FINDING E-BUSINESS SOLUTIONS WITH THE HELP OF A SELF-MANAGED ONLINE TOOL

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Abstract: In recent years, providers of e-business software have started tailoring their solutions to the needs of SMEs, e.g. smaller sized ERP and CRM systems. However, for many SMEs, e-business systems are still too expensive or require a lot of effort on the SME's side. As SMEs often do not employ IT-specialists who possess the necessary skills and knowledge to evaluate and select an appropriate e-business software system that fits the company's needs, the need for external support becomes evident. The eBSN eBusiness Solutions Guide is an online tool that especially helps SMEs in finding suitable e-business solutions. It is equipped with different search algorithms and offers an e-business competence calculator. The paper introduces the tool and thereby focuses on the methods and concepts to match the offers of e-business suppliers and SME needs.

1 INTRODUCTION

Information and communication technology (ICT) and e-business models have a deep impact on a company's innovativeness and competitiveness which is expected to keep growing in the future. As the variety of offered solutions grows, it becomes more difficult for companies to chose the product or service that fits their needs best. This holds true especially for small and medium-sized enterprises (SMEs). SMEs can only invest a limited effort into exploitation of ICT and often do not possess the necessary knowhow to do so. Since SMEs are highly important in the European economy it is one of the European Commission's priorities to support them (cf. European Commission, 2005).

Fraunhofer IAO on behalf of the European Commission has realised an interactive web-based online tool (the eBSN eBusiness Solutions Guide) to support SMEs in finding suitable ICT solutions. The ICT market for SMEs is very heterogeneous and many software systems require much adaption effort on the customer's side. The eBusiness Solutions Guide was created to minimize the effort of choosing a suitable solution for SMEs by taking care of SME specific characteristics. It includes a growing database on e-business solutions and services currently available (cf. Renner, Vetter et al., 2008). Since its publication in March 2009 on the European Commission's web server[1] the tool has achieved growing popularity. This paper introduces the tool's main concepts and discusses its current status and acceptance.

The remainder of this paper is structured as follows: In chapter 2 we depict the rising importance of e-business awareness for SMEs and discuss the benefits and problems that go with it. We deduce the need for an easy-to-use online tool that helps SMEs finding the right software products and services within the unclear diversity of different offers. In chapter 3 we describe our proposed solution in detail by showing how providers can enter their solutions in the portal and how SMEs can apply different search strategies to find the solution that fits their specific needs best. In chapter 4 we discuss the reception of the eBSN eBusiness Solutions Guide based on the current content and usage statistics and describe the forthcoming development.

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[1]   http://ec.europa.eu/enterprise/e-bsn/ebusiness-solutions-guide

2 MOTIVATION

The Sectorial eBusiness Watch – an annual journal published by the European Commission – describes the adoption, implications and impact of electronic business practices in different sectors of the economy. According to them, small firms benefit from e-business solutions especially by gaining access to international markets and expanding their business networks, e.g., through online collaboration tools (Selhofer, Lilischkis et al., 2008). Moreover, two trends for the benefit of SMEs are noticed:

- Large ICT vendors have started developing affordable solutions targeted to the needs of SMEs (e.g. smaller-sized ERP and CRM software).
- Large companies take stock in a connection with their smaller partners to benefit from the advantages of e-business.

The need for SMEs to invest into an appropriate e-business strategy rises in the business-to-business as well as in the business-to-customer sector: cooperation with large industrial consumers requires electronic process integration, while end-users nowadays expect a modern online offer.

Nevertheless, SMEs often do not have the possibility to develop a coherent ICT investment strategy or employ ICT practitioners due to their limited resources (Selhofer, Lilischkis et al., 2008). This is also stated by Harindranath, Dyerson et al., who conducted a survey among 378 SMEs located in the southeast of England. They notice a rather low investment into ICT and trace it back to SME's limited strategic flexibility. According to their findings, the main barriers that prevent SMEs from ICT adoption are (cf. Harindranath, Dyerson et al., 2008):

- the fear of technology obsolesce and requiring of frequent updates
- the dependence from external consultants or vendors
- SME owners or managers do not believe in ICT as long term solutions to business sustainability because of the complexity in quantifying the business benefits that might arise from such investments.

The German network of e-commerce on behalf of the German Federal Ministry of Research and Technology was responsible for a comparative survey among SMEs in Germany between 2005 and 2008. Their research emphasised the SMEs need of information and advice. Among other things the

1930 attendees where asked to rate their usage intensity of internet applications (on a scale from one = low to five = high). In 2008 the main usage was the e-mail communication (4.4 points in average) and the information search (4.29 points). E-business relevant use cases like online procurement were in fifth place (3.17 points) and online selling at eight (2.14 points). The biggest increases from the year 2005 to 2008 were found in online procurement (+ 0.41) and data exchange with external partners (+ 0.29). This trend is expected to further increase in the future (cf. Hudetz, Eckstein, 2008). Therefore, the need for reasonable and specialised solutions and advices is expected to grow also.

In summary, one can detect an expanding range of available products and a growing need for such products on the SMEs side. The challenge now is to help the SMEs in finding and assorting appropriate products and services. Several commercial websites aim at bringing seekers and solvers of ICT solutions together (e.g., Europages[2], ECeurope[3], webtradecenter[4], commercial place[5]). The eBusiness Solutions Guide however differs from those offers with regard to some important aspects regarding specific requirements of European SMEs.

- Products and services are classified not only with regard to their business focus but also regarding their adequacy for different company sizes.
- SMEs can evaluate their "e-business readiness" based on the "eBusiness Competence Index".
- Users can give feedback and thereby recommend or disadvise the use of products and services.

As the eBusiness Solutions Guide is offered and run by the European Commission, the webpage is neutral, evident and free of advertisement. Of course suppliers of solutions have the opportunity to promote their offerings (this is one of the main goals of the tool) but they only can do this by using the specified number of words and without images or different fonts or colours. So the user will not be "overwhelmed" by the offerings or be stressed e.g. by pop-ups on the webpage.

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[2] http://www.europages.co.uk
[3] http://www.eceurope.com
[4] http://dci.wai.de/wai.asp
[5] http://www.commercialplace.com

3 SOLUTION DESCRIPTION

In the following, we describe the e-Business solutions Guide's main features in detail:

- Adding new information on providers, products, and services;
- Finding appropriate products and services;
- Evaluating an SME's company's e-business competence.

We close the section by giving some information on the technical implementation.

3.1 Adding New Information on Providers, Products, and Services

The eBSN eBusiness Solutions Guide's content is self-managed, e.g., vendors can enter their company and product information themselves. This grants the suppliers the opportunity to promote their products as best as they can. The approach also helps to keep the content up-to-date and downsizes the operating costs for the European Commission, as the responsibility for updating information is distributed among the providers. Additionally a staff member of the European Commission will take care for the quality and correctness of the data. If the acceptance of the tool is growing the implementation of further quality assurance mechanisms would be helpful (e.g. activation of entries by an administrator).

3.1.1 Role Model

The Guide offers two distinct user roles to insert supplier specific data:

Producer: The role "Producer" can enter product data and facts about the own company into the Guide. After the registration the producer has the possibility to fill out several forms which specify the producer's offerings. This includes e.g. the description of the company and the offering, keywords, size of target firms and the possibility to classify the products with the help of the classification system that was developed for this project. The Producer can only insert and manage his own company's data. Additionally he has all the rights of an evaluator.

Sales Partner or Consultants: Members of this group can add information about multiple producers and their respective products and services. This is intended for associations or distributors of solutions from different providers.

3.1.2 Classification Systems

The eBSN eBusiness Solutions Guide uses its own hierarchical product and services classification system containing 170 categories. It uses two main classifications: An industry sector and a product classification. Both classifications aim at demanders who look for special tools and solutions for their specific economic and industrial sectors. The classifications base on an analysis of a variety of internationally recognised classification standards such as the classification of branches of trade by the German Federal Statistical Office[6], the Central Product Classification (CPC)[7] and the International Standard Industrial Classification (ISIC)[8] of the United Nations Statistics Division. We found that those classification systems were too complex for our purposes. We therefore implemented a "best-of-breed" approach in order to achieve both, a carefully-designed and complete but still easily manageable classification system. This provides a structuring factor, both for the demand and supply side.

3.2 Finding Appropriate Products and Services

The eBusiness Solution Guide's main module is the assessment framework that proposes e-business products and services that fit the needs of SMEs seeking to improve their business processes.

Using this support the SME looking for a solution is independent from external consultants or vendors. The list of solutions is generated alphabetically by the tool and organised according to the entered needs of the SME.

3.2.1 Searching and Navigating

Depending on the user's initial search situation, different search strategies can be applied.

The *simple keyword search* enables the SME to find a solution by typing in a keyword. A result list of products and providers regarding the keyword will be provided.

The *detailed search* offers distinct forms for finding products, services, providers, or open source products. In each case, the intended industry branch and size of the searcher's company can be specified. Depending on the intended search object, the search

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[6] http://www.destatis.de

[7] http://unstats.un.org/unsd/cr/registry/regcst.asp? Cl=25&Lg=1

[8] http://unstats.un.org/unsd/cr/registry/isic-4.asp

space can be further restricted with regard to product or provider names, product or service categories, price ranges, address information, etc.

The *hierarchical search* can be applied if the detailed search is considered as too explicit and the text search seems to be not restricting enough. The user can browse the e-business and service classifications, select one or several entries, and list all products and services that fall into those categories.

3.2.2 Result Presentation and Analysis

The results delivered by the assessment framework are arranged in a structured list to achieve intuitive illustration and comfortable analysis possibilities.

Figure 1 shows an example of a result list containing two products. The list provides information about the product itself and can be ordered by price or evaluation. It contains:

Product name, description and provider: the product name, a short description of the product and the provider name are displayed. Clicking on the product name leads to a detailed product information.

The *supplier link* leads to the supplier details view providing all information concerning the supplier.

SME Fit: The SME Fit describes the suitability of a product including e.g. transactions, availability and capacity for different sizes of companies (1-9, 10-49, 50-250, >250 employees) and can be either "not suitable", "well suitable", or "very well suitable", respectively. Users can find appropriate e-business solutions for their company's size by analysing the SME fit value.

The *categories* help to specify the domain of the product, service, open source project, or company.

Comments and rating: Additional to the producer provided information a community rating value is shown. By ordering all results by evaluation the user can find best rated products on top of the result list. Every registered user can rate a project. To enter an evaluation for a product the user just has to click on the product details page and then use the "Evaluate Product" button. One can assign one (very poor) to five (very good) stars. Users can also enter a short text describing their own experience with the product. The average rating value shows up in the product search result list while the textual reviews are listed in the product detail list. The comments and ratings are an instrument to assure the quality of the entries in the guide. Furthermore it gives the

managers of SMEs the possibility to learn more about the business benefits that might arise from the solution e.g. when the product has a high rating value and good comments over a long time.

Price: The price range is symbolised with coins; It starts with 0 to 299 € (one coin) and ends with more than 5000 € (five coins).

Figure 1: Result list.

3.3 Evaluating a Company's e-Business Competence

The eBusiness Solution Guide offers means to estimate a company's eBusiness Competence Index (EBCI). This index incorporates 16 questions divided into four categories describing the overall IT competences for companies. The EBCI follows the specification of indicators developed by the Sectorial eBusiness Watch in 2004 (cf. Selhofer, 2004). They are:

- ICTBI: ICT Infrastructure and Basic Connectivity Indicator (e.g. LAN use, remote/wireless access to the company);
- IBPAI: Internal Business Process Automation Indicator (e.g. use of online technology, ERP systems, intranet);
- PSCI: Procurement and Supply Chain Integration Indicator (e.g. integration of IT system and electronic exchange with providers);
- MSPI: Marketing and Sales Processes Indicator (e.g. use of CRM systems, online selling rate).

For each question of the indicators the possible answers are:

- The ICT solutions has already been implemented (value: 3 points);
- There is an implementation or deployment in progress (value: 2 points);
- The implementation is planned in the near future (value: 1 point);

- The implementation has neither been considered nor planned (value: 0 points).

As to be seen in equation (1) the calculation of one single indicator z contains values of answers a_j (j=1…4). The given value for one answer a is between 0 and 3. The sum of the four values is averaged by the sum of maximum points (four values with maximum 3 points each give a 12 points maximum).

$$z_i = \frac{1}{12} \sum_{j=1}^{4} a_{ij}$$

where z_i…indicator i (i= 1…4)　　　　(1)
a_{ij}…value of answer j of indicator
number i (a_{ij}= 0…3)

By aggregating these indicators an overview of a SME's current e-business infrastructure is obtained. The eBusiness Guide calculates the EBCI e as the sum of the indicators z_i (i= 1…4) averaged by the number of indicators as to be seen in equation (2).

$$e = \frac{1}{4} \sum_{i=1}^{4} z_i$$

where e…value of EBCI　　　　(2)
z_i…value of indicator i ($0 \leq z_i \leq 1$)

The resulting EBCI has a value between 0 and 1. The e-business maturity of the SME is defined as follows:

- Low e-business-competence firms (EBCI from 0 to 0.333)
- Medium e-business-competence firms (EBCI from 0.334 to 0.666)
- High e-business-competence firms (EBCI from 0.667 to 1)

The EBCI as well as the single indicators and their values appear at the summary. Additionally the indicators are presented in the spider charts (see Figure 2) which compare the indicators with the average values of other companies' entries. The outcomes offer the SME useful advice regarding which product categories would help to improve its infrastructure. The advice is arranged according to the four indicators including a direct connection to the matching algorithm. Thus concrete solutions that suit the related product categories are suggested. The comparison of the different entries helps the managers of the SMEs to be informed about the e-business competence of the company without the help of advisors. In corresponding cases it also helps them in choosing newer and better products to get on the same level as other competitors. When they see

that others also invest in ICT it gives the managers more understanding for ICT as long-term solution.
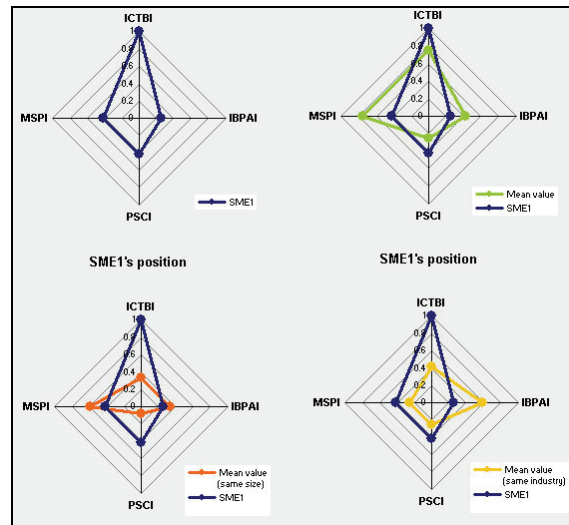

Figure 2: e-Business Competence Indexes (EBCIs).

3.4 Implementation Notes

The eBSN eBusiness Solutions Guide is build on a standard 5-layer-architecture (data management, business entities, business logic, web layer, and user interface).
It is implemented as a web application and has been tested with the most common web browsers. The server code runs inside a J2EE application server (currently, BEA Weblogic is used[9]). The usage of up-to-date software frameworks assures maintainability and extensibility: Struts[10] (model-2 web framework), Tiles[11] (templates), Hibernate[12] (object relational mapping), and Spring[13] (inversion of control and dependency injection) are applied. Data is stored in a relational database (currently, Oracle 9i[14] is used).

As the eBusiness Solutions Guide aims at SMEs in Europe, the need for multi language support is evident. While currently the user interface is only implemented in English, French, and German, support for further languages can be provided by simply adding appropriate configuration files.

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[9]　http://www.oracle.com/appserve
[10]　http://struts.apache.org
[11]　http://tiles.apache.org
[12]　https://www.hibernate.org
[13]　http://www.springsource.or
[14]　http://www.oracle.com/technology/software/database

4 DISCUSSION AND CONCLUSIONS

As of October, 2009, there are 1,392 active registered users at the eBSN eBusiness Solutions Guide. They have inserted information of 799 producers. Figure 3 shows the distribution of the countries the entered producers are located in.
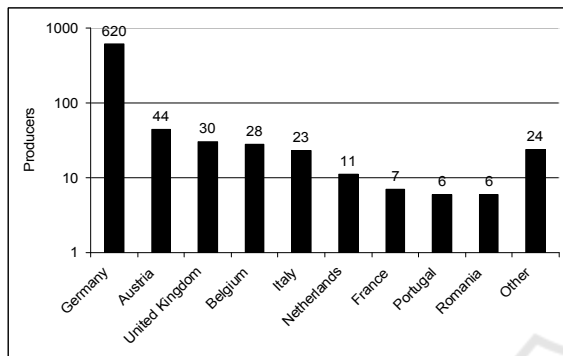

Figure 3: Distribution on entered producers among different countries.

Most of the producers taking part so far stem from Germany (78 %). This can be lead back to the fact that the eBusiness Solutions Guide has so far been mainly promoted in Germany (where it was developed). Further entries are from Austria, the United Kingdom, Belgium, Italy, and the Netherlands, together accounting for 17 % of the producers.

The distribution of the products' localisation is obviously related to the ones of the producers. Figure 4 shows that so far, 993 of the 1,207 entered products stem from Germany (82 %). Thus, there are 1.6 products registered per producer. The United Kingdom has an equal rate but only provided 48 products, so far.

We measured the number of users on the demand side by analysing the web server's access log file. As of October 2009 15,532 visitors attended the platform. The introduction phase started in September 2008. At that time, the tool was known only to a small number of users. In December 2008, a first stable version was promoted to a growing number of associations and clients. The actual production phase started in March 2009. As Figure 5 shows the number of visitors has levelled out to approx. 1,300 visitors per month.
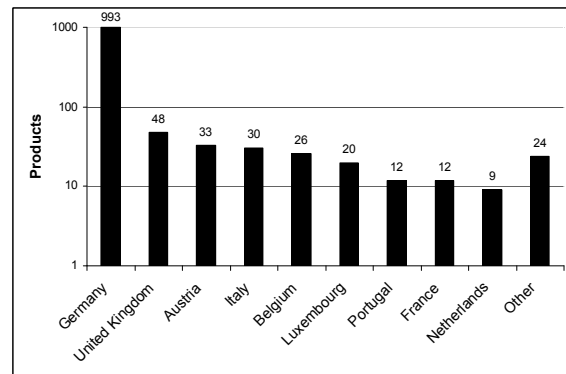

Figure 4: Distribution on entered e-business products among different countries.
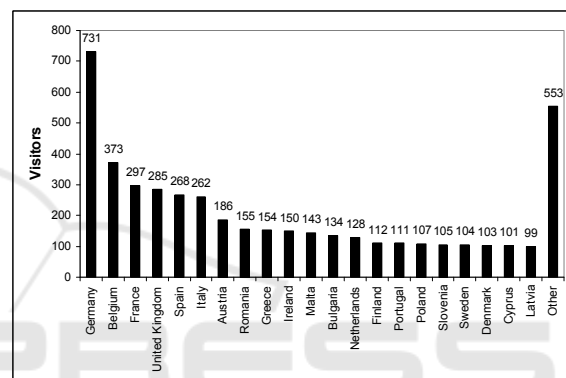

Figure 5: Distribution of visitors in 2008 and 2009.

The log files also tell us which country-specific view the user has selected – and thus give hints to where the user stem from. Figure 6 shows that each of the 27 EU countries has been selected. Not surprisingly, Germany was chosen most often.
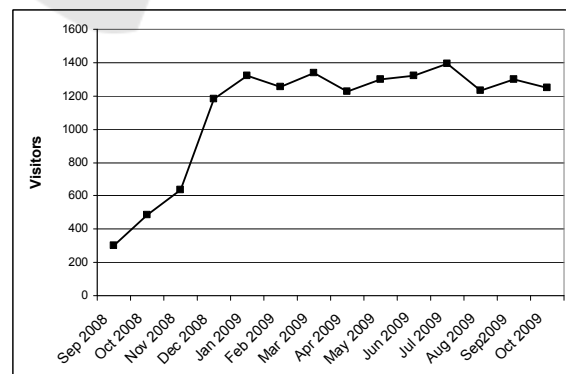

Figure 6: Visitor's choice of country.

We expect the awareness level on the demand side to grow with the amount of products and services entered in the platform. As of today, the content for

the non-German market is still quite limited. But the experiences so far indicate that the eBSN eBusiness Solutions Guide is being well accepted among both, e-business solution providers and e-business solution seeking SMEs. However the current supply-side usage statistics show a clear imbalance with regard to the usage in different European countries. Thus, forthcoming marketing campaigns should aim at raising the tool's awareness level in other European countries.

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