The Electronic Silverback

Absorb Knowledge Loss in Industry by Social Network Approach

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Abstract—**Over the last decades, focusing on core competencies was one of the major management strategies to reduce cost and improve performance. Knowledge loss was accepted to some extent as this knowledge was not seen as crucial for the well-being of the company. What most companies underestimated was the impact of losing application knowledge, defining the specialties of applying non-core competencies on a company specific implementation. As both sides, the company and the supplier, limited their knowledge to their own core competencies, the required interfacing knowledge was completely lost. In this paper we will explain from an industrial perspective why this loss was disregarded for a long time, what the impact of this loss is and how the lost knowledge can be regained using a social network approach. Social networks are already widely used in industry, but mainly limited to marketing and recruiting. By this paper we want to extent the usage to the field of knowledge management. It builds the basis for a project starting in German Chemical Industry in 2012.**

Keywords- ***social network; industrial knowledge loss; core competencies; expert knowledge; incentives.***

I. INTRODUCTION

In the late decades of the last century, lots of companies reduced their processes and workforce to the minimum, required to deliver their so called core competencies. Under core competencies fall all elements that contribute directly to the creation of value of the produced product or delivered service, and build a unique selling proposition – or be at least not too easy reproduced by competitors.

All other competencies were outsourced to third parties, either by outsourcing parts of the company into independent companies or handing over work to a third party supplier. The basic idea was not too bad: let the company with the most experience and knowledge do the work it is specialized for - and by this benefit from their performance.

Companies easily accepted the loss in knowledge of outsourced work – as this knowledge was not seen as crucial and they still had suppliers to continue, and maybe optimize, this knowledge. By this approach, companies were able to free resources and money to further improve their core competencies and specialize on these - the same did the supplier. By this, another creeping knowledge loss started, which was not managed by most companies: the loss of application knowledge [1].

What is meant by application knowledge might best be explained by an example: if a company produces chemicals it needs pipes. Pipes are a highly standardized product. Therefore, the chemical company outsourced all piping work to an external supplier. Due to the high standardization of pipes, the supplier was able to deliver piping work in shorter time for lower cost.

With the saved money the chemical company was able to invest in more research for new products and optimized production processes. After several years of research the chemical company came up with a new product requiring a special type of piping. The company itself was not able to develop the piping system as it had outsourced all piping work. The piping supplier also was not able to deliver the piping work as it has focused on delivering standard piping systems and was afraid of the extra invest that has to be spend on research for developing the special piping system.

At the end of the last century, companies were still able to cope with this situation. Most companies still had employees "knowing the old times". In these old times, where everything was developed and delivered by the company itself, it was the employees' day-to-day work to cover all required steps of the production process. These employees usually were still able to give "hints" what a system should look like and therefore were the hidden knowledge tanks of the company – in one company they have been called "silverbacks" (like the gorillas) to express the deep technical knowledge they had collected during their lifetime.

By this, the problem was somehow known but not properly addressed as resources were still available to cover the problem.

But the longer it lasted, the more simple biological aspects came into account. Employees who collected their expert knowledge in the 70's or 80's of the last century are now retired – the silverbacks left the forest!

In Section II of this paper we will further define the problem. Section III describes the needs of the stakeholders. Section IV covers possible solution approaches. One of these approaches is detailed in Section V followed by a description of the implementation requirements in Sections VI to VIII. The paper ends with a conclusion, outlook and references in Sections IX to XI.

II. DEFINING THE PROBLEM

Focusing on core competencies leads to a knowledge gap where different knowledge areas come together. If both sides focus on their own knowledge area only, existing application

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knowledge is stepwise lost. For some time, this can be absorbed by remaining part-knowledge on both sides and in later phases maybe also by knowledge silverbacks, but in the very end knowledge is irretrievably lost [2].

In the first phase, the company holds knowledge on the core competencies as well as on non-core competencies. By this, application knowledge is automatically maintained and developed.

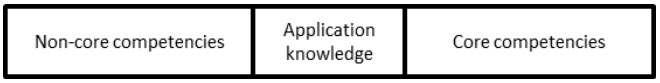

Figure 1. Starting state

Once the non-core competencies are outsourced, application knowledge decreases, the more both sides are focusing on their own core competencies.

Figure 2. Knowledge decrease

This lasts until the knowledge is limited to some experts.

Figure 3. Silverback state

In the very end, this leads to a knowledge gap.

Figure 4. End state - knowledge disconnect

Dependent on the state a company is already in, the problem has different severity. A company in starting state has to perform a knowledge management initiative to ensure that application management knowledge is collected, maintained and developed.

A company in knowledge decrease state has to do the same, but should also evaluate how much knowledge is already lost, e.g., by analyzing application knowledge need for possible research and development initiatives.

If the company is already in Silverback state it has to ensure that the knowledge of the Silverbacks is conserved and multiplied (e.g., by a mentoring approach, interviews, scenario techniques…).

The biggest challenge is to regain application knowledge for a company that is already in the knowledge disconnect state. Here once existing knowledge is lost and has to be re-build based on the requirements of the further developed core competencies.

The approach described in this paper covers the knowledge disconnect state, integrating elements from the Silverback state, as the first two states allow management by standard knowledge management techniques.

III. DEVELOP THE PROBLEM

To propose a solution, the impact, impediments and preferences of the different stakeholders have to be evaluated [6].

Stakeholders, in this case, are the company which is asking for the best solution, the supplier who is interested in developing a long-lasting customer relationship as well as the development of its own core competencies, and last not least the Silverbacks as long as they are available [3].

A. *Company needs*

The company first has to identify which application knowledge is required [4]. Based on this it has to be decided whether this application knowledge should be developed by the company itself or a supplier.

If the application knowledge is developed by the company itself, it has to cover research time as well as research invest. Based on time and invest it has to decide whether this application knowledge might or should become a core competency of the company.

If the application knowledge should be delivered by a supplier, the company has to cover the additional research cost and the risk, that the supplier is not able to deliver the application knowledge in the very end. If the company is developing the application knowledge itself, it is facing the same risk, but in this case the company is able to manage the risk directly, which is not possible if knowledge provision is outsourced.

B. *Supplier needs*

If a supplier develops application knowledge for a company, this work has to improve the suppliers' capabilities and economic success – otherwise there is no need for the supplier to perform this work.

Supplier capabilities are improved if the supplier can reuse the developed knowledge for other customers or improve its own core competencies.

Economic success is reached if either the cost for knowledge development is covered or the knowledge can be used for several customers and by this an economic benefit can be reached. Indirect economic benefit is delivered if the supplier becomes a preferred status and therefore is more often selected by the company.

C. *Silverback needs*

The Silverbacks are the most contributing but also the most problematic stakeholders. On one hand they hold most of the required knowledge. On the other hand they need a strong incentive to participate ("why should I help them on

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something they have thrown away several years ago, now that I'm retired?").

IV. SOLUTION APPROACHES

As problem and stakeholders are known now, question is how the problem can be solved with the given stakeholders. Usually a formal approach is chosen.

A. Formal Approach

In a formal approach a project is set up to develop the knowledge. Therefore resources from company and supplier are required, which work on a defined topic to deliver defined results on a defined timeline.

The positives of a formal approach are that
- Structured management is possible
- Resources and roles are defined
- Goals are defined
- Effort and cost are planned

The negatives of a formal approach are that
- Required resources are hard to get (Silverbacks working for a defined duration with a defined effort)
- Effort and cost are hardly predictable if research methodology and impacting factors are unknown
- Project is limited to the goals, additional benefit opportunities identified during the project are not followed up

So, a formal approach will always help when we know what we need and want, and be able to define whom we need for this work, and can ensure that all the required resources are available.

B. Informal Approach

By an informal approach, information is collected in a community. Several people can work on a topic at their own will defining their own effort and contribution.

The positives of an informal approach are that
- A wide group can contribute
- Costs are minimized for the first step
- Additional benefit opportunities might be mentioned as well as impediments unknown by now

The negatives of a formal approach are that there is
- No guarantee that a solution will be developed at all
- No structured approach and timeline
- Unclear ownership of contributed knowledge

Given the management benefits of a formal approach and creativity benefits of the informal approach, combination of both might also be reasonable.

C. Combined Approach

In the combined approach, knowledge development starts with the informal approach. Driven by an event the collected information is transferred into the formal approach.

Possible events might be
- Information quality – amount of collected information and knowledge is sufficient to perform a reliable planning
- Time constraint – knowledge development project has to be started at a defined point in time to ensure in-time knowledge delivery. Up to this starting point as much information as possible is collected by the informal approach.

V. DEFINING THE INFORMAL SOLUTION APPROACH

Performing projects is a well-known and properly equipped process in industry [10; 11]. Therefore, the formal approach is not further described here.

Using the informal approach is much more uncommon in industry. Therefore, influencing factors and possible impediments require further analysis.

At first, the contributors (here stakeholders) act at free will. To foster this, each contributor must receive an incentive for the contribution.

Then, the contributors provide knowledge. This knowledge must be useful for other users. Therefore, the benefit of a contribution must be rateable.

As a third point, the user wants to get his problems solved, so there must be a possibility to communicate questions and problems.

Last, but not least, intellectual property must be safe. It has to be either ensured that only selected users have access to defined information or the incentive reaches a level that allows common usage.

VI. IMPLEMENTING THE INFORMAL SOLUTION APPROACH

The basic idea is to implement the informal solution approach by using the strategies and technologies known from social networks, in this specific case:
- Set up stakeholder specific profiles
- Connect to other stakeholders
- Share information (knowledge, questions, problems, etc.)
- Comment on shared information
- Reuse shared information
- Rate shared information
- Limit access to information
- Allow direct contact
- Calculate and deliver incentives
- Independent clearance

Each of the topics above will be further discussed now.

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A. Setup stakeholder specific profiles

As described before, stakeholders are companies, suppliers and silverbacks. In the interaction, companies now become information customers of suppliers and Silverbacks. Customer companies want to get their problems and future challenges resolved. Therefore, it has to be possible to profile requests as well as fields of work. This allows other stakeholders to react on a problem or identify, develop or contribute knowledge useful for solving further challenges.

Suppliers mainly want to present themselves and show their capabilities. Therefore, there should be an appetite to present marketing information in addition to the competencies itself.

Major question regarding the Silverbacks is how it can be ensured that they are interested in participation. Thinkable might be a Silverback network which allows connecting to retired colleagues and a very strong incentive model ("what do I get out of it?"). On the other hand, it has to be ensured that required information about the Silverbacks' qualification and capabilities is available.

B. Connect to other stakeholders

Once stakeholders are present in the network, connecting types have to be evaluated. First question is whether direct competition is allowed. If so, each supplier can see the offers of its competitors and can react by pointing out which advantages it has compared to the competitors. Same is the case for customers. If they are able to see their competitors and also the suppliers working for them, they are able to benchmark themselves as well as to select new suppliers based on the contributions for other customers [9]. The direct approach allows building sub-communities (e.g., setting up a syndicate working together on a specific product or service for a defined period of time under defined rules).

On the other hand, it might be required to limit information to a specific group (e.g., if confidential information is made available). In this case the information offering partner should be able to decide which information is publicly shared and which is limited to a defined group.

Same is applicable for Silverbacks. They should be able to openly present themselves and their knowledge as well as limit access to private knowledge and conversations.

C. Share knowledge

Knowledge sharing is defined by profile and connection type. It should be possible to share structured knowledge as well as unstructured knowledge. Structured knowledge is offered based on a defined topic, question or problem. It can clearly be assigned to a specific field of work or application. Unstructured knowledge is each information, a supplier, customer or Silverback wants to offer. It has more a "what I also did in my life" style than addressing a specific topic.

Knowledge sharing should be able in a pull and push mode. In the pull mode [8], an interested party searches for information. In the push mode information is distributed to generally interested parties whenever it is produced. To avoid information overload, a subscribing mechanism must be in place to allow a pre-selection of acceptable "pushs".

D. Share questions and problems

Questions and problems are requests for information. Whilst a question is usually made available to all participants, a problem might require a proper pre-selection of involved parties. Background of a question is to retrieve as much information as possible on the specific topic. Problems look for more specified information and therefore have to avoid "information noise", meaning information which is generally useful but not contributing in resolving the problem.

It should be defined who is allowed to raise questions and problems. In a customer-centric network only customers should be able to raise questions and problems.

In a knowledge-centric network, everybody should be able to ask everybody else (e.g., Silverback asking for a specific tool, supplier asking for a special sub-process, etc.).

E. Comment on shared information

Once information is shared, everybody should be able to comment on it. Comments could be remarks, enhancements, corrections, but only the original provider should be able to change information based on the comments.

F. Reuse shared information

All information should be available to the intended user group. This can either be all participants or a limited group defined by the information provider (supplier makes new method available to preferred customer) or an information user (e.g., customer uses specific supplier knowledge).

Question is how an interested party gets hands on the information. Therefore manual and automatic search mechanisms must be available to identify and select required and useful information. Especially in research driven industries the "language" often is not fully defined, therefore search must be possible on syntactical and semantic level.

Additional search setting might be the current rating of information, to identify often used (common) information as well as seldom used (expert) information in relationship to the search topic. To avoid information noise, it has to be possible to exclude information rated as not useful.

Once information is selected, it has to be defined under which rules information can be re-used [5]. Silverback knowledge might e.g., be re-published by everyone as long as it is ensured that the originator receives his incentive for each reuse. Confidential, protected or trademarked information might only be reused under defined rules.

G. Rate shared information

Every information has to be rated on quantity, quality and domain level. Rating on quantity level means that it has to be measured, how often information has been accessed. Rating on quality means that each retriever of information

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rates the benefit he gets out of the information. In the last step the search keywords leading to information are collected to improve the matching of search results.

Based on these 3 base ratings, a participants rating can be calculated. By this all participants can be grouped in classes like "contributors" (delivering a significant amount of useful information), "profiteers" (using more information than they are contributing), "blabbermouths" (contributing lots of information but with low benefit for others) or "freeloader" (which are using lots of information without contributing anything).

H. Limit access to information

As said before, it must be possible to limit access to information. Therefore an invite mechanism is required which allows a contributor to select participants who are allowed to retrieve this information. For search improvement reasons this might be structured stepwise. It might e.g., be possible to limit access to the information but not to related keywords. If a participant now searches for a keyword, he might see that information on this topic is available but still has to ask the information provider for access (e.g., access to trademarked / confidential information requiring a contract, non-disclosure agreement…).

I. Allow direct contact

To allow quick feedback or clarification, there must be a possibility to contact other participants directly. This could e.g., be done by chat functionality.

J. Calculate and deliver incentives

Incentives should be calculated based on the rating that a participant receives (as described under VI.G). The easiest way is to transform the different ratings into points. These points then might be changed into different incentives per group (Silverbacks, suppliers, customers). How these incentives might be managed is described in section VII.

K. Independent clearance

Even though the whole network is based on trust, misuse cannot be ruled out. For this reason an independent clearance body (e.g., trust center borne by all groups) should be installed.

Whenever a participant thinks that information is incorrect, copyright and related rights are not properly respected, or the ethics of the network are not followed, the participant can ask for clearance.

Additionally this clearance body can support the installation of the Electronic Silverback as described in section VIII.

VII. HOW TO MANAGE INCENTIVES

It is evident that incentives have to be managed differently per group: an incentive for a Silverback has to look different than an incentive for a supplier or customer [7].

A. Customer Incentives

For customers no specific incentives are required at first sight. Customers benefit from the provided information. However in later phases incentives might be reasonable, if customers act differently in information provision. If e.g., some customers provide information regularly ("contributor") whilst others only use information ("freeloader"), new Silverback or supplier information might e.g., be made available to contributors first, whilst freeloaders are granted access after a defined period (x days / weeks later).

B. Supplier Incentives

Suppliers might see the network as a possibility to tighten their relationship to their customers. On the other hand suppliers have to spend a reasonable amount of time and effort if they really want to contribute to the network. A possible incentive might be to integrate the supplier ratings into supplier performance monitoring. Most large companies have performance indicators for their suppliers. Contract terms and durations, supplier selection and preference and cost calculation are often driven by these indicators. If a supplier now has collected a high number of points in the network, this should improve the suppliers' performance indicator. For this reason it might be required to calculate customer specific ratings (e.g., not only "how often has information provided by this supplier been used" but "how often has information provided by this supplier been used by a specific customer"). These customer specific ratings should be confidential and might e.g., be managed by the clearance body.

C. Silverback Incentives

The hardest group to get is the Silverback community. What drives a Silverback to contribute time and knowledge? If the Silverback is still in the company, classic incentive models like salary increase might be possible as well as early retirement ("you can retire earlier if you are still available as expert from time to time").

Silverbacks already retired might be caught by receiving credit or direct or indirect payments.

Giving credit might e.g., been implemented by inviting highly pointed Silverbacks to conferences or setting up expert groups which meet in appropriate locations with high quality service.

Indirect payment might e.g., be done by providing Silverbacks with the newest computer technology, offering discounts in company owned stores or allowing them to participate in company rebate systems.

Direct payment might either result from points (points collected are converted in € or $), or improvement sharing (Silverback receives a percentage of the calculated

improvement benefit reached by information provided by him).

To ensure fairness of the calculations, this might also be performed by the clearance body.

VIII. THE ELECTRONIC SILVERBACK

Most of the activities described above look like delivering short term results. Customers ask questions or search help for problems. Silverbacks help on questions and problems and suppliers will mainly use it to combine marketing with customer relationship.

But, over time, the network will become a vault of knowledge. The more the network is used, the more information and knowledge will be available. This is the time to lift the treasure.

Based on the questions asked and searches performed, standard question and search strategies can be designed. Based on the information structure and keywords, information can be grouped and combined.

In the very end the network will become the Electronic Silverback: holding and improving application knowledge and establishing analysis and retrieval mechanisms to provide this knowledge in defined use cases.

IX. CONCLUSION

Companies are more and more using social networks. Whether it is Facebook, LinkedIn or Twitter, the number of companies represented there is increasing every day.

But the fields of application are still limited. Social networks are seen as marketing or recruiting platforms, but not to conserve knowledge. On the other hand everything required is already there – it just has to be used.

The major challenge for using a social network is trust in the network provider. Companies have to rely that information is not distributed unauthorized. Therefore the network provider has still to ensure an independent clearance body trusted by all partners.

X. OUTLOOK

In the current stage, it still has to be proven that a social network approach for companies delivers benefits beyond marketing and recruiting. The approach described in this paper offers another field of application.

Looking at the environment surrounding companies the way to social networking is irreversible: research is more and more performed in communities; innovative products are developed in open source communities; and even companies bring together experts from all over the world to improve their research, development and production capabilities.

So why not trying this in the field of knowledge management? This approach and the upcoming project should prove this, and lead the way from a selected group of customers, suppliers and Silverbacks to a repository for a whole sector or industry. Who is not willing to share might not be able to survive.

XI. REFERENCES

This paper does not have any direct references to other publications. Reason for this is that the paper is an independent industry approach not relying on any academic pre-work.

However basis of this paper are discussions with industry leaders on usage and possible benefits of social networks in industry. Major topics of these discussions were:

- How can we conserve expert knowledge?
- Can social media help?
- How do we get from expert knowledge to community knowledge?
- How do we get knowledge communities working in industry?
- How do we make this approach sustainable?

During discussions we often came to the point where one of the participants said “you know, I read the book from…” – indicating the basic thoughts on and perception of social media and collaboration usage in industry.

Knowing that the list below is neither complete nor comply with academic research requirements, it should give an overview, which topics already drive industrial decision makers.

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