apache-Webserver, MySQL-Databank and PHP.

The software application is called EuMoS and is developed within a partnership between four companies; aspera that does the core development of the software, EUtech, 500ppm and ERM that does consultancy towards prospective users. The order and sponsor of the project to develop the solution has been Bayern Land, which also has run trials of EuMoS with 50 companies in cooperation with the 4 partners.

EuMoS is a software application which handles and creates reports over the emission of greenhouse gases, such as carbon-dioxide (CO2), Methan (CH4), Laughing gas (N2O), several forms of HFCs and fluorides. EuMoS supports the company in producing necessary key figures and delivers a report according to the EU-commission guidelines that is used to apply for the emission trading credits.

To be able to trade with emission rights the impacted companies first have to have an approved inventory of their GHG levels. This is one of the central outputs from the EuMoS software.
2 PURPOSE AND LIMITATION

As the product EuMoS is distributed through GPL there is no charge for the program as such, but a business model has to be created to sustain further development of the software. The software need further development and enhancements due to updates in the EU regulations for greenhouse gases on a regular basis. The market in Germany consists of some 1400 companies impacted by the EU GHG regulation, all in all 2500 plants. As most business models using GPL software are distributed to a mass-market, with a factor of 100 or 1000 times more customers, it is uncertain if these business models can be applied to the case of EuMoS. Therefore aspera and the three consulting companies want to examine the possibilities to finance the further development. The purpose of this study is to investigate, in cooperation with the EuMoS software consortium, “how to finance a GPL software such as EuMoS for a non-mass market product”.

Currently no such research has been done. The available business models all either focus on a huge community of users/developers that wants to contribute with their efforts, or products such as Linux or MySQL, with a mass-market deployment.

2.1 Problem description

The problem description can be divided into 3 areas: the important concepts such as GPL and its implications, GPL and dual licensing, problem description and the limitations.

2.1.1 GPL its implications and dual licensing

EuMoS is currently only licensed under General Public License (GPL). The licence is considered as highly restricted. GPL is “viral” and contaminates any new code that is incorporated to an existing piece of GPL software, and the new code will inherit the GPL. The GPL is a license with a history deriving from the Open Source Software (OSS) initiative. GPL forces the developer to share the developed code, and to distribute the software freely. The software can be altered but the derived code must always be re-published back to the OSS communion and distributed with the GPL.

The open source and GLP in specific puts the requirements that:
- “The source code for the program must be available for little or no charge
- Redistribution of the program, in source code or other form, must be allowed without fee
- Distribution of modified software must be allowed without discrimination
- The distribution of those modifications on the same terms as the original program must be permitted.”

As the product is distributed through GPL there is no charge for the program as such, but a business model has to be created to sustain further development of the software without any sales profit from the software. The software needs further development and enhancement on a regular basis, due to updates in the EU regulations for greenhouse gases.

The market in Germany consists of approximately 2500 plants from some 1400 companies. This can be considered as a small market in comparison with other open source markets

---

1 Lerner, Tirole, “The Scope of Open Source Licensing”, 2002
where there exists e.g. the several millions of distributed LINUX systems, mySQL databases, millions of Sleepycat Berkley DB and hundreds of thousands of Trolltechs GUI solutions.3

In the development case of EuMoS, the code has been produced by aspera only and aspera also holds the intellectual rights to the software as such. This also gives the option to have a so called dual licensing model for the EuMoS software. Dual licensing is when a product is registered under two licenses, in this case a free open source GPL license and a commercial license that must be purchased by the user. Companies like mySQL AB, Trolltech AS and Sleepycat Software Inc. has successfully used this option to generate income.4

2.1.2 Problem definition

At the initiation of this work the aim was to understand how the software EuMoS could be financed as an OSS product. The first activity was to read through existing business models for other OSS products such as LINUX, Netscape, mySQL etc. When going through these business models it became apparent that all of these products where very widespread and had a huge user base in comparison with the possible user base for EuMoS. When looking for products with a smaller user base, more similar to EuMoS, no information or litterature could be found on products supporting less than several 100 000 users developed by a commercial company. The products I found was distributed in lesser amount by individuals or without the aim to have a sustainable business, but created by enthusiasts. This observation raised two questions; is the size of the user base important to create a sustainable business model and will existing business models be able to support the case for a application developed for a non mass market. Another observation was that all OSS applications where mainly distributed to consumers where as the EuMoS application is targeting a pure business market. Is there a difference between an OSS application that is distributed to consumers and an application that is distributed to business users? The findings in the initiation of this work was presented to aspera and out of this discussion the frame for this essay was defined.

Following our discussions, aspera and the 3 consulting companies wanted to examine the possibilities to finance the further development of EuMoS. The purpose with this study was formulated in according to this:

“How to finance a GPL software for a non-mass market product”.

I have constructed two questions on a lower level, which will help me fulfill my purpose. These questions are:

1. Is it at all possible to finance GPL software for a non-mass market product?
2. What are the possibilities to provide a sustainable business model for the software consortium based on GPL?

The purpose is chosen with the assumption that there would be a difference between a mass market OSS product and a non-mass market OSS product. To understand if this is the case the existing business models will be looked at and assessed if an adaptation is needed to support a non-mass market product. During the study I will also examine if the type of user base, consumer of business users, is of importance for a OSS business model with the variable size

of the user base. The two lower-level questions are constructed to help me, step-wise, to come closer to fulfilling my purpose.
3 METHOD

The work has been based on available research literature and through cooperation with the software consortium, using mainly interviews and relevant statistical data, during the launch and establishment timeframe of the application. In addition, a close cooperation with the involved consortium and continuous updates of the research agenda has been made. With other words the results has been gathered with a qualitative approach using the action research method as guiding principle. The assumptions and findings have constantly been revised and are by no means concluded with this study. This study only marks a snapshot in the ongoing process of modeling the strategy to create a sustainable business.

3.1 Limitations

This study only focuses on one single product, the EuMoS application. This puts limitations on the possibility to do a generalization of the results. The users interviewed are tied to the EuMoS user group, as no access to other users has been available.

The theoretical frame of this work is limited to Porters, Ansoff and Mintzbergs work for general business strategies. It would be impossible to cover all business strategies and related theories in a study on this level. I have therefore limited myself to the above mentioned authorities. It can be discussed if not also authors like Drucker, Hamel & Prahalad or Haskett should have been part, but I am of the meaning that the chosen theories are defining the subject as well as providing a stable theoretical frame for the essay.

I have also chosen not to include any theories from microeconomics, such as supply and demand or pricing theories, as these are in my eyes not suitable for an analysis on this level. The markets investigated are primary the german market and secondary the EU market, other possible markets are left outside this work.

3.2 Literature research

The first aim in the literature research has been two folded: first to find research on similar cases like EuMoS and secondly to find business models and strategies that could support the understanding of the research questions.

I have used the following sources for the above mentioned purpose: LIBRIS websök (http://websok.libris.kb.se), The Economist article database (www.economist.com), the MIT free and open source software (F/OSS) community research paper database (http://opensource.mit.edu/online_papers.php) and GOOGLE (www.google.com). Literature recommendations have also been given from former teacher at BTH (Anders Hedenstierna), aspera, EUtech. I have also used references in material, I looked through but not used, for this essay. After the essay was nearly concluded a second literature search was done using the ABI/Inform database, but no additional literature could be found. All existing literature was already referred to in the MIT (F/OSS) research database.

A second part of the literature research was to create an understanding on the background and environment that the EuMoS application was situated in. Background material regarding the introduction of GHG regulation has been gathered using the Economist article database (www.economist.com), European Union web (europa.eu.int), GOOGLE, the German...
environmental institution web pages, (Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit, BMU) (http://www.umweltbundesamt.de/index-e.htm) , and the German authority to control and issue emission licenses (Deutsche Emissionshandelsstelle, DEHSt) web pages (http://www.dehst.de/).

3.3 Secondary data used
The secondary data in relation to OSS products used in this study is the data available from Dahlanders study and Välimäki study. These studies focus on OSS products that have dual licensing as part of their business models. I however use the data to form a understanding on the paying user base, and as dual licensing is also an option this does not put any limitations on the data.

I also use secondary data to estimate the market sizes, possible number of users of GHG monitoring applications in Germany and EU. All this information is collected from EU’s web servers and should quality wise be without concern. For the estimations of market prices, a estimation is used from the article “Estimation on economic volumes traded in 2005”\(^6\) and the uncertainty in these figures has also been kept in this report.

3.4 Selection of case and respondents
Two selections have been made for this work. First selection was made of EuMoS as a case. This was done on both requests from aspera and the direct interest in the development from my side.

The second selection was what users should be interviewed and how the collection of information would be performed. The selection of the candidates for the survey handed out was based on the participants at the EuMoS user forum. It would have been preferable to have a wider participation. However, due to two blocking issues, this could not be done. First the lack of addresses of the responsible in each company impacted by the GHG regulation was a hinder and secondly, the regulations in Germany that not requested mailings are considered as spam mail and therefore illegal, made it not possible to extend the number of participants. The collection of information from the respondents has been done through a survey. The reason for this is high efficiency, economical benefits and the time pressure to get the information in time. Surveys are generally quicker and less costly to perform than interviews. The need to get a wider participation from the users motivated the selection of a survey instead of interviews. It was also anticipated that the EuMoS users did not have the needed time to participate in interview, and also the time to evaluate interviews were not perceived to be in relation with the benefit of get deeper information. To somewhat compensate this, each question in the survey gave each respondent the possibility to formulate open answers.

3.5 Selection of methods to be used in the cooperation with aspera

The cooperation with the EuMos software consortium, mainly aspera, has been done in an action research manner. This concept is a part of the organizational development.

![Action Research Model for Organizational Development](image)

Figure 2.1-1: An action research Model for Organizational Development

Bell defines action research in the following way,

"Action research is the process of systematically collecting research data about an ongoing system relative to some objective, goal, or need of that system; feeding these data back to into the system; taking actions by altering selected variables within the system based both on the data and on hypotheses; and evaluating the results of actions by collecting more data" (Bell).

Two methods need to be clarified before the research work can start. First; how the designs of the research work shall be done. As mentioned, I have used the action research method. Secondly; what data collection methods needs to be used. For the data collection I have used both qualitative methods and quantitative methods. As qualitative method the unstructured interviews has been used as tool to collect data, in form of the meetings with aspera. As quantitative method, the survey has been used to collect data.

For this work, I have selected the action research method out of two reasons. The first is that when beginning with the study, it was not obvious where it would lead. During the first phase benchmarking was done to find similar cases in other areas that might be of a help to understand the research question, but after no comparable cases where identified, if became

---

8 French, Bell, *Organizational Development*, New Jersey: Prentice Hall, 1999, p.130
obvious that the understanding had to be build while trying to expand the knowledge on how an OSS solution could be financed for a non mass market. The action research method gives an opportunity to create an understanding and adjusts the given agenda when new knowledge evolved. The second reason is the opportunity of learning that the method gives for the involved parties. This work is both aimed to get a better understanding of the research question, but it is also a direct consultancy towards the software consortium. The action research method is in my eyes suitable to provide both the input and output for both the research work and for the consultancy work. Action research also serves the benefit that it can work as an umbrella for other methods. Both comparative studies and case study methods has been used. Comparative studies have been used in the form of benchmarking, when doing the competitive analysis. The case study method has been used to view the EuMoS application, its environment and the contributors as a case.

Other methods might have served the same purpose. For example a pure case study would also give the opportunity to study the events of EuMoS, but the drawback is that the consortium also wanted advice on the possible development. A pure case study does not give an opportunity for involvement of the researcher, which is the case of action research. Halvorsen mentions the possible methods such as longitudinal studies, experimental studies, case studies, comparative studies, validity studies, interdisciplinary research etc. All these methods have in common that the involvement of the researcher is limited, which is, as mentioned before, the main reason for me to refrain from using one of the methods exclusively.

As part of the action research, several steps were taken to create the understanding around the EuMoS case. The data collection was made in three phases. The first phase was to collect the available data for a competitive analysis, existing literature in the area of OSS business models and to create an understanding how the business case might look like. The second phase was to elaborate on marketing and, as an outcome of the first phase, invite to a user group meeting. The third phase was to conclude and present results. More detail on the three phases is given in the chapter 9.1, Activity Plans. Each of the phases started with a meeting with aspera. Each meeting was set-up with a loose agenda to give the possibility to elaborate more freely around possible activities that were to be the outcome of the meetings. Once the activities were set, these were used as a fixed frame for the next meeting. This gave us the freedom to take new directions at each meeting, and still make sure that the lead time to reach a result (of this work) was not missed. This freedom proved to very valuable at the initial phase of the work. Prior to the start, both the consortium and myself was convinced that a benchmarking would generate results that could give enough guidance for the EuMoS future path. But once the results from the benchmark showed that no similar business models existed, and there was a need to elaborate more to reach a conclusion, this learning could be integrated in the future work and a new agenda set for the first phase.

3.6 Surveys

To complement the secondary data found through the literature research, a survey has been sent out to the users of EuMoS via the user group. This primary data has been collected at the actual user group meeting, but also per email, as only some 25% of the users completed the survey sheet at the occasion. The survey produced is a multiple choice questionnaire with possibilities to fill in own comments. The questionnaire is included as attachment in chapter 9.3, Survey to EuMoS User group. The results from the survey can be found in chapter 5.6. Below I describe how these results has been calculated.
The average has been calculated by adding the numbers and dividing by the number of participants. The education average was calculated by giving a number for each level. The median has been calculated by selecting the value in the middle when sorting the values according to size. All calculations have been made in Microsoft Excel and using the Average and Median functions.

The answers where a multiple choice selection has been made, e.g. how to finance EuMoS further development, each positive answer has been marked as a 1. Percentage of the selected alternative has then been calculated by adding the number of 1’s and dividing by the number of participants.

Questions where a ranking is asked, e.g. what is the meaning of OSS for you, good quality etc. each alternative has been replaced with a ranking number and then the average of the results has been calculated. Five boxes were possible to mark. See example below.

Gute qualität: stimme überein □ □ □ □ □ stimme nicht überein
Good quality: (corresponds)                          (does not correspond)
Ranking made        1  2  3  4  5

I have then used the wordings “good” if the result was above 29. A value slightly higher or lower then 3 has been notes as above or below average.

For the full results of the survey see chapter 9.3.3.

3.7 Competitor research

The other primary data that was collected was the research of competitors to the software consortium. This has been done though searching for GHG monitoring application via the web (www.google.com) and though exhibitors at fares related to GHG. Input has also been received from aspera.

3.8 Methodology problems

By choosing the survey as method instead of interview, a conscious selection of quantitative data in preference of qualitative data was made. The survey has given less information on the factors behind the users statements then an interview would have done. I tried to compensate for this by having the option for “free statements” after each question, but this opportunity was very seldom used. The learning is that the depth in an interview is very hard to replace by a survey.

The first problem I see concerning the survey is the validity of the results from the survey. This must be questioned for two reasons. The first validity issue is the selection of the survey participants. They all belong to a group of possible users that has shown an active interest in the OSS application. This makes their answers possibly more biased in favor of open source software and EuMoS as a solution as such then other respondents. The possible solution to avoid this biased view would be to also distribute the survey to non-EuMoS users, but as

9 Note: the reversed grading is due to that the German school system uses 1 as the best grade, and lower grades are then in the order 2, 3, 4, 5.
stated previously in this work, this has been impossible due to both German laws and the access of addresses for such respondents. As a result, the study has to interpret the information based on this selection.

The second issue is the actual questions in the survey. I have followed advises by Dahmström in her book regarding surveys to the most possible extent\textsuperscript{10}, i.e. to start with simple questions first that all can answer before coming to more complex questions. However, some basic uncertainties remain as with all surveys. Are the right questions asked? Have the participants answered honestly or with a political agenda in mind? Are the answers correctly interpreted? How is for example the questions related to OSS quality interpreted by the respondents? The statement “Good Quality”, has probably different meanings for different people, and almost certainly is depending on cultural aspect how this wording is interpreted. The questions on how EuMoS should be financed is put with clear alternatives, including alternatives that would negatively impact the cost for the users I do not foresee that a political agenda has been behind these answers.

Two questions that are hard to interpret the answers to are “What benefits do you see, that EuMoS is a Open Source Product?: My company can participate in the development” and the question “How do you expect that EuMoS as an Open Source product should be financed?: Through my companies participation in the development”. The first question got a positive answer rate of 73\% and the second question a positive answer rate of 60\%. Does this mean that the companies are willing to actively contribute with programming efforts or does this participation takes other forms like participation in the user forum? If I were to construct the survey today I would have added an additional question to clarify what kind of participation the respondents was suggesting. In this work I have chosen to not use the results of the two mentioned answers indicating an willingness to participate in the development of EuMoS. I have done this, to lower the risk of a faulty interpretation of the customers willingness to participate with active roles in the EuMoS business model.

The research of competitors has been done in German and English language. Therefore there is a risk that local products in non German or non English speaking countries that has a aim to also enter the German market or step into the EU market, has not been found and identified. The search for competitors is also a less stable part in the study, first because this information continuously changes as new entrants might appear on the German and European market, which makes this work very time dependant, secondly because there exists no good overview information on the solutions available. This means that the information quality is not 100\% as competing solutions might not have been found at the time the research was done or that new entrants to the market appeared after this work. I have not found a good methodology to avoid these problems and the results form the competitor research must be taken as is.

4 THEORIES

This chapter covers theories within market strategy and open source business models. I first go through different theories concerning market strategy. After the market strategy theories, I continue with explaining different business models for open source software. The theories in this part is concentrated on the open source specific factors.

4.1 Market strategy

There are several tools and theories on how to define structure and analyze market information and markets. This chapter explores some of the important theories that can prove useful to understand if it is possible to finance a GPL software for a non-mass market product and what the possibilities are to provide a sustainable business model for the software consortium based on GPL. The focus is on three authorities in this area: Ansoff, Mintzberg and Porter.

4.1.1 Ansoff Strategic Management

In Ansoff book Strategic Management, he uses several key factors to describe what strategy and behavior model can be used in certain situations. The key factors are turbulence in the environment, power structure, strategic culture, strategic leadership, Organizational resources, leadership ability and logical ability. He breaks each of these key factors down to create the bases for the analysis. Ansoff proposes a model for the strategic choices. This model is very detailed and the effort to use this in the case of EuMoS is not justified, I find.

4.1.2 Ansoff Product/Market matrix

Ansoff also describes the Product/Market matrix as a pathway to growth. The Ansoff product/market theory can serve as a useful tool for the software consortium. I will elaborate on this perspective shortly in the analysis of what future options the EuMoS product might have.

The Matrix compares the market penetration strategies, product development strategies, market development strategies and horizontal and vertical integration and diversification strategies.

---

11 Ansoff, Strategisk Företagsledning, Malmö: Liber, 1978, pp. 51-73
12 Ansoff refers to Environmental serving organizations = private and governmental organizations that are producing services or products to the society.
13 Ansoff, Strategisk Företagsledning, Malmö: Liber, 1978, pp. 191-207
The matrix serves as a guide on what strategy a company can take to grow the current and future business and suggests the probability that this strategy will be successful. The Matrix contains of two dimensions; the product dimension and the market penetration dimension. It then divides these dimensions into existing market or existing product and new market or new product for the company. For the Market penetration the objective is to create additional turnover from the existing market. The probability of success with this strategy is the highest among the four alternatives. This is also the most profitable in a short and medium term. Market development is to find new markets for an existing product; this can be expansions to new geographical areas or to new customer segments. The Product launch is the survival path for the company’s future. Here the strategy is to develop new products for the present market. Diversification is a strategy to change the previous focus in the company to a new market with a new product. This is the riskiest strategy but might also in certain circumstances be logical for the company.

### 4.1.3 SWOT Analysis

The SWOT analysis is a classic tool to structure the environment. The SWOT analysis will be used to structure the market factors for the EuMoS application in the analysis part.

In 1957 Philip Selznick introduced the base for the SWOT analysis with the idea of matching the organization's internal factors with external environmental circumstances. Selznick's core idea was developed by Learned, Andrews, and others at the Harvard Business School General Management Group into what we now call SWOT analysis\(^\text{15}\).
A SWOT analysis is a framework to identify the Strengths, Weaknesses, Opportunities and Threats in an organization. Strengths and Weaknesses are internal values that the organization shows. Opportunities and Threats are external value that the organization is exposed too. The inputs to a SWOT analysis are often the results from other analyses, such as Value add analysis, Porters Value chain analysis, market analysis, environmental analysis, and industry and competitor analysis.

4.1.4 Mintzberg 5 P’s For Strategy

Henry Mintzberg reexamined how strategic management was done. He looked at the strategic process and concluded it was much more fluid and not as predictable as people thought. For this paper all five versions of strategy according to Mintzberg can be used, but I will mainly use the view on strategy as a plan combined with strategy as a pattern. This is due to that strategy as a ploy better serves a situation where e.g. competition needs to be outmaneuvered. Strategy as position is more aimed towards a branding situation and Strategy as perspective for a less pragmatic strategy view then this work needs in my eyes. Strategy as a plan and patterns describes the situation where a strategy needs to outline the future path and give guidance towards possible road choices, which I think is the case for this work.

Mintzberg mentions that strategies have several faces. A strategy can be intended, unrealized, deliberate, and emergent and executed. The intended strategy is planned and is expected to be executed by the organization. The unrealized strategy is strategies that for one or another reason was not possible to realize. The deliberate strategy is strategies that were planned and then executed. The emergent strategy is a strategy that emerges from a chain of events. The executed strategy is a strategy that has already been executed.

---

Therefore Mintzberg did not point to one process that could be called strategic planning. Instead he concludes that there are five types of strategies. Mintzberg listed them as:

- **Strategy as plan**, giving a direction, guide, course of action. Strategy is seen as intention rather than actual.
- **Strategy as ploy**, a maneuver intended to outwit a competitor
- **Strategy as pattern**, leading into a consistent pattern of past behavior. Strategy is realized rather than intended.
- **Strategy as position**, when looking at locating of brands, products, or companies within the framework of consumers or other stakeholders. The strategy is determined primarily by factors outside the firm.
- **Strategy as perspective**, the strategy determined primarily by a master strategist.

In the conservative hierarchy strategy is something that is being formed from a perspective to a plan to take a position and execute the necessary actions in this pattern. One can also form an emergent strategy from the patterns of events that has occurred to create a plan based on the perspective the organization has. However, the organization can also create a perspective from an action pattern or position. In the case the organizations perspective is firm, this can lead to a changed position in the perspective, but never outside it.

### 4.1.5 Porters Strategy View

Porter describes three strategic positions that an organization can use. His strategic view is directly relevant for every business model, but I have chosen not to include them as a working model in this work. In my view a business model needs to exist prior to adopting Porters strategy view. This work aims to create an understanding about how a business model might look like, if at all feasible, and using Porters strategy view would be a second step, outside the scope of this work.

Variety based positioning, is when a organization produces a product or service based on the variety of products or services. Need based positioning arise when an organization produces products/services based on the need by the customer segment the organization targets. The third strategic position Porter describes is access based positioning. Access based positioning is when a organization bases its customer base on the access to the product/service the organization supplies.

Porter also mentions four factors that direct the strategy and it’s usefulness for an organization. The four factors are; strategy is an advantage, strategy rests on unique activities, a sustainable strategy requires trade-offs and finally that the organizations fit drives both the competitive advantage and the sustainability.

Strategy is an advantage that an organization can maintain regardless changes in example technology, productivity or quality. This implies that to outperform others the organization needs to create a difference that the organization can preserve over time. This difference must not only be based on operational effectiveness as Porter states that the border is constantly moved for the effectiveness. On an open effective market the relation between the relative

---

cost position and the buyers’ value delivered tends to go towards the lowest possible value. This implies that operational efficiency can not be counted as a strategy as the border area constantly changes in comparison with a strategy which is durable.

A strategy is based on unique activities. To maintain a competitive advantage the organization is required to deliberately select different activities to deliver a unique mix of values to it’s customers.

A strategy that can be sustained requires trade-offs. To preserve a strategy it is impossible to perform everything the organization is capable of, but it needs to restrain from doing some activities.

The organizational fit drives both the competitive advantage and the sustainability. This means that the strategy how activities fits together impacts the organizations competitive advantage as more well fitted activities creates a stronger organization and a better sustainability.

4.1.6 Porters Value Chain

Porter describes the value chain that a company can contribute to add value to the customer. The value chain identifies five primary and four support activities.

The Value chain is an important tool to structure and understand the different perspectives and the value they bring when delivering a product or service to the customer. For the EuMoS case this tool is too complex with all dimensions and a stripped version would suit better. Leiteritz provides instead a model for open source business models that is more applicable to the EuMoS case, see chapter 4.2.2.

![Porters Value Chain Diagram](image)

**Figure 2.1-4: Porters Value Chain**

The five primary activities are:
- **Inbound logistics**, to receive goods or services from suppliers and moving these on to the operations activity.
- **Operations**, where the production of the product or service is made.
- **Outbound Logistics** covers order fulfillment which means warehousing of finished goods and the distribution of the product or service.
- **Marketing and Sales**, includes pricing, packaging and advertising and market research.
- **Services** include all services done after the first sale (support etc).
The Four support activities contribute to the primary activities during the complete chain:

- **Firm infrastructure**, includes activities such as accounting, facilities, planning and control and general administration.
- **Human Resource management** covers recruitment, training, planning, labor relations and salaries.
- **Technology development** is development of new products or services and enhancements to the existing company portfolio. Due to the importance in high tech industries, this is sometimes seen as a primary activity.
- **Procurement**, covers purchasing of raw material, intermediate goods, office supply and e.g. electricity.

The value chain is useful to identify activities where value is added as opposed to where value is lost. In addition, to identify if a product or service shall be produced in-house or outsourced.

**4.1.7 Porters Five Forces**

Porter also describes the five forces that drive the industry competition\(^\text{19}\). Porters 5 competitive forces provide a framework to analyze the factors that drives competition within an industry and suggests the strategies a company can use. I will use the model to create an understanding of how the market works prior to the analysis phase.

The industry competition is driven by the rivalry among the existing firms, potential entrants, suppliers, buyers and substitutions. Each of these areas has factors that either strengthens the force or weakens it. See the figure below for the factors that are connected to each force.

---

**Figure 2.1-5: Porters 5 competitive forces**

---

\[^{19}\text{Porter, Competitive Advantage, New York: Free Press, 1985}\]
4.1.8 Porter’s three generic competitive strategies

Porter also suggests three generic strategies to cope with the five competitive forces and thereby outperform the competition:\(^{20}\):

- overall cost leadership
- differentiation
- focus

These three generic strategies can provide a framework for a future strategic direction for EuMoS. I will use this model to develop some thought on the next possible steps for the EuMoS product in chapter 6.1.

The *overall cost leadership* puts focus on the internal costs for the organization and its suppliers. The goal is to achieve an overall cost leadership in an industry, and this can be done by functional policies. This strategy requires an aggressive focus on keeping costs low by, efficient-scale facilities, pursuit of cost reductions from experience, tight cost and overhead control avoidance of marginal customer accounts and cost minimization in areas as R&D, Service sales, advertising etc. By achieving a low cost base the company can obtain a better return than the industry average despite the strong competition.

*Differentiation* puts focus on the product or service that the company offers. The product or service must be perceived as truly unique industrywide. This differentiation can take many forms: a design or brand image, technology, customer services, sales network but also other dimensions. The advantage with the differentiation strategy, and the reason the company applying it successfully is receiving above market returns, is that the strategy deals with how to cope with the 5 competitive forces. The strategy insulates towards the competing companies, due to the brand loyalty, and it saves the company from needing to compete with the low-cost position.

Porter’s last generic strategy is *focus*. By focusing on a special segment of the product line, geographical market or a buyer group, the company can select a market that is less vulnerable against the competition. The focus strategy is different from the cost-leadership and differentiation strategies in the way that this can be applies to both a uniqueness perceived by the customers and a low cost position. Nevertheless, the both first strategies can be applied industrywide, the focus strategy can only be applied to particular segments on the industry.

<table>
<thead>
<tr>
<th>Generic Strategy</th>
<th>Commonly Required Skills and Resources</th>
<th>Common Organization Requirements</th>
<th>Risks</th>
</tr>
</thead>
</table>
| Overall Cost Leadership | - Substantial capital investment and access to capital  
- Process engineering skills  
- Intense supervision of labor  
- Products designed for ease in manufacturing  
- Low-cost distribution system | - Tight cost control  
- Frequent, detailed control reports  
- Structured organization and responsibilities  
- Incentives based on meeting strict quantitative targets | - Technological change that nullifies past investments or learning  
- Low-cost learning by industry newcomers or followers  
- Inability to see required product or marketing change because of the attention placed on cost  
- Inflation in costs that narrow the firm’s ability to maintain enough of a price differential to offset competitor’s brand images or other approaches to differentiation |
| Differentiation | - Strong marketing abilities  
- Product engineering  
- Creative flair  
- Strong capabilities in basic research  
- Corporate reputation for quality or technological leadership  
- Long tradition in the industry or unique combination of skills drawn from other businesses  
- Strong cooperation from channels | - Strong coordination among functions in R&D, product development, and marketing  
- Subjective measurements and incentives instead of quantitative measures  
- Amenities to attract highly skilled labor, scientists or creative people | - The cost differential between low-cost competitors and the differentiated firm becomes too great for differentiation to hold brand loyalty  
- Buyers’ need for the differentiating factor falls. This can occur as byers become more sophisticated  
- Imitation narrows perceived differentiation, a common occurrence as industry matures |
| Focus | - Combination of the above policies directed at the particular strategic target | - Combination of the above policies directed at the particular strategic target | - the cost differential between broad-range competitors and the focused firm widens to eliminate the cost advantages of serving a narrow target or to offset the differentiation achieved by focus  
- the differences in desired products or services between the strategic target and the market as a whole narrows  
- competitors find submarkets within the strategic target and outfocus the focuser |

*Table 1-1: Requirements and risks with the generic strategies*
4.2 Business models for Open Source and Information Technology

In the first subchapter I will first look at some research done for OSS business models and IT business models in general. In the second subchapter I will specifically look at the business models that Leitneritz describes for Open Source.

4.2.1 Research on Open Source business models and IT business models

The open source software business model can be seen as a limited, or more challenging business model in comparison to a commercial software business model, as fewer possibilities for income exists. The open source model is also highly dependant on the restrictions that are put due to the selection of the open source license selected.

The OSS business models above all are relevant in the EuMoS case, but a more complete model is described by Leiteritz, chapter 4.2.2, that I will use. The theories regarding the motivation to participate, distribute etc. OSS by Learner and Tirole is highly interesting, but not used to answer the research questions in this work. Hedman and Kallings summary of business models related to Information Technology gives a good overview. But as with Porters Value Chain, I have choosen to not use this model due to the complexity in relation to the EuMoS case.

Hedman and Kalling provide a summary of the content for a business model related to Information Technology. In this model the firm’s internal aspects are interpreted and transformed to activities into offerings to the market on one hand and into resources towards the suppliers on the other hand21.

---

According to Krishnamurthy several business models can be found for open source products. He lists the 4 different models; the distributor, the software producer for non-GPL software, the software producer for GPL software and third party service provider business model.

Lerner and Tirole describes the economics behind open source from a different angle and emphasizes parameters as motivation for participating in the development of open source software, quality and cost advantages over commercial software, individual incentive and finally the organization and governance of OSS.

Mundie discusses the shortcomings in OSS business models and points at the three areas: failures of business models in the .com space such as: Advertising as the primary revenue stream, operating under the assumption that market share equals revenue or Free now, pay later. Development models not being able to cover heavy investment in research and development and problems to motivate Peoples due to lack of prove its commitment to privacy and security in order to encourage user acceptance of the technologies.

---

4.2.2 Leiteritz open source business models

Leiteritz describes the open source business model from the perspective of added value from the different parts in the chain to create, supply and maintain an open source solution\(^{25}\).

Leiteritz models present some interesting aspects and will be used to explain and understand the business model behind the EuMoS case. The model is generic and does not differ between mass and non-mass markets for OSS products. In my analysis, chapter 6.2, I will try to explore if this generalization is of importance for the EuMoS case.

Leiteritz uses 6 different models: Product distributors, Application producers, Appliance producers, Service offerings, Mediation offerings, other offerings. Leiteritz uses the value chain to indicate if a part of the chain is part of the offering.

Figure 2.1-7: Model for value chain for open source

*Product distributors* create a package by pulling OSS parts together and making installation routines that can be directly used by the end-user. Normally these product distributors position themselves in the market of operating systems for servers, clients and embedded systems. The target groups are companies as well as individuals.

Figure 2.1-8: Resource focus for product distributors

*Application producers* create the actual OSS application and put this on the market under an OSS license. There are three different cases behind this:

- A company has previously developed the software under proprietary license and has at a specific point-in-time decided to make the software code open source.
- A company starts at a specific point-in-time to develop an OSS software. Normally no independent developer are part of the code development and all process knowledge is kept within the developing company.
- A company takes over OSS software to further maintain the OSS project commercially.

The market can be anything within software development. Application producers can make anything from office suites to highly specialized add-on applications.

The business models for the application producers are several:

- Giving away the software for free. This is the most radical business model and is only profitable if the application producer has a secondary business model that will cover the cost to produce and maintain the free software.

- OSS Licensing after a certain time. The software is from the beginning commercial but when e.g. a new version is delivered or after a specific time frame, the old version is given an OSS license.
- Licensing according the target group. The application is given a license according to the end-users status, e.g. if a commercial company uses the product it is has a proprietary license and for schools and educational purpose it maintains an OSS license.
- Licensing according to the number of users. This is similar to the above license but with the exception that the number of users decides if the application is regarded as a proprietary license or an OSS license.
- Licensing according to the platform, e.g. if the application is used on a windows system then the application is regarded as a proprietary license and if it is used under a UNIX system then it’s licensed as OSS.
- Licensing according to the components. Some companies have offered parts of their system application as OSS, normally to get more users or to weaken the competitors.
- Proprietary software for OSS. In the OSS market there are companies offering commercial add-on software to the OSS solution, e.g. Covalent offers commercial software as a complement to the OSS web-server Apache.
- Bridging to secondary business model. The OSS application is marketed to create a market so that other services such as support, documentation and training, etc. from the company can be sold.

Figure 2.1-9: Value chain for OSS application producers

Appliance producers are producers of products containing hardware, software and operating system. The producer typically produces an interface application running on an OSS operating system. The application is often proprietary, which also is in accordance with e.g. GPL, as the application is not logically or technical integrated. The value chain for Appliance producers are the same as the value chain for product distributors, see Figure 2.1-8: Resource focus for product distributors.

Service offerings are a market strategy for a company that does not produce any complete software on its own, but instead offers services around this OSS software. In comparison with the business model for classical IT service companies such as Accenture or IBM, the service model for OSS has no differences and some of the classic companies offer services for OSS products. The OSS offerings can be grouped in four categories:

- Distributors whose primary business model is sales of OSS distributions. As secondary model they offer support for the product distributed.
- Big hardware producers that sell hardware with preinstalled OSS products, but does not do any OSS distribution apart from this.
- Global system integrators who offers worldwide IT services in proprietary, but also for OSS software
- Specialized OSS service providers that are fully concentrated on OSS components.

---

26 According to IDA/UNISYS, 2000
The market offerings can also be categorized in four categories\(^{27}\): Installation support, Support packages, maintenance licenses, integration services.

Figure 2.1-10: Resource focus for service providers

*Mediation offerings* are a company that brings different interest groups together in one marketplace (Developer, user, service provider, etc.). The business idea is to create an attractive portal and get advertising companies and other sponsors to make the model profitable.

Other offerings can be; embedded OSS which is a mix of distribution and service provider model, preinstalled hardware, big integrated IT provider, embedded appliances, Linux hotels and finally books and gimmicks.

\(^{27}\) According to IDA/UNISYS, 2000
5 EUMOS AND THE MARKET

5.1 Actors

The enforcement of the GHG regulations is initially the European Union, but as the local governments in each country has the responsibility for the implementation, the enforcement is also driven by the German government in the case of Germany. As there is certain independence in Germany for each of the regions, the so called Bundesländer, the regions too pushes for a smooth implementation in this case.

The GHG regulations mostly impacts larger companies with production of e.g. paper/pulp, metal, energy. As these companies core business is not energy and environmental tuning of the production facilities, a wide range of energy and environmental consultancy companies exists. The three other companies cooperating with aspera about EuMoS provides such services. In the case of EuMoS, they provide advice to what application that shall be used by the production companies to monitor and produce the needed documents to comply with EU regulations for GHG towards the local government. aspera normally do not have any direct contact with customers unless there is a software customer issue.

![Diagram showing the actors and relationships around EuMoS](image)

*Figure 2.1-11: Interest model*

The involved actors around EuMoS are showed in the above figure to simplify the different actors and their relationships.
5.2 Competition and substitution

The competition **aspera** faces in Germany for EuMoS can be grouped into 3 types of offerings:

- Alternative freeware
- Commercial offerings
- Spreadsheet solutions applying to a certain industry

**Alternative Freeware** includes RISA-GEN financed by „Deutschen Emissionshandelsstelle im Umweltbundesamt“ (DEHSt). RISA-GEN is only represented in Germany. RISA-GEN is not an OSS project, but is available for free. This has been the leading application in Germany with the support by the DEHSt.

The **commercial offerings** are among other the Xem module by SAP, Siemens Power-IT from Siemens AG, CO2e Portfolio Builder℠ and CALM℠ from CO2e.com and the Greenhouse Gas Suite™ by Environmental Software Providers. All four commercial competitors are globally represented.

**Spreadsheet solutions** are applying to a certain industry such as or the paper or glass industry. They are based on rules behind the Kyoto agreement, and can be seen as globally represented. These need an adaptation to be used and fulfill the EU regulations.

All the commercial offerings and EuMoS do not differ substantially in the feature offer. All covers the mandatory reporting and documentation requirements according to the form needed for the emission rights. Most also contain an emission scenario planning module. The main difference are the way of working with the application it self. The spreadsheet solutions on the other hand needs manual adaptation to conform to the specific reporting form in each country and normally lacks emission scenario planning and a easy interface to databases such as mySQL, Oracle or Sybase. The alternative freeware RISA-GEN only support the basic reporting functionality and import of the data in formats like e.g. excel and XML.

When structuring the market according to Porters 5 forces the following picture emerges: The existing entry barriers consists of switching costs, access to distribution, proprietary learning curve, access to necessary inputs and the government policy.

The **switching cost** is an important factor, as the company needs to live with the solution they choose. Shapiro and Varian defines switching cost as the total cost the customer bears plus the cost that the new supplier bears. A change in software will mean dead investments in the training and learning curve from the old software, possible installation costs, and possible adaptation costs to company internal solutions for the customer. For the new supplier the cost of sales and possible installation and adaptation costs to the customer specific environment needs to be covered.

The **access to distribution** is, in the case for GHG software, the access to the consultancy companies that deals with environmental and energy questions towards the customers. These play an important role in providing advice on what suppliers of software are available and recommendable.

---

The *proprietary learning curve* is the need to learn the individual application before the company can efficiently use the software.

The *access to necessary inputs* are in this case the access to information from EU and the local government institutions about what rules and regulations needs to be followed. This is for an outsider a very tricky information flow as the information normally needs to be integrated into the application before the information is fully released as the application programming otherwise will be to late for the customers. In addition, the environmental and energy consultancy companies play a significant role here as they are already integrated in this flow.

The *governmental policy* has the entry barrier as the government can put a recommendation, as is in the case of RISA-GEN, that the reporting must follow the given format this application outputs.

The existing rivalry determinants are characterized by the industry growth, switching costs, informational complexity, diversity of competitors, product difference.

The *industry growth* is substantial as the trade with emission rights starts 2005 and this market has previously not existed.

The *switching costs* are from a pure cost perspective not that high, but there are few persons involved in most companies. This becomes a bottleneck when switching to new software.

*Diversity of competitors* is existing, the background from all application providers are diverse with pure software development companies to worldwide systems development and sales companies participating.

*Product difference* is medium when considering all offerings, but when looking at the commercial products and EuMoS the product differences are less apparent, which single features and handling defining the product differences.

The existing determinants of supplier power are solely the switching costs of the supplier.

The existing determinants of buyer power are:
1. bargaining leverage:
   - *substitute products*, characterized by a range of other alternative products all competing to get a share of the market.
   - *buyer information*, possibly high, as most of the competitors have been presented at trade shows during the last two years.
2. price sensitivity:
   - impact of Impact on quality/Performance,
   - Product differences.

The *price sensitivity* is affected by the *impact of Impact on quality/Performance* and the *product differences*. Both are relevant in the current market. The impact on quality versus performance in relation to price sensitivity is put into relation with the availability of applications with lesser performance and application with a full range of features and high
quality. The product difference in the range of OSS and commercial products are, as mentioned before, not that big, which pushes the power more towards the buyers.

The substitution threats are relative price performance of substitutes and buyer information. The relative price performance of substitutes is especially hard to evaluate as some software is available for free and it is not apparent how the buyers evaluate this. The buyer information creates a substitution threat when the buyer is informed about the alternatives. This is estimated that the buyers are well informed about the options available.

![Porter's Five Forces Model](image)

Figure 2.1-12: The market situation in Germany for EuMoS according to Porters 5 forces

The figure above summarizes the existing and non- or low exiting factors in the market for monitoring and reporting GHG applications in Germany using Porters model of 5 forces.

### 5.3 Defining EuMoS business model

As described previously, the software consortium contributes and can contribute with a range of services. These services can be split into the category of current existing services and the possible future services. The currently existing services are:

- Production of the EuMoS Software,
- consultancy services,
- support services,
- training,
- marketing the EuMoS product,
- distribution of a packaged solution,
- production of customized solutions,
- Integration and installation services.
The possible future services would be:
- sale of documentation,
- Sale of a commercial version.

Some of the existing services might not yet have been sold to customers, but the consortium is already prepared to perform the services. The possible future services are characterized by the additional effort to be able to deliver this service.

Seen out of the perspective from Leiteritz definition of OSS business model from the perspective of added value, EuMoS and aspera model can be grouped into Application producers, and Service offerings. The Application producer model acts as the primary model and the Service offerings as secondary model. A combined picture of these two models applicable for EuMoS is illustrated below.

![Figure 2.1-13: EuMoS Primary and Secondary OSS business model](image)

EuMoS is given away for free, but with hopes that it will bridge to the secondary business model. It is marketed to appeal to other services such as support, documentation, training etc. from the company. So far Leiteritz model can be used, but there is also a dual license possibility with EuMoS. EuMoS can be bought as proprietary software. This can be done when changes to the standard software is requested, and thus the first business model serves as a feedback to the research and development. In this case the “consultancy” part of the chain feeds a third business model where the software is purchased as a proprietary solution.

![Figure 2.1-14: EuMoS business model](image)

For EuMoS the most significant factors for a business model are:
- amount of users,
- willingness and need by the users to buy services,
- forced updates of the software due to changed EU regulations,
- cost of maintaining the current software,
- Possibility to expand the market in and outside of Germany.
The combination of several business models exists for other OSS companies. MySQL offers services such as consultancy, commercial software and training, but does not offer documentation, installation or integration services.29. Netscape offers commercial versions, ISP services and training.30. LINUX doesn’t provide any services, as this is not a company but a collectively produced product, but all services are handled by companies normally living on a very specialized part of the value chain. Red Hat distributes the LINUX package and also offers training, support, specialized solutions, consultancy services and special corporate versions.31. The are also other companies distributing LINUX, but most have the same setup as Red Hat, or offers less services. The base line is that no company I have come across uses all parts in the business model to base their survival on. I believe this is because when a product is widely distributed, the amount of supporting companies increases and this drives needs for the surviving companies to specialize to keep their market share. Porters also confirms this in his three generic strategies, with the result that the company needs to focus on differentiation, overall cost leadership or focus to create a strategic advantage.32 This is a direct consequence of Porters strategy view, see chapter 4.1.5. This means that EuMoS, as a non-mass market product, also has the consequence that a specialization is not driven by the competition within the product area, but between companies with similar target area. This forces and benefits the EuMoS consortium to provide all services that the customers might need, but can also be seen as a burden due to the need to offer a wide range of services.

5.4 Potential users of EuMoS

In Germany some 2500 factories belonging to 1400 companies are potential users, within total EU some 12000 factories (see Table 1-8, Number of impacted plants in the European Union) belonging to an estimated 6700 companies. The factories are from a wide range of industries. Everything from car manufacturing, steel production, glass industries to energy suppliers are impacted by the EU GHG regulation. All companies needs to report their factories GHG pollution on a yearly base. The report is submitted to the respective governmental agency, in the German case the DEHSt. The report serves as a base to receive the emission trade rights.

There are also some U.S. companies that have tried to reach the European market, which indicates that it might also be possible for an EU company to expand into the U.S. market, but this is outside the scope of this work.

5.5 Economical background

In this chapter follow descriptions on the two sides of the economical situation around the EuMoS application. On one hand, the external market with the emission trading, this is the reason for the existence of EuMoS, and on the other hand, the internal economical parameters with the perspective of profitability for EuMoS as a freeware OSS application.

29 https://order.mysql.com/
30 http://www.netscape.com/
31 http://www.redhat.com/solutions/
5.5.1 The external market economics

To understand the potential market size for the trading of the GHG licenses, which is the driving force behind the need of EuMoS and similar applications, I do an estimation below to visualize this.

The estimated license trade price for carbon-dioxide (CO$_2$) is in the range of 3-13 EUR per ton. The total CO$_2$ emissions in 2001 within EU was 4108.3 Mt and for Germany 993.5 Mt. given the range of trade prices the market value for CO$_2$ is in the range of 12325 MEUR – 53408 MEUR for EU in total and 2980 MEUR – 12915 MEUR in Germany. The estimate that EU governments will allocate 50 million–55 million tones of allowances less than is required by industry to meet projected emissions.$^{34}$

Given the relation between Germany and the total EU GHG emissions, this would mean an under allocation of 12.1 -13.3 Mt in Germany alone.

Derived from these figures the actual traded value in EU would be an estimated 150 - 715 MEUR and within Germany 36 – 173 MEUR.

The above data does not indicate the total market size that an application like EuMoS can feed from, but rather that there is a market of potential size available.

5.5.2 The internal profitability perspectives

The described Open source business models in chapter 4.2 have been used in with mixed results for OSS based companies. Some have managed to keep a profit and some not.$^{35,36}$ The open source software applications in the studies by Dahlander and Välimäki have a user base of hundreds of thousands to several millions. Välimäki details the amount of customers paying for services to the software developing company for the three Dual license based companies he has studied in the range of 0.1% of the total user base.

Given the same conditions as in Välimäkis study and applying this to the potential market for EuMoS with 1400 companies in Germany and 6700 companies totally in EU, this would give only 1 company as customer in Germany and 7 companies within EU as customer paying for services for EuMoS if all companies would be users of EuMoS.$^{37}$ It is obvious that a one-to-one copy of the business models from the companies in the Välimäki study would not last very long.

5.6 Results from the survey

At the first EuMoS user group work shop, my questionnaire was handed out to the participants.(see chapter 9.3). Slightly more then 50% of the participants returned the survey. Almost all (~95%) were male with an average age of 42,3 years, median age 41,0 years and on an average and median with a bachelor degree (Fachhochschule) as the highest completed education.

The survey done at the EuMoS user group workshop gave the following results:

- There is a medium understanding of what OSS is, 53% answered correctly what OSS corresponds too.

---

$^{35}$ Dahlander, ”Appropriating the commons: Firms in Open Source Software”, 2004
$^{36}$ Välimäki, “Dual Licensing in Open Source Software Industry”, 2003
$^{37}$ 1400 companies * 0,1% = approximately 1 company, 6700 companies * 0,1% = approximately 7 companies
- For the users, OSS symbolizes a good quality, an above average security, a below average sense of long-term responsibility to the development, an good price to performance relation and gives possibilities to do adaptations.

- The perceived biggest benefit of that EuMoS is an OSS product was that the users company can take part in the development (73%) and the possibility to correct errors on their own (53%).

- The expectation on how to finance EuMoS further development was through the participation in the development by the own company (60%), 47% through sales from additional features/modules and 40 % were of the opinion that EuMoS should be financed through yearly subscription fees.

- The current problems that the users perceive are adaptations to their own company internal software/databases (47%) and training in how to use EuMoS (47%).
6 DISCUSSION, INTERPRETATION AND CONCLUSIONS

In this chapter I will try to create an understanding what the answer to my research question is. To provide this understanding I will first analyze the possibilities EuMoS has in its current market position. This will be done by using the input from chapter 5 and mapping this to the SWOT analysis tool.

Then I will use the outcome of the SWOT analysis to translate this to Porters 3 generic strategies, the reason for this is to understand what strategy the EuMos consortium shall aim for. In addition, Ansoffs product-market matrix will be used with the same reason. I will also present the results from a business case planning tool which indicates sales development, gross margin and net profit.

The next step is to conclude and argue what the outcome of the research question is. This is done in the chapter 6.2.
6.1 Strategy direction for EuMoS

The SWOT analysis below is made with the perspective what possibilities the EuMoS application has in competition with its competitors to reach a sufficient market size and the possibilities to continue to finance further development of the software.

<table>
<thead>
<tr>
<th>Strengths:</th>
<th>Opportunities:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Early actor in the German market</td>
<td>- Same requirements in all EU countries</td>
</tr>
<tr>
<td>- Low cost position (freeware)</td>
<td>which can lead to low cost to adapt and</td>
</tr>
<tr>
<td>- Good market channels through the consortium</td>
<td>export the software to other EU countries</td>
</tr>
<tr>
<td>- Preferred application by the Bayern Land</td>
<td>- OSS perceived as excellent value for money</td>
</tr>
<tr>
<td>- Good understanding of the who are the users</td>
<td>- OSS perceived as high quality</td>
</tr>
<tr>
<td>- Good access through the consortium to</td>
<td>- OSS perceived as very good quality</td>
</tr>
<tr>
<td>necessary inputs to keep EuMoS updated</td>
<td>- OSS perceived as above average security</td>
</tr>
<tr>
<td>according with the EU regulations and</td>
<td>- OSS perceived as excellent possibilities to</td>
</tr>
<tr>
<td>German requirements.</td>
<td>do adaptations and participate in development</td>
</tr>
<tr>
<td>- Extensive feature portfolio in comparison</td>
<td>- High willingness from current users to be</td>
</tr>
<tr>
<td>with all other competing application</td>
<td>involved in development.</td>
</tr>
<tr>
<td>- The software developing is a small,</td>
<td>- A high need for adaptations to company</td>
</tr>
<tr>
<td>innovative company with quick turnaround</td>
<td>internal software or databases</td>
</tr>
<tr>
<td>times and open structure</td>
<td>- A high need for training</td>
</tr>
<tr>
<td></td>
<td>- Consortium covers most of the EU countries</td>
</tr>
<tr>
<td></td>
<td>and can support with information for adaptations to</td>
</tr>
<tr>
<td></td>
<td>other countries outside Germany.</td>
</tr>
<tr>
<td></td>
<td>- High growth market</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Weaknesses:</th>
<th>Treats:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Low knowledge of the current users are</td>
<td>- Costly changes in the SW due to future new EU</td>
</tr>
<tr>
<td>- Low understanding by users what OSS is.</td>
<td>requirements</td>
</tr>
<tr>
<td>- Current OSS business models with the number</td>
<td>- Expected sales low due to less need to adapt SW</td>
</tr>
<tr>
<td>of paying users would not support further</td>
<td>towards customer needs than expected</td>
</tr>
<tr>
<td>development</td>
<td>- OSS perceived as below average sense of</td>
</tr>
<tr>
<td></td>
<td>long-term responsibility to the development</td>
</tr>
<tr>
<td></td>
<td>- Main competitor RISA-GEN subsidies by the</td>
</tr>
<tr>
<td></td>
<td>German regulatory ministry (DEHSt)</td>
</tr>
</tbody>
</table>

**Figure 2.1-15: SWOT analysis**

Porter describes three generic competitive strategies\(^{38}\), (chapter 4.1.8): The overall cost leadership, differentiation and focus. The overall cost leadership might be assumed to be the default strategy connected with a product like EuMoS that is given away without compensation. However, I would like to point to the full cost of ownership that the customer will have and argue against that this is the case. Instead when looking at the results from the market structure given by Porters 5 forces in chapter 5.2, product differentiation serves an important role in the market picture. The SWOT analysis shows several similarities in the strength area with the commonly required skills and resources and common organizational requirements for the Differentiation strategy.

---

### Table 1-2: Correlation table between SWOT analysis and Porters Differentiation strategy requirements

As can be seen in the Table 1-1 above the correlation between the strengths in EuMoS and the requirements on skills and resources is high. Therefore it is advisable that the strategy to pursue in the future is based on Porters generic strategy for Differentiation.

When putting the EuMoS application in to the picture of Ansoffs Product/Market matrix, the current situation is that EuMoS during the last year was a new product on a new market, as was all other competitors. Some of the competitors were already established in the US market and the product were as such not new, but the market as all the potential customers are new, which puts all products in the same situation. As can be seen from the table below, the highest rate for success is to achieve market penetration with a known product to a known market.

<table>
<thead>
<tr>
<th>Strength column in SWOT analysis</th>
<th>Commonly Required Skills and Resources in Porters generic strategies for Differentiation</th>
<th>Correlation between SWOT and Differentiation</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Early actor in the German market</td>
<td>- Long tradition in the industry or unique combination of skills drawn from other businesses</td>
<td>YES</td>
</tr>
<tr>
<td>- Low cost position (freeware)</td>
<td></td>
<td>Not Applicable</td>
</tr>
<tr>
<td>- Good market channels through the consortium</td>
<td>- Strong cooperation from channels - Strong marketing abilities</td>
<td>YES</td>
</tr>
<tr>
<td>- Preferred application by the Bayern Land</td>
<td>- Corporate reputation for quality or technological leadership</td>
<td>YES</td>
</tr>
<tr>
<td>- Good understanding of the who are the users</td>
<td></td>
<td>Not Applicable</td>
</tr>
<tr>
<td>- Good access through the consortium to necessary inputs to keep EuMoS updated according with the EU regulations and German requirements.</td>
<td></td>
<td>Not Applicable</td>
</tr>
<tr>
<td>- Extensive feature portfolio in comparison with all other competing application</td>
<td>- Product engineering</td>
<td>YES</td>
</tr>
<tr>
<td>- Small, innovative company with quick turnaround times and open structure</td>
<td>- Creative flair</td>
<td>YES</td>
</tr>
<tr>
<td>-</td>
<td>- Strong capabilities in basic research</td>
<td>NO</td>
</tr>
</tbody>
</table>
According to Ansoff the strategy with the lowest risk would be to do a market penetration which has a 75% probability of success\(^{39}\). To expand the next following step would be to move into a new market. This can be done either by developing the market or by diversification. However, this step needs to be evaluated when the time is right and is out of the scope for this work.

<table>
<thead>
<tr>
<th>Market Participation</th>
<th>Present market</th>
<th>New market</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present product</td>
<td>Market penetration</td>
<td>Product Launch</td>
</tr>
<tr>
<td>EuMoS</td>
<td>EuMoS</td>
<td>EuMoS</td>
</tr>
<tr>
<td>Probability of success = 75%</td>
<td>Probability of success = 45%</td>
<td></td>
</tr>
<tr>
<td>New product</td>
<td>Market Development</td>
<td>Diversification</td>
</tr>
<tr>
<td>EuMoS</td>
<td>EuMoS</td>
<td>EuMoS</td>
</tr>
<tr>
<td>Probability of success = 35%</td>
<td>Probability of success via organic diversification = 25%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Probability of success via acquisition = 35%</td>
<td></td>
</tr>
</tbody>
</table>

Table 1-3: EuMoS in Ansoff Product/Market matrix

### 6.2 Conclusions of the research question

The aim for this work is to understand “How to finance GPL software for a non-mass market product” with the two questions:

1. Is it possible to finance GPL software for a non-mass market product?
2. What are the possibilities to provide a sustainable business model for the software consortium based on GPL?

From the SWOT analysis we can also see some opportunities that need to be turned into strengths if EuMoS shall be able to gain from them. If we turn these possibilities to cost contribution we can calculate a net margin. The possibilities we take into account are membership/attendance fee to EuMoS, sales of program distribution, sales of Services as support, installation, hosting (ASP), maintenance of data, consulting, training and sales of additional modules and sales of customization. The price level for each service has been set to the comparable level to the commercial alternatives, but can not be showed in full here due to the need to protect the consortiums income structure. The sales parameters are based on the results from the survey (see chapter 5.6). They have been adjusted to reflect a possible market share and the willingness and need to purchase the available services. These input parameters has then been feed into the excel sheet that the “Venture cup” competition provides\(^{40}\). The result from the business case calculation is the diagram below.

---


\(^{40}\) Calculation based on the profitability calculation excel sheet: http://www.venturecup.org/files/doc/vast/Diverse/monetaranalyz5_0.xls (Accessed 2004-09-20)
As can be seen from the figure above, the EuMoS case can be profitable under the right circumstances. Nevertheless, keeping in mind the finding in chapter 5.5.2, the number of paying users for OSS products is a mere 0.1% in the three companies studied by Välimäki. For EuMoS it is clear that this low base of paying customers would result in a failure to sustain the development of EuMoS. The case above is built on the results from the questionnaire, indicating that corporate users are more willing to pay for additional services than private consumers are. This is, I believe, highly dependant on that the customers are companies with a greater need and willingness to outsource and pay for activities such as training, support, and adaptations than an individual, which is visualized in the survey. Corporate customers might also have a greater need for accountability if there are problems with the software solution they apply, and are willing to pay for this accountability.

So can the generic OSS business models provided by Leiteritz and others really serve EuMoS? As mentioned in chapter 5.3, other companies also use a mixture of the defined business models. Nevertheless, does the EuMoS case introduce something new in these models? The answer would be yes and no. On one hand EuMoS would need to use a more full range of opportunities then the various business models described by Leiteritz, but nothing of these activities would be new. On the other hand a large part of the income from EuMoS would be from leading the OSS user to the commercial model and the sale from development of proprietary solutions such as adaptations to commercial databases and information systems. This business model is not described yet in any of the models I have researched through this work, and thus must be considered as something “new”.

Concentrating on the financial calculations and the results from the questionnaire in combination with the project sales and profit assumptions, this data can serve as base to make

---

42 Välimäki, “Dual Licensing in Open Source Software Industry”, 2003
a judgment to the first research question. To the first research question; if it is at all possible to finance GPL software for a non-mass market product, I would answer yes.

The second research question, “What are the possibilities to provide a sustainable business model for the software consortium based on GPL?”. Here the chapter 5 gives guidance. I have tried to pick the key possibilities based on some findings when doing this work to create an agenda that the software consortium can use in their future work to establish EuMoS as a important player on the market for GHG monitoring products. A summary of the actions needed is given below and a more detailed description is given in chapter 7.

- establish a excellent knowledge of who are the users of the application
- sell a commercial version of EuMoS
- get the message out what services can be bought and where to order
- look into possibilities to expand the market to outside Germany
- create a way to motivate the consultancy companies to create sales of services
- pursue the differentiation strategy as Porter has defined it
- follow Ansoffs market penetration strategy to increase the chance of success

Based on the answers to my two subordinated research questions, I hope this work will also give the answer the purpose of this work.

The assumption made in the beginning of this essay, that there would be a difference between a mass market OSS product and a non-mass market OSS product, can be confirmed in the sense that the non mass market OSS product needs to consider the relation that such OSS product has a very low base of paying customers.

I would like to conclude the analysis with a short statement on “How to finance a GPL software for a non-mass market product”. To make this feasible, a more active pursue of the possible income sources must be done than in the usual OSS case, and a target group that has a need and a willingness to pay for additional services must be focused on.
7 RECOMMENDATIONS TO EUMOS CONSORTIUM

Include a possibility for the user of EuMoS to register for information about updates, news, and other market information. Either this can be done in the SW itself or when downloading the SW. Preferable both ways should be used to catch as many users as possible, as the revenues is highly dependant on this.

Add a secondary web site where the EuMoS software is marketed and sold as a proprietary solution together with a mySQL commercial license, or interfaces to other commercial data bases.

Pursue the following internal possibilities for revenues:
- User forum (cost contribution in form of membership/attendance fee)
- Sales of program distribution (CD), user guides, manuals
- Sales of Services as Support, Installation, Hosting (ASP), maintenance of data, Consulting, Training.
- Sales of additional modules (DB support, multi-user environment etc)
- Sales of Customization (support of other languages, support of other report forms etc)

Pursue the following external possibilities for increasing revenues
- Expand number of users by marketing the EuMoS product actively, also towards other EU countries in a first step and possibly internationally in a second step.
- Include efforts from outside programmers
- External funding (EU, governmental, NGO)

Follow up the survey with a second survey aimed to all possible users. One key problem will be to get the addresses of the candidates, a second to legally be allowed to send the survey without being regarded as spam.

Utilize the market channels:
aspera as developer of additional services and technical managing company of EuMoS does not directly get in contact with customers during the sales process. This is done through the consultancy companies that advices the production companies what applications to use, to be able to monitor and produce the relevant documentation towards the local government. In the sales phase for the EuMoS application, this makes marketing for enhanced features and services as addition to the EuMoS offerings more problematic, as the “sales force” for EuMoS are the three consultancy companies and not the developer of the application. Therefore the business model must contain a way of motivating the companies with contact points to the actual customers to also market features that are sellable and not only propagate the free software. There are several ways of creating an interest for the contact points to also market proprietary features, a fixed or flexible royalty or part of the actual profit are possible solutions, or part of incentive to keep EuMoS alive and prospering.

Increase the market size:
Use the possibilities to increase the market to outside Germany. This should be possible due to regulations as the EU GHG regulations are the same in all EU countries. A market increase outside EU also looks promising. This is due to that adaptations needed to the EU directives
would be minor as the directives are based on the Kyoto Protocol only minor adaptation would be needed for international customers outside EU. Nevertheless, for each country an adaptation on the report format is needed and the way internal parameters for the calculations made to the report as these are not the same in all EU countries.
8 REFERENCES


DiBona, Chris, Ockman, Sam and Mark Stone, editors, *Open Sources: Voices from the Open Source Revolution*, 1999, Sebastopol: O'Reilly


“Dual licensing, what are the restrictions in regards of the GPL license”, http://www.oreillynet.com/pub/wlg/4715, (accessed 2004-08-10)


German specific info on emission trade, http://www.bmu.de/de/1024/js/sachthemen/emissionshandel/oeffentlichkeit/, (accessed 2004-07-12)


Lerner, Tirole, "The Scope of Open Source Licensing", 2002


“The Open Source Definition”, Available at: [www.opensource.org/docs/definitions.php](http://www.opensource.org/docs/definitions.php), (accessed 2004-06-11)


9 APPENDIX

9.1 Activity plans

Start-up meeting, April 2004, with aspera. Focus to set scope for the work with EuMoS.
1. Benchmark existing similar solutions

Phase 1, sketched in May 2004, with aspera. Focus was to find out what are the possibilities available for EuMoS as OSS/GPL
2. Investigate EU proposal possibilities, and estimate if worth to proceed with a proposal. Ready date mid July
3. Get evaluation report from EuMoS trial projects. Ready date mid July
4. Determine what proposals shall be sold and what can be offered as introduced in open source code. Ready date end July
5. Finished chapters for theory models and market analysis. Ready date end July
6. Produce customer offering proposal for Eumos services from aspera. Ready date end July
7. Proposals on how installed base can be traced and a customer register be build. Ready date end July

Phase 2, sketched in July 2004, with aspera. Focus was to practically go on with some of the solutions chosen.

1. Produce marketing material:
2. Update webpage with offerings (and prices)
3. Produce slide-ware package for consultant companies, showing offerings and give a short presentation of the product and future plans
4. Plan and schedule first EuMoS user-group
5. Create business case
6. Coordination of EuMoS activities
7. Keep sales force up-to-date and get feedback from users-customers
8. Produce questionnaire for users/customers (why use Eumos, why not, improvements, wanted modules). Need to be ready in time for user group
9. aspera to network with consultancy companies on a regular basis (lunch etc) to keep updated with their plans, whishes and development regarding Eumos.

Phase 3, sketched in October 2004, with aspera. Focus was to conclude the research.

1. Send out questionnaires, ready date mid October
2. Evaluate available data, ready date mid December
3. Wrap up investigation, ready date end December
4. Present results and Propose improvements, ready date end January 2005
### 9.2 Available solutions for GHG monitoring and reporting

<table>
<thead>
<tr>
<th>Freeware solutions</th>
<th>Commercial solutions</th>
<th>Spreadsheet solutions</th>
</tr>
</thead>
</table>

*Table 1-4, Available solutions for GHG monitoring and reporting*
9.3 Survey to EuMoS Usergroup

Due to formatting reasons page 1 and 2 is split.

9.3.1 Survey to EuMoS User group, page 1

Franck Emmerich, MSc
Königstrasse 30
52064 Aachen, Deutschland/Germany
Mail: franck_emmerich@hotmail.com
Handy: 0049 (0)173 2594461

Bitte nehmen Sie sich einen Moment Zeit und helfen Sie mir weiter bei meinem Forschungsprojekt bezüglich „Business model for an Open Source project“.  
Wenn Sie den Fragebogen fertig ausgefüllt haben, geben Sie ihn bitte ab.

A. Persönliche Angaben
   A1. Ich bin: männlich □
       weiblich □

   A2. Mein Alter ist: ______

   A3. Meine höchste Ausbildung:
       □ Realschule
       □ Gymnasium
       □ Fachhochschule
       □ Universität
       □ Höhere Universität (Dr. etc)

B. Was ist Open Source? (bitte wählen Sie nur eine Alternative)
   Kostenfreie Software-Entwicklung
   Linux
   Öffentlicher Quellcode
   Ein internationaler Verein von Software-Entwicklern
   Sonstiges: (bitte angeben)

________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________
C. Was bedeutet Open Source für Sie?
(bitte kreuzen Sie die Box an, die ihre Meinung am besten wiedergibt)
C1. Gute Qualität
   stimme überein □ □ □ □ □ stimme nicht überein
C2. Hohe Sicherheit
   stimme überein □ □ □ □ □ stimme nicht überein
C3. Langfristige Verantwortlichkeit
   stimme überein □ □ □ □ □ stimme nicht überein
C4. Umfassende Funktionalität
   stimme überein □ □ □ □ □ stimme nicht überein
C5. Gutes Preis-/Leistungsverhältnis
   stimme überein □ □ □ □ □ stimme nicht überein
C6. Möglichkeit zu Anpassungen
   stimme überein □ □ □ □ □ stimme nicht überein

9.3.2 Survey to EuMoS User group, page 2

D. Welche Vorteile sehen Sie darin, dass EuMoS ein Open Source Produkt ist?
(bitte wählen Sie eine oder mehrere Alternativen)
   Meine Firma kann sich an der Entwicklung beteiligen.
   Überdurchschnittliche Qualität
   Möglichkeit, eventuelle Fehler selber zu beheben.
   Ich sehe keine Vorteile.
   Sonstige Gründe: (bitte angeben) _________________________________________________________________________
   ______________________________________________________________________________
   ______________________________________________________________________________

E. Wie würden Sie erwarten, dass EuMoS als Open Source Produkt finanziert werden soll?
(bitte wählen Sie eine oder mehrere Alternativen)
   Durch die Beteiligung meiner Firma an der Entwicklung (EuMoS Nutzergruppe).
   Durch die Einführung eines Kaufpreises.
   Durch Supportverträge.
   Durch ein jährliches Abonnement.
   Durch den Verkauf von Erweiterungsmodulen.
   Weiß ich nicht.
   Sonstige Möglichkeiten: (bitte angeben) _________________________________________________________________________
   ______________________________________________________________________________
   ______________________________________________________________________________

F. Welche Probleme haben Sie bei der Arbeit mit EuMoS?
(bitte wählen Sie eine oder mehrere Alternativen)
   Anpassungen an firmeninterne Software/Datenbanken.
   Schulung für handhaben von EuMoS
   Installation von EuMoS.
   Ich habe keine Probleme.
   Sonstige Probleme: (bitte angeben) _________________________________________________________________________
   ______________________________________________________________________________
   ______________________________________________________________________________
Sonstige Kommentare:

______________________________________________________________________________________________

______________________________________________________________________________________________

______________________________________________________________________________________________

______________________________________________________________________________________________

Angaben (freiwillig)

Name ____________________________ Vorname ____________________________
Firma ____________________________ E-Mail ____________________________
Straße ____________________________ Telefon ____________________________
Postleitzahl ____________________________
Stadt, ____________________________
Bundesland ____________________________

Vielen Dank für ihre Hilfe!
9.3.3 Results of the Survey to EuMoS User group

<table>
<thead>
<tr>
<th>Original question in German</th>
<th>Translation</th>
<th>Answer quota</th>
<th>number of respondents</th>
<th>average gender</th>
<th>average age</th>
<th>median age</th>
<th>average education</th>
<th>median education</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A. Persönliche Angaben</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A1. Ich bin:</td>
<td>I am (Male=0, Female=1)</td>
<td>56%</td>
<td>15</td>
<td>0.066667</td>
<td>42.3</td>
<td>41.0</td>
<td>3.3</td>
<td>3</td>
</tr>
<tr>
<td>A2. Mein Alter ist:</td>
<td>My age is</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A3. Meine höchste Ausbildung:</td>
<td>My highest education</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>B. Was ist Open Source? (bitte wählen Sie nur eine Alternative)</strong></td>
<td>What is Open Source? (Please chose only one alternative)</td>
<td>percentage correct answer</td>
<td>53%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ Kostenfreie Software-Entwicklung</td>
<td>Free of charge software development</td>
<td>percentage thinks is</td>
<td>40%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ Linux</td>
<td>Linux</td>
<td>percentage thinks is</td>
<td>7%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ Öffentlicher Quellcode</td>
<td>Open source code</td>
<td>percentage thinks is</td>
<td>53%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ Ein internationaler Verein von Software-Entwicklern</td>
<td>A international community of software developers</td>
<td>percentage thinks is</td>
<td>0%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ Sonstiges: (bitte angeben)</td>
<td>Other: (Please state)</td>
<td>percentage thinks is</td>
<td>0%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>comment</td>
<td>comment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>C. Was bedeutet Open Source für Sie?</strong></td>
<td>What is Open Source to you?</td>
<td>average note</td>
<td>2.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C1. Gute Qualität</td>
<td>Good quality</td>
<td>average note</td>
<td>2.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C2. Hohe Sicherheit</td>
<td>High security</td>
<td>average note</td>
<td>3.6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C3. Langfristige Verantwortlichkeit</td>
<td>Long term responsibility</td>
<td>average note</td>
<td>3.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C4. Umfassende Funktionalität</td>
<td>Rich functionality</td>
<td>average note</td>
<td>1.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C5. Gutes Preis-/Leistungsverhältnis</td>
<td>Good price/performance relation</td>
<td>average note</td>
<td>1.7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C6. Möglichkeit zu Anpassungen</td>
<td>Possibility to adaptations</td>
<td>average note</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>D. Welche Vorteile sehen Sie darin, dass EuMoS ein Open Source Produkt ist?</strong></td>
<td>What benefits do you see, that EuMoS is a Open Source Product?</td>
<td>percentage</td>
<td>73%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ Meine Firma kann sich an der Entwicklung beteiligen.</td>
<td>My company can participate in the development</td>
<td>percentage</td>
<td>20%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ Überdurchschnittliche Qualität</td>
<td>Over average quality</td>
<td>percentage</td>
<td>53%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ Möglichkeit, eventuelle Fehler selber zu beheben.</td>
<td>A Possibility to correct possible errors on your own</td>
<td>percentage</td>
<td>7%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ Ich sehe keine Vorteile.</td>
<td>I see no benefits</td>
<td>percentage</td>
<td>7%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ Sonstige Gründe: (bitte angeben)</td>
<td>Other: (Please state)</td>
<td>percentage</td>
<td>7%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comment</td>
<td>comment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
E. Wie würden Sie erwarren, dass EuMoS als Open Source Produkt finanziert werden soll?

- Durch die Beteiligung meiner Firma an der Entwicklung.
- Durch die Einführung eines Kaufpreises.
- Durch Supportverträge.
- Durch ein jährliches Abonnement.
- Durch den Verkauf von Erweiterungsmodulen.
- Weiβ ich nicht.
- Sonstige Möglichkeiten: (bitte angeben)

How do you expect that EuMoS as an Open Source product should be financed?
- Through my companys participation in the development percentage 60%
- Through the introduction of cost to purchase EuMoS percentage 0%
- Through support contracts percentage 7%
- Through a yearly subscription fee percentage 40%
- Through the sales of adaptations percentage 47%
- I don't know percentage 7%
- Other: (Please state) percentage 13%

F. Welche Probleme haben Sie bei der Arbeit mit EuMoS?

- Anpassungen an firmeninterne Software/Datenbanken.
- Schulung für handhaben von EuMoS.
- Installation von EuMoS.
- Ich habe keine Probleme.
- Sonstige Probleme: (bitte angeben)

What problems do you have when working with EuMoS?
- Adaptation to company internal software/databases percentage 47%
- Education how to use EuMoS percentage 47%
- Installation of EuMoS percentage 0%
- I have no problems percentage 13%
- Other: (Please state) percentage 13%

G. Sonstige Kommentare

Other Comments
### 9.4 Time schedule in EU in general for Monitoring

<table>
<thead>
<tr>
<th>Element</th>
<th>Who</th>
<th>When</th>
<th>What</th>
</tr>
</thead>
</table>
| 1. Submission of annual inventory by MS | Member States | 15 January annually | Anthropogenic CO₂ emissions and CO₂ removals by sinks, for the year n-2
|         |     |               | Emissions by source and removals by sinks of the other greenhouse gases; **3)**                                                     |
| 2. Initial check of MS submissions | European Commission (incl. Eurostat), assisted by EEA | up to 28 February | Initial checks (by EEA) Comparison of energy data in MS IPCC Reference Approach with Eurostat energy data (by Eurostat and MS) |
| 3. Compilation and circulation of draft EC inventory | European Commission (incl. Eurostat), assisted by EEA | 28 February | Draft EC inventory (by EEA), based on MS inventories and additional information where needed
|         |     |               | Circulation of the draft EC inventory on 1 March                                                                               |
| 4. Submission of updated or additional data by MS | Member States | up to 15 March | Updated or additional data submitted by MS **3)**                                                                                  |
| 5. Final annual EC inventory | European Commission (incl. Eurostat), assisted by EEA | 15 April | Submission to UNFCCC of the final annual EC inventory. This inventory will also be used to evaluate progress as part of the Monitoring Mechanism |
| 6. Additional review of MS submissions and EC inventory | European Commission (incl. Eurostat), assisted by EEA | June to December | Additional review aimed at improving the next annual MS and EC inventories
|         |     |               | In November Eurostat makes available to MS energy balance data (1990 to inventory year)                                           |

**Table 1-5, Annual process of submission and review of MS inventories and compilation of the EC inventory 1)**

**Notes:**

1) In accordance with Decision 280/2004/EC
2) In accordance with Art. 3(1) and 3(2) of Council Decision 280/2004/EC
3) updating is limited to the following situations: to remove major inconsistencies, to fill major gaps or to provide essential additional information.

**44** [http://europa.eu.int/comm/environment/climat/greenhouse_monitoring.htm](http://europa.eu.int/comm/environment/climat/greenhouse_monitoring.htm)
### 9.5 Actual situation for GHG emission in the EU countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Base year(^{[1]}) (Mt CO₂)</th>
<th>Kyoto target (^{[2]}) according to EC Burden sharing</th>
<th>GHG emissions 2001 (Mt CO₂)</th>
<th>Change 2001 (in % of base year emissions)</th>
<th>Change 2001 (in % of 2000 emissions)</th>
<th>Distance-to-target indicator (index points)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>78.3</td>
<td>-13.0 %</td>
<td>85.9</td>
<td>+9.6 %</td>
<td>+4.8 %</td>
<td>+16.8</td>
</tr>
<tr>
<td>Belgium</td>
<td>141.2</td>
<td>-7.5 %</td>
<td>150.2</td>
<td>+6.3 %</td>
<td>+0.2 %</td>
<td>+10.5</td>
</tr>
<tr>
<td>Denmark</td>
<td>69.5</td>
<td>-21.0 %</td>
<td>69.4</td>
<td>-0.2 % (-9.0)</td>
<td>+1.8 %</td>
<td>+11.4 (+2.6)</td>
</tr>
<tr>
<td>Finland</td>
<td>77.2</td>
<td>0.0 %</td>
<td>80.9</td>
<td>+4.7 %</td>
<td>+7.3 %</td>
<td>+4.7</td>
</tr>
<tr>
<td>France</td>
<td>560.8</td>
<td>0.0 %</td>
<td>560.8</td>
<td>+0.4 %</td>
<td>+0.5 %</td>
<td>+0.4</td>
</tr>
<tr>
<td>Germany</td>
<td>1216.2</td>
<td>-21.0 %</td>
<td>993.5</td>
<td>-18.3 %</td>
<td>+1.2 %</td>
<td>-6.8</td>
</tr>
<tr>
<td>Greece</td>
<td>107.0</td>
<td>+25.0 %</td>
<td>132.2</td>
<td>+23.5 %</td>
<td>+1.9 %</td>
<td>+9.8</td>
</tr>
<tr>
<td>Ireland</td>
<td>53.4</td>
<td>+13.0 %</td>
<td>70.0</td>
<td>+31.1 %</td>
<td>+2.7 %</td>
<td>+23.9</td>
</tr>
<tr>
<td>Italy</td>
<td>509.3</td>
<td>-6.5 %</td>
<td>545.4</td>
<td>+7.1 %</td>
<td>+0.3 %</td>
<td>+10.7</td>
</tr>
<tr>
<td>Luxembourg</td>
<td>10.9</td>
<td>-28.0 %</td>
<td>6.1</td>
<td>-44.2 %</td>
<td>+1.3 %</td>
<td>-28.8</td>
</tr>
<tr>
<td>The Netherlands</td>
<td>211.1</td>
<td>-6.0 %</td>
<td>219.7</td>
<td>+4.1 %</td>
<td>+1.3 %</td>
<td>+7.4</td>
</tr>
<tr>
<td>Portugal</td>
<td>61.4</td>
<td>+27.0 %</td>
<td>83.8</td>
<td>+36.4 %</td>
<td>+1.9 %</td>
<td>+21.6</td>
</tr>
<tr>
<td>Spain</td>
<td>289.9</td>
<td>+15.0 %</td>
<td>382.8</td>
<td>+32.1 %</td>
<td>-1.1 %</td>
<td>+23.8</td>
</tr>
<tr>
<td>Sweden</td>
<td>72.9</td>
<td>+4.0 %</td>
<td>70.5</td>
<td>-3.3 %</td>
<td>+2.2 %</td>
<td>-5.5</td>
</tr>
<tr>
<td>The United Kingdom</td>
<td>747.2</td>
<td>-12.5 %</td>
<td>657.2</td>
<td>-12.0 %</td>
<td>+1.3 %</td>
<td>-5.2</td>
</tr>
<tr>
<td>Total EC</td>
<td>4204.0</td>
<td>-8.0 %</td>
<td>4108.3</td>
<td>-2.3 %</td>
<td>+1.0 %</td>
<td>+2.1</td>
</tr>
</tbody>
</table>

*Table 1-6: Greenhouse gas emission trends and Kyoto Protocol targets for 2008-2012*\(^{45}\)

**Notes:**

\(^{[1]}\) Base year for CO₂, CH₄ and N₂O is 1990; for the fluorinated gases most Member States have indicated to select 1995 as base year, as allowed for under the Protocol. Therefore, for the purpose of this analysis of the EU greenhouse gas emission trends, 1995 is used as the base year for fluorinated gases for all Member States.

\(^{[2]}\) In the Council decision on the approval by the EC of the Kyoto Protocol the different commitments of the Member States are expressed as percentage change from the base year. In 2006 the respective emission level shall be expressed in terms of tonnes of carbon dioxide equivalent. In this connection, the Council of Environment Ministers and the Commission have a joint statement agreed to take into account i.a. the assumptions in Denmark’s statement to the Council Conclusion from June 16-17 1998 relating to the base year emissions.

\(^{[3]}\) For Denmark, data that reflect adjustments for variations in electricity trade in 1990 are given in brackets.

---

9.6 Distance-to-target indicators for the Kyoto Protocol and burden sharing targets of EU Member States

**Table 1-7, Distance-to-target indicators (in index points = percent) for the Kyoto Protocol and burden sharing targets of EU Member States**

**Notes:**

1. Distance to target in percent (the bars) show the deviations between a hypothetical target (in 2001) and what actually has been achieved (in 2001), under the assumption that reductions as a percentage of 1990 levels take place on a linear basis. It assumes that the Member States meet their target entirely on the basis of domestic measures and therefore does not include the use of Kyoto mechanisms or sinks allowed for under the protocol.

2. The Danish distance-to-target indicator is +2.6 index points, if Danish greenhouse gas emissions are adjusted for electricity trade in 1990.

---

9.7 Number of impacted plants in the European Union

<table>
<thead>
<tr>
<th>Country</th>
<th>Number of plants</th>
<th>Country</th>
<th>Number of plants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belgium</td>
<td>290</td>
<td>Malta</td>
<td>not known</td>
</tr>
<tr>
<td>Denmark</td>
<td>350</td>
<td>Netherlands</td>
<td>250</td>
</tr>
<tr>
<td>Germany</td>
<td>2500</td>
<td>Austria</td>
<td>230</td>
</tr>
<tr>
<td>Estonia</td>
<td>30</td>
<td>Poland</td>
<td>1400</td>
</tr>
<tr>
<td>Finland</td>
<td>300</td>
<td>Portugal</td>
<td>200</td>
</tr>
<tr>
<td>France</td>
<td>1500</td>
<td>Sweden</td>
<td>300</td>
</tr>
<tr>
<td>Greece</td>
<td>150</td>
<td>Slovakia</td>
<td>300</td>
</tr>
<tr>
<td>Great Britain</td>
<td>1500</td>
<td>Slovenia</td>
<td>70</td>
</tr>
<tr>
<td>Ireland</td>
<td>100</td>
<td>Spain</td>
<td>not known</td>
</tr>
<tr>
<td>Italy</td>
<td>1900</td>
<td>Czech Republic</td>
<td>420</td>
</tr>
<tr>
<td>Latvia</td>
<td>90</td>
<td>Hungary</td>
<td>300</td>
</tr>
<tr>
<td>Lithuania</td>
<td>not known</td>
<td>Cyprus</td>
<td>not known</td>
</tr>
<tr>
<td>Luxemburg</td>
<td>13</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total sum 12193

Table 1-8, Number of impacted plants in the European Union

9.8 Additional Info

The move towards the liberalisation of energy markets in the whole world and the general shift from command-and-control to market mechanisms bring forward new ways of stimulating initiatives to increase the efficiency in the final uses of energy and demand-side management. In this context, it is important to consider the ways in which the increase of the share of energy supplied by renewable sources, and the increase in the efficiency of energy utilisation can be promoted. These measures are considered the mainframe of any sustainable energy strategy and necessary steps to combat the threats of climate change. Of considerable interest are “White Certificates” (Energy Efficiency), “Green Certificates” (Renewable Energy) and Emissions Trading.

White Certificates (Energy Efficiency)

Energy Saving Trust  
http://www.est.co.uk/

Italian Regulatory Authority for Electricity and Gas  
http://www.autorita.energia.it/

Office of Gas and Electricity Markets  
http://www.ofgem.gov.uk/

Energy Efficiency 21  
http://www.ee-21.net/

International Energy Agency Demand-Side Management Programme  
http://dsm.iea.org/

47 Emissionshandel, Energie & Management, "Wirtschaftliche Selbstläufer gesucht", page 44. April 2004
Green Certificates (Renewable Energy)

Tradable Renewable Certificate Know-how and Initiatives Network
http://www.treckin.com/

Renewable Energy Certificate System
http://www.recs.org/

Green Stream Network
http://www.gsn-trade.com/

European Renewable Electricity Certificate Trading Project
http://recert.energyprojects.net/

Greenpower Network
http://www.eere.energy.gov/greenpower/

Emission Trading

International Emissions Trading Association
http://www.ieta.org/

Emissions Marketing Association
http://www.emissions.org/

Environmental Finance

Emissions Trading Education Initiative
http://www.etei.org/

Kyoto Mechanisms Expert Network
http://www.kyotoexperts.com/

Comparison Environmental programs

http://www.climateregistry.org/docs/EVENTS/GHGRegistries_Compared.pdf