Sustainable Cooperate Information Portals: Digital Knowledge Communities for SME

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1 Construction of the Ecoradar Knowledge-Community

A large variety of research has been published in the field of Sustainable management during the last 20 years (Baumgartner and Rauter 2017). The problem was the conversion of this knowledge (Loebbecke and Myers 2016) into enterprise practice Development-Target of the ecoradar-portal is it to reduce the information costs of those SME enterprises, which are interested in Sustainable management. Especially in the subjects of energy management and climate protection instruments. In order to achieve these targets, a strategic Community concept of the third generation has been developed in order to build a knowledge-community (Deshpande et al. 2017) in the SME sector.

The main emphasis of the ecoradar-community is on the knowledge field and the service and project-areas. The community will start as a project-community. In the beginning, ecoradar, as a classical research project, is measuring the success by certain criteria focusing on timeframe and milestones (Vlas et al. 2017), evolutionary Software Requirements Factors and their Effect on Open Source Project Attractiveness. In the Proceedings of the 50th Hawaii International Conference on System Sciences, an additional feature is the use of a virtual project team (scientists, consultants, entrepreneurs). A virtual cooperation has been realized by establishing a specific editorship- and tele-cooperations system. This project-communities represent the preliminary stage on the way to a knowledge-

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community. Ecoradar will be a knowledge network stretched beyond the limits of individual organizations and enterprises (Krämer and Kalka 2017).

Wenger and Snyder 2000 describe the knowledge-community as a "flexible organizational unit, beyond official organizational resp. informal units. The community is animated by the common interest of the members in the field of knowledge. The participation is voluntary. The motivation to participate is a positive cost/benefit relation." (Wenger and Snyder 2000).

The collective benefit is categorized by Rheingold (Rheingold 1994) using the following three dimensions:

- Social use, identification by a common goal
- knowledge capital, use of knowledge from various sources
- community feeling, system of real contacts and experience backgrounds

The ecoradar-community understands itself as community of interests, with the following features defined by Hagel and Armstrong (1997: 23)

- focus and emphasis on a specific interest
- the ability to integrate contents and communication
- the use of information, supplied by the members
- the access to competing providers

The major task of the community-developers is the professional relations management between the individual community-members. The goal of the ecoradar-relation management is to integrate stakeholders like NGO, companies und communal administration in the community process. This means that anonymous coworker will be transformed into active community-members. The socio-economic-group-dynamic pocesses together with technological-organizational processes have absolute priority.

2 Knowledge Management in the Ecoradar-Community

For the joint-project an expert set of 21 different research institutions could be won. The expert set has the function to edit the relevant knowledge of the "community-environment" so that enterprises can transfer this expert knowledge to the Sustainable-oriented management. The knowledge management model of ecoradar supports the creation of knowledge within the enterprise on the basis of the external source of knowledge in the sense of the ontological knowledge spiral. The expert knowledge helps to support the acquisition of external knowledge and the development of own knowledge. The actual knowledge distribution is supported both over a especially designed telecooperations-system as well as over the portal (Frömmgen et al. 2016; Böhmann and Krcmar 1999). That telecooperations-modell as well as the portal is regularly updated by the experts and is supporting the knowledge preservation (Bannister and Grönlund 2017) in the organization. In the later course of the project it has to be assessed by the experts whether a ontology-based knowledge evaluation can be realized (Huang et al. 2017). The

evaluation research in co-operation with enterprise practice and with the help of empirical methods has to ensure that the quality criteria that are pursued by ecoradar such as Sustainable discharge, target group orientation and in particular practice fitness (glossary word: SME proximity) are actually respected and realized. The evaluation of enterprise practice will be performed by the practice-community.

The development team of ecoradar confirms the experience of Davenport and Prusak (1998: 32), that knowledge can exclusively be created in the brains of the knowledge carriers. The knowledge carriers of ecoradar are scientific experts and entrepreneurs, who cooperate within the community-process. The primary focus is on the externalization of the expert's knowledge. The know-how is transferred in an external information system (Knowledge Warehouse, CMS). Externalization of knowledge (Zhou et al. 2017) is especially suitable for standardizable knowledge (standards, laws, etc.). The recent experience of the ecoradar research project has shown that direct communication in a Knowledge Network is the best way to convey the expert's knowledge and experience (see below Table 1).

Table 1 Knowledge warehouse versus knowledge network (own illustration)

Criteria	Knowledge Warehouse	Knowledge network
Philosophy	Externalisation of knowledge	Direct communication, Reference to human experts
Range of application	Structured problem areasgiven goalknown relevance of informationConsequences of the decision foreseeablere-usable solutions	unstructured problem areasnot given goalunknown interdependencies Consequences of the decision unforeseeable limited reusability of solutions
Artificial intelligence	High (CMS)	low
Knowledge-requirements	Rules and methods	Not exactly specifiable
Moment of knowledge division	at the beginning of the knowledge process	On demand
Method to display knowledge	structured knowledge	Reference to knowledge carriers as well as presentations of experts's assessment
Knowledge transfer	Knowledge conveyed by knowledge carrier (experts)	Bilateral negotiating of the modalities for the sharing of knowledge
Role of IT	Storage and processing of knowledge	support of the information process and communication process
Access to knowledge	Information Retrieval & Data Mining (Sathiyamoorthi 2017)	creating of contact and communication with knowledge carrier

3 The Ecoradar Practise-Community

Representatives of the joint project's target group, enterprises in Germany, have already given it broad approval in its start-up phase. Some 40 enterprises employing an estimated one million members of staff have made the decision to support production and development of the prototype. The development of so-called 'eco-radar' screens is to be carried out in 18 workshops, hand in hand with business representatives and numerous experts. The organization of the high-calibre working groups has been taken on by Europe's largest business-led Sustainable initiative, the German Sustainable Management Association (BAUM e.V.), Hamburg. In addition, in the summer of 2001 a representative written survey was conducted in around 9000 enterprises-ECORADAR is a prototype early detection system which will enable German enterprises to identify technical, political and economic risks—but also market opportunities—of an Sustainable nature much earlier than their competitors, and to assess them more competently.

4 Content-Model

The ECORADAR system portal consists of eight ECORADAR screens which users can view as an ensemble—or individually if preferred—to scan a company profile (Company Radar—'micro-level') or the wider economic setting (Macro Radar—'macro-level'). The Company Radar is a system component that can be accessed from any ECORADAR screen, enabling users to systematically record and evaluate their company Sustainable Data, their company Sustainable Policy and their company Sustainable Goals. The Macro Radar, a similar system component that can be accessed from any ECORADAR screen, enables users to record and evaluate the 'macro-level' on the basis of the latest research—for instance global, national and regional Sustainable Data and Sustainable Goals as well a Content Management.

Within the project ECORADAR there will be created a portal that supplies Sustainable services. First, it is essential to embed information, references and checklists that have been already part of the ECORADAR-FRAMEWORK and former designs. In addition to these functions, the final version should be able to support all users interested in the Sustainable field by providing a virtual community. It should also identify possibilities for cooperation between all participants. Finally, it should enable the integration of Sustainable Management in business processes.

The first step is the creation of a user-friendly page layout. The essentials are a clear graphical structure, simple usability and the direct access to the services that are available with short download times.

5 Content Structure

ECORADAR is the result of a wealth of research which has mounted up over at least two decades. There are copious research findings under all eight of the sub-headings, along with applications that have been tested in practice, in some cases. Some parts of the ECORADAR system rely heavily on the latest Sustainable performance standards. The ECORADAR sequence of 'Sustainable Data—Sustainable Policy—Sustainable Goals—Sustainable Organization—Sustainable Knowledge' largely follows the thought processes of the European Union Eco-Management and Audit Scheme (EMAS) and ISO 14001. The integration of the ECORADAR screens 'Sustainable Costs', 'Sustainable Market' and 'Sustainable Technology' in the overall system is largely attributable to experience reported by companies. In business practice apparently there is plainly a recurring need for this kind of information.

5.1 Guidelines for Action

ECORADAR is a prototype early detection system which will enable German enterprises to identify technical, political and economic risks—but also market opportunities—of an Sustainable nature much earlier than their competitors, and to assess them more competently. The ECORADAR system portal consists of eight ECORADAR screens which users can view as an ensemble—or individually if preferred—to scan a company profile (Company Radar—'micro-level') or the wider economic setting (Macro Radar—'macro-level').

Company Radar

The Company Radar is a system component that can be accessed from any ECORADAR screen, enabling users to systematically record and evaluate their company Sustainable Data, their company Sustainable Policy and their company Sustainable Goals.

Macro Radar

The Macro Radar, a similar system component that can be accessed from any ECORADAR screen, enables users to record and evaluate the 'macro-level' on the basis of the latest research—for instance global, national and regional Sustainable Data and Sustainable Goals.

5.2 Four-Point Menu for the Company Radar

ECORADAR will use the Internet to provide structured communication of the latest expertise on sustainable management in a way that assists decision making

and is comprehensible and relevant to enterprises. A four-point menu—which once again is integrated into all ECORADAR screens—will ease this task for companies.

1. 'Getting Started'
   The 'Getting Started' menu shows companies the fundamental points they should take into account.
2. 'Stumbling Blocks'
   The 'Stumbling Blocks' menu shows how common mistakes can be avoided.
3. 'Checklists'
   The 'Checklists' contain guidelines for action which can be used interactively.
4. 'Benchmarks'
   The 'Benchmarks' allow for comparison with other enterprises by 'looking over their shoulder'.

6 Portal Structure

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6.1 Sustainable Data

Sustainable data are generally held to be the 'oxygen' of Sustainable policy. The regional, national and global Sustainable data provide a key basis on which companies can take action. Wherever the Sustainable situation is monitored and observed, wherever citizens are surveyed on their subjective experience of Sustainable problems, this can provide the impetus for action in Sustainable policy. Elementary company Sustainable data, for example, might be figures relating to energy, water, wastewater, waste, emissions and hazardous substances. Carbon dioxide emissions would be one example of key global Sustainable data.

6.2 Sustainable Policy

Approaches for Action Towards Sustainable Management
The future Sustainable standards imposed on enterprises are moulded partly by their own Sustainable policies but especially by external government and party programmes. For example, national environment policy approaches for action form an important basis for the future use of 'command-and-control' instruments. In Germany, for instance, the ideas of the coalition parties, the opposition and the separate parties at national, federal state and municipal level are not the only matters of importance. A considerable influence is exerted on future Sustainable policy by the policy-making bodies of the European Union and numerous other international organizations.

6.3 Sustainable Goals

Principles for Action Towards Sustainable Management
While Sustainable data represent a significant basis on which to take Sustainable policy action, Sustainable goals provide principles for action which, for their part, form the basis for the future application of environment policy instruments. Society should come together and use environment quality objectives to define core elements of environment policy action, working towards sustainable management in years to come. A company's own Sustainable targets, in contrast, are an element of the internal early detection system. Basically these should be geared to continuous improvement of Sustainable performance.

6.4 Sustainable Organization

An effective Sustainable early detection system can only be incorporated successfully within the enterprise once an efficient organization is in place for the structure and processes of Sustainable performance. Because then, and only then, is it possible to perform the target-performance comparisons which are necessary for early detection. For early detection, another important factor is to work closely with the public Sustainable authorities and associations: Sustainable authorities are the pivotal interface between the letter of the law and its enforcement. Enterprises that maintain good contacts with Sustainable authorities have swift access to information on new requirements under Sustainable law. Associations are viewed as powerful Sustainable policy actors and can pass on to their corporate members targeted advance information on Sustainable performance, picked up during the course of their lobbying.

6.5 Sustainable Knowledge Management

Sustainable know-how, both inside and outside a company, is a central element of Sustainable early detection. A cornerstone for knowledge transfer in the Sustainable sphere is formed by institutions such as the German Federal Sustainable Agency, the Federal Agency for Nature Conservation, the Federal German Foundation for the Environment, and the International Transfer Centre for Sustainable Technology. Likewise the media, as environment policy opinion-formers, play an important part in early detection.

6.6 Sustainable Costs

Monitoring and assessment of Sustainable costs in the widest sense (calculation of a company's pollution control costs, anticipation of external costs and the costs of neglecting Sustainable aspects, identification of potential cost reductions) is a permanent task within early detection. In particular, deducting—at least mentally—the costs of Sustainable degradation (today's external costs—tomorrow's operating costs) is a strategic element of eco-controlling.

6.7 Sustainable Market

Sustainable protection has developed into a significant economic factor over the past 30 years. In the year 1997 alone, German private and public sector spending on Sustainable protection was around DM 65,000 million. Studies predict that the market for Sustainable technology and Sustainably friendly products will continue to grow internationally in the coming years. Admittedly Germany still has a high market share in this area. However, other industrial nations—notably the USA, Canada and Great Britain—have developed strategies for gaining targeted access to new markets and supporting exports of Sustainable technology by their suppliers.

6.8 Sustainable Technology

Technical indicators play an important part in the early detection process. In particular, specialist trade fairs and exhibitions not only forge new contacts and stabilize business relationships but also provide advance information on technical innovations. Delphi surveys are increasingly conducted as part of this technology preview process, and these can serve to guide future strategic orientation.

7 Information Technology

Information technology (IT) research should contribute to ensuring that ECORADAR actually fulfils the quality criteria it has set itself, namely coherence and effectiveness, capacity for integration, clarity and, in particular, user-friendliness. The ECORADAR system must measure up to the latest developments in IT so that it can do full justice to its future-oriented role. Intelligent solutions must be developed for three fields in particular:

7.1 ECORADAR as a Workable Tool

The concern here is to create interactive, creative opportunities for the user (examples: automatic generation of indexes on the basis of a personal database; form-filling assistance; checklist programmes). The success of the ECORADAR system may well critically depend on the level of convenience built into the system architecture.

7.2 Integrating ECORADAR into Existing Business Processes

The better Sustainable performance is integrated into typical business procedures, the greater the prospects of success for sustainable management.

7.3 Mounting ECORADAR Technology on the Internet

The core parts of the ECORADAR system should be placed on the Internet as soon as possible (no later than 1 year into the project) and continually updated so that the feedback coming from users can be integrated reasonably quickly into the current research and development process. ECORADAR forms an ideal foundation for an Internet portal for ‘sustainable management’ and can be seen as the seed from which such a portal may grow.

8 Internet Strategy

The concept of a web portal has proven to be useful to handle the overwhelming data available on the internet. A portal can structure the information and is able to display the content in a user-friendly layout. This is the basis for an effective research by the business community. A portal is a universal and comfortable system to access applications, content and services that are focused on a specific topic.

Portals can be labeled as web-based: multimedia-style and accessible via standard internet-browsers

- task-oriented: adaptable regarding the tasks of users or customers
- categorized: content and services structured by categories
- personalized: individually designed to achieve 1:1 relationships with users/customers.

9 Internal and External Aspects of the Portal

The original concept of portals (i.e. Yahoo) was focused on the private, individual internet user. The main difference between a portal and a search engine (i.e. Google) is, that experts prove the content—not mathematical algorithm like the Google information world.

The idea of the portal is now increasingly focusing on individual companies. This is called an "Enterprise Information Portal" (EIP) (Kumar and García 2017). An EIP is focused both on internal users (employees and management) and external parties (customers, suppliers and other stakeholders of the company).

The internal focus of the portal has increasingly been on knowledge-management and the supply of software applications (i.e. inventory management, PPS, sales).

The external focus has in addition also functions for transactions like e-commerce, e-procurement, e-logistics and supply-chain-management). The internal interface is sometimes referred to as "Workplace", while the external side is called "Marketplace" (see SAP AG, mySAP.com). The themes of a portal, like applications, content and services can be designed to suit the needs of a specific geographical region or enterprise and the themes can also be selected to cover the requirements of a specific task or problem. It is also possible to mix a focus of a specific subject and a specific enterprise.

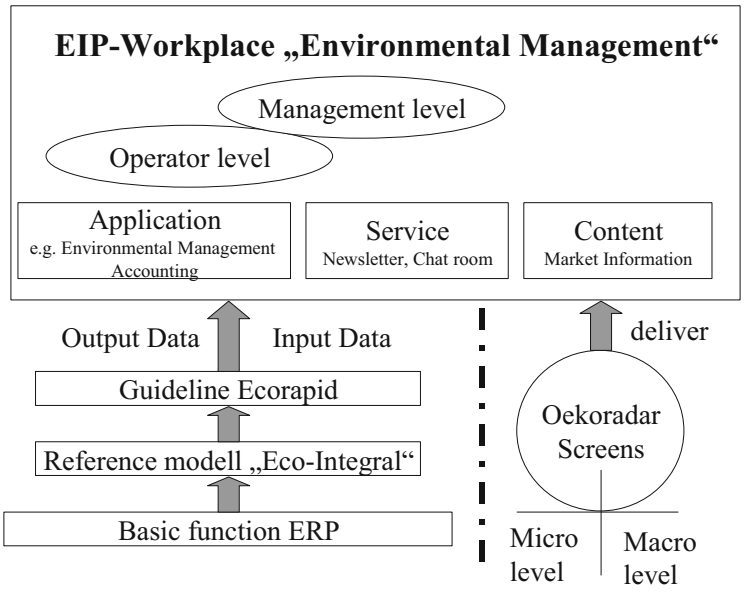

Fig. 1 EIP-workplace “sustainable management” (own illustration)

10 Workplace and Marketplace-Functions

The basic idea of ECORADAR (Kreeb et al. 2009) is the combination of “Enterprise Radar” and “Surrounding Field Radar”. This is the ideal basis to create a theme-related portal with a public/external side (“Marketplace”) to supply content and services for all companies and individuals that are interested in “Sustainable Management” and an internal side (“Workplace”) to supply the enterprise with functions for “Sustainable-Management” with both strategic and operational tasks.

The following illustration (Fig. 1) will show this internet-based dual approach:

The key innovation is the consistent use of all available “internet technologies”. The great idea of sustainable management will substantially benefit from this transition towards “Internet-Economy”.

11 Creation of an Internet-Platform for Sustainable Management: A “Workplace”-Architecture

One of the important trends in Enterprise-Data-Processing is the introduction of the so-called “Enterprise Information Portals” (EIP). As described above, every individual employee (from a simple operator to top managers) is offered customized information, applications and services via a common, open-platform internet-

browser. Beside these operational functions there are also now increasingly offered various functions in knowledge-management. The final goal of the development of a portal based on ECORADAR is the concept and consecutive design of a workplace (following the concept of an EIP), that offers all information, applications and services necessary for the tasks in Sustainable Management.

In addition to ECORADAR, the project "ECO-Rapid" is also an important basis for this development. Both projects are cooperating. There is an active exchange of results and planning. The following illustration is roughly showing the workplace-architecture on the basis of "ECORADAR" and "ECO-Rapid": Creation of a web-based, open, dynamic access to all relevant Resources of Sustainable Management for Enterprises and Individuals. The bundling of all relevant resources concerning Sustainability on one webpage is the primary goal of this public portal. The task of this portal is to cover all needs of enterprises and individuals for information about the topic of Sustainability. There is a substantial demand for that kind of bundled information in Germany.

The following topics are possible and some are already integrated in the presented framework of the prototype ECORADAR:

- current and historic Sustainable data
- knowledge base for Sustainable Management and
- Sustainable Technology
- Sustainable Laws, intelligent checklists for individual use
- Ecologic Market (Purchase of ecological products for enterprises and private households)
- Ecologic investments
- List of ecologic business consultants
- Specific literature

The portal is offering three main functions:

1. Passive, regularly updated information for research
2. Interactive communication between users, assuming that there is a demand for exchange of specific subjects via chat-rooms, interactive message-boards, exchange of knowledge and experiences
3. Transactions, products and services. The portal can be upgraded for electronic procurement of Sustainably friendly products and services.

The module for supply of information can already be almost completely covered by ECORADAR. It would be required to create a Content-Management-System that provides a regular flow of information at reasonable costs. The module for transactions could be started with partner-companies and then be gradually expanded.

12 The Editorial System and Telecooperation-System

The design of the portal is also requiring the development of a technological infrastructure. The community that is providing the Sustainable information needs a system for editing and telecooperation. The careful design of a sustainable project has to ensure the possibility for current and easy upgrades. The approach of iterative prototyping and learning by-doing will provide constant input by users that can be integrated in the development process. The valuable data will also contribute to the development of a business model for the portal ECORADAR. Data about addresses, for advertising, newsletters and commissions is essential.

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