

GLOBAL EXCHANGE OF KNOWLEDGE AND BEST-PRACTICES IN SIEMENS BUILDING TECHNOLOGIES WITH 'REFERENCES@SBT'

JOHANNES MÜLLER

*Siemens Switzerland Ltd.
Building Technologies Group, Security Systems Division
Gubelstrasse 22, 6301 Zug, Switzerland
e-Mail: j-mueller@siemens.com*

This case study presents References@SBT, a web-based application for sharing knowledge, experiences and best-practices globally within Siemens Building Technologies. The application architecture, the content structure and actions on how to improve and increase the content are described. The user community with currently about 3,000 members is highlighted as the critical success factor. As a social networking tool, References@SBT intends to connect people by supporting the communication with each other. The result of a user survey shows the benefits of deploying and using this application from a qualitative and quantitative perspective: It is helpful for 84.6% of the users and implicates an average time saving of 0.6 working days per user.

1. History

The Siemens Building Technologies (SBT) group was founded on October 1st, 1998 as a result of integrating the former *Elektrowatt* group's industrial sector units into the building technologies activities of *Siemens*. Thus, the competencies of the former companies *Cerberus*, *Landis & Staefa* and *Siemens* were consolidated into one organization. Today, the SBT group is headquartered in Zug, Switzerland, and consists of four business divisions: Building Automation (BAU), Fire Safety and Security Products (FS), Heating, Ventilation and Air Conditioning Products (HVP) and Security Systems (SES).

Each division operates in its own, highly competitive market and sells products, systems, customized solutions and services by a decentralized organization. Because SBT has been significantly challenged on price by its competitors, several strategic initiatives have been defined and implemented to reach the Siemens business targets. Concerning the growth of sales and profitability, one of the focus areas was to enable the global sales force to learn from successfully implemented projects and solutions. To facilitate this knowledge transfer, the divisional SES management decided to develop a web-based intranet application, which contains solution concepts in order to replicate or re-use them.

In January 2005, this paper's author joined SES to take the lead in this program and immediately started with database design, application development and programming, content collection, and community building. According to the motto "*How can people and computers be connected so that - collectively - they act more intelligently than any individuals, groups, or computers have ever done before?*" (CCI, 2007), the main objectives have been and still are today:

- Build a reliable source of business-related knowledge,
- identify trusted and proven sources of best-practices for further exchange,

- establish a global community of practice (CoP), and
- build up an environment, where it is rewarding and encouraging to publish and share own work and individual experiences.

The application, which was at first planned for SES projects and solutions only, was developed in a rapid prototyping manner. Instead of writing concepts and specifications and having time-consuming discussions with a lot of colleagues, the application was quickly designed and implemented by one single person, and the database was filled with about ten contributions as initial content. Already in March 2005, a working prototype was ready to be demonstrated. Afterwards, it was improved and extended in many iterations driven by the requirements of the user community (see chapter 4).

A major obstacle at the beginning was the filling of the database. It turned out to be quite challenging to discover and prepare existing projects for a contribution. The greatest achievement was (and still is) to convince the sales reps and project managers/engineers to invest time and effort to enter project information into the database without immediate payback for themselves. Getting access to people and obtaining buy-in was only possible with active top-management support. The critical success factor was to generate a momentum and keep it going (Akçay, Amdı, Haddad, Miceli, Schott, Thoma, 2006).

Some weeks after the initial prototype was available on the Siemens intranet, the other divisions of SBT realized the benefit of such an application for their own business needs. After some relatively minor adaptations, the application could be extended for group-wide and cross-divisional use in mid-2005. In October 2005, the application was named References@SBT and became an integral part of the official 'Global SBT Intranet'.



Fig. 1. Homepage of References@SBT, where recent urgent requests, news announcements, and knowledge references are dynamically displayed.

2. Content Structure and Taxonomy

The contributions stored in References@SBT can be divided in well structured "Knowledge References", feedbacks and spontaneous discussion postings. An unlimited number of files in any format can be attached to any contribution.

Each contribution clearly displays the name of its author, i.e. the person, who entered the contribution and is responsible for its correctness and completeness. Persons are always displayed as hyperlinks to the respective member pages (see chapter 4.2), which include the full contact information of the mentioned persons. This enables to build a community of experts and to identify "knowledge champions" (Hariharan, 2005).

2.1 Knowledge References

While the first application prototype contained finalized customer projects only, nowadays several different content types can be stored and found in References@SBT:

- Customer Projects (finalized, ongoing, or recently contracted)
- Solution Concepts
- Service Concepts
- Technology Information
- Market Analyses
- External Award Stories
- Business Excellence Cases (i.e. internal improvement project)
- "Lessons Learned"

Besides textual information, each knowledge reference contains several attributes like discipline (e.g. access control, fire detection, heating/ventilation), customer industry sector (e.g. airport, financial service, oil and gas), country, year of completion, and confidentiality status (for internal use only, externally communicable). This taxonomy allows multi-dimensional search profiles with a combination of several attributes and/or keywords (e.g. access control projects executed in the healthcare market in Germany and completed in 2004 or later).

Besides the author (i.e. information provider), one or two contact partners, who can give technical advice concerning the contribution, can be optionally mentioned. Furthermore, the geographic position of the site/building (see figure 2), where the project was executed, can be specified in terms of geographic coordinates.

Every 4-6 months, all knowledge references are scanned for completeness. This automated process has to be manually started by an administrator. If a knowledge reference is detected having incomplete or inconsistent data, the author and the contact partner(s) will receive a notification e-mail asking for data completion or correction. Usually, the rate of return after such a measure results to about 20-25%, which is comparatively high.

2.2 Feedback to Knowledge References

Any user can give feedback to any knowledge reference, which is in principle similar to customer reviews on the internet. This can be seen as a continuous content improvement process and helps to ensure the quality of the contributions and to reward active users. A feedback always contains a title, a textual comment, a feedback type attribute (e.g. "learned something", "created business", "outdated info", etc.), and the name of the feedback provider, which is displayed as hyperlink to the respective member page (see

chapter 4.2). Optionally, a rating can be given on a scale from 0 to 5, which will be displayed as stars, e.g. "★★★★☆" representing a rating of 4. All given feedbacks are displayed below the respective knowledge reference and are immediately visible for all readers. They are accompanied by an automatic notification e-mail to the author and the contact partner(s).

2.3 Discussion Postings

Currently, the following discussion forums are available in References@SBT:

- Feedback and Help concerning References@SBT
- Solution Talk
- Successful Knowledge Reuse with References@SBT
- Urgent Requests

A discussion forum can accommodate several discussion topics. Each discussion topic, being a discussion about a certain subject, consists of one or several discussion postings: one 'topic starter' (i.e. the topic's initial posting) and an arbitrary number of replies.

3. Application Features

References@SBT is implemented as a web application and is exclusively available on the Siemens intranet. It is programmed in VBScript running in an 'Active Server Pages' (ASP) environment. All information is stored in an MS SQL database, which is connected to the application via an ADO/OLE DB interface (Henderson, 2004).

3.1 Barrier-free Access

References@SBT is open for all Siemens employees. Since it is only accessible within the intranet, there isn't any further login necessary. The 'Integrated Windows Authentication' feature, which is supported in ASP, identifies any user by his or her Windows login data. (A Windows login is mandatory to enter Siemens' computer network.) For a pure reading access, a registration as community member (see chapter 4.1) is not necessary. But to use the interactive features (contribute a discussion posting, give feedback, modify the 'About me' data, set and manage notification alerts), a registration is required.

3.2 Intuitive System Usage

An all-important goal while developing References@SBT was to design a self-explanatory and intuitive user interface. A user should quickly feel comfortable, while interacting with References@SBT, without reading any manuals or attending any trainings. On the basis of the author's working experiences, the overall usability and the way of how to interact with References@SBT was taken from *Com ShareNet* (Clasohm, 2002) (Müller, Baumann, Manuth, Meinert, 2004), the KM application of the previous Siemens Communications group, and adapted to SBT's requirements.

3.3 How to Find Relevant Contributions

1. Via the '**Quick Search**' field located in every page, a search term can be specified. This leads to a one-dimensional search profile (e.g. all contributions containing the term "SiPass"). Terms with similar or identical semantics (e.g. "Wien" and "Vienna") are automatically proposed as search alternatives. This enables a quick, simple and spontaneous search query at anytime.

Using the attributes, which are described in chapter 2.1, it is possible to search for relevant content without specifying keywords:

2. The **'Browse Knowledge'** page allows the selection of one attribute resulting in a one-dimensional search profile (e.g. all contributions related to healthcare).
3. The **'Search Knowledge'** page allows the selection of multiple attributes and/or multiple keywords, which results in a multi-dimensional search profile (e.g. all knowledge references, which describe projects executed for hotels in Germany, have both access control and fire detection, show an order volume of at least €500,000, and contain the term "management").
4. A **geographic depiction**, where the resulting locations of any search profile are geographically displayed using *Google Maps*TM, allows to search for projects executed around a certain geographic location (see figure 2).

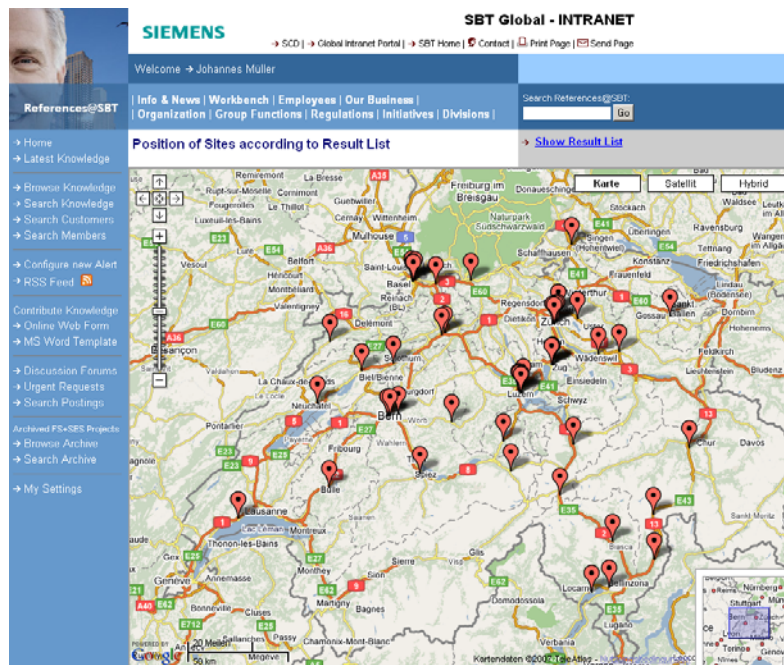


Fig. 2. Geographic display of projects executed in Switzerland. When clicking on a red marker, a small window opens and displays the project's title, which is a hyperlink to the project page, and a site picture. The positioning was done manually and very precisely, i.e. to the site/building, where the project was executed.

Each one- or multi-dimensional search profile can be individually subscribed, thus the user will be automatically notified in case of any changes (i.e. new/modified knowledge references or new discussion postings). This helps the users to stay informed according to their specific field of interest without the need of accessing the application.

5. A **'Notification Alert'** can be set on any search profile or on any discussion forum. Then, the user will receive a daily or weekly e-mail with new and modified contributions.
6. An **'RSS Feed'**, which is a standardized XML data format and can be subscribed within any feed reader, is dynamically provided for any arbitrary search profile.

Additionally, it is possible to search for customers or community members. Doing so, corresponding contributions can be found as well.

7. The '**Search Customers**' page performs a direct search for the projects' customers by country and/or keyword. Within any customer page, all related knowledge references (i.e. all projects ordered by this particular customer) are listed.
8. The '**Search Members**' page allows a search for registered community members by country and/or keyword and delivers links to the respective member pages. In chapter 4.2, a detailed description of the member data is given.

References@SBT was originally intended as knowledge exchange platform for purely internal use. Thus all contributions are shown by default. Due to the lack of a suitable reference database, which presents SBT projects towards external users, it was required to utilize References@SBT for customer presentations and therefore to implement a 'Presentation Mode'. After switching to this mode, all contributions with the confidentiality status "for internal use only" (see chapter 2.1) and all commercial data (e.g. value of the project contract) are consequently hidden.

Content from the References@SBT database is also displayed on other Siemens intranet pages. This ensures the data storage and maintenance within one single database and disburdens the other webmasters from permanently updating static link lists. The data import from References@SBT is done using one of the following mechanisms:

- An 'inner frame' displays a References@SBT page delivered in a special layout.
- The content is dynamically imported with RSS and displayed according to the style and layout of the respective page.

3.4 How to Contribute a New Knowledge Reference

The contribution of a new knowledge reference is allowed in English or German language. German texts will be translated into English before being released in the database. File attachments are welcome in any language and won't be translated.

On each page, two links are provided for contributing a new knowledge reference. The first one points to a web form, the other one to an 'MS Word' template, which can be completed and sent to the administrator via e-mail. Since the users cannot directly add or edit knowledge references in the database, any new contribution will be checked, edited or translated, and copied to the database by the administrator. As soon as a new knowledge reference is released, a notification e-mail is sent to the author and the contact partner(s) asking them to check the content and, if necessary, to complete missing data.

4. Community Building around References@SBT

From the very beginning, the users have been the main focus while developing the application and collecting the content. References@SBT is not intended to be an omniscient tool, which can store and provide the complete SBT knowledge. Besides offering data, information, and codified knowledge, References@SBT wants to connect people and to let them communicate with each other - just in the sense of a social networking tool.

Although the application is - from a technological viewpoint - quite simple, it is used very often, and the number of registered users is steadily growing (see table 1). This success has been mainly achieved by consequently focusing on the usage part.

Table 1. Monthly access statistics, user registrations, and contributed knowledge references

month	page views	unique users	user registrations new / cumulated	know. references new / cumulated
April 2007	9,337	1,873	182 / 3,030	73 / 1,070
March 2007	10,603	3,329	121 / 2,848	41 / 997
February 2007	8,689	3,270	87 / 2,727	33 / 956
January 2007	8,407	2,181	115 / 2,640	32 / 923
December 2006	8,198	3,050	111 / 2,525	37 / 891

An important key success factor is getting in touch with the people, who are directly involved with the customer projects and are usually located in regional sales branches. This target audience of *References@SBT* must be motivated to participate, to enter content and to reuse other colleagues' contributions.

Many features of today's version are based on user feedbacks. Significant developments are done in close interaction with the users. Thus, all user feedbacks, suggestions or enhancement requests are always treated very seriously, replied quickly and reflected in the tool in very short iteration cycles.

4.1 How to Join the Community

The *References@SBT Community* aims to bring together all frequent users and project/technology experts, who are usually Siemens employees. Any user can quickly register in order to become a community member. There are several ways to participate:

1. At the beginning of each *References@SBT* browser session, a popup window automatically appears for unregistered users and suggests a registration. (Approximately 80% of the members registered that way.)
2. If an unregistered user wants to contribute a knowledge reference, feedback, or discussion posting or to activate an alert, he/she is asked to register.
3. If an unregistered user is mentioned as contact partner in a new knowledge reference, he/she will be registered by the administrator. This means that any contact partner appears as a member of the *References@SBT Community* - even if he/she never used the system.

4.2 Member Page

Each community member has - similar to a "yellow page" - an own member page in *References@SBT*. This page displays name, organizational department, office location, phone numbers, mail address, an optional '*About me*' field, and an optional portrait (as jpg file). Via an LDAP interface, most user data are derived from the Siemens-wide employee directory, thus a manual maintenance of the user data in *References@SBT* is not necessary. The key for the data synchronization is the member's e-mail address, which is always unique and remains mostly unchanged.

The '*About me*' field can be edited by the member him/herself and can contain any individual and business-relevant information such as current function, competencies, work-

ing history, etc. Due to local working regulations in certain countries, it is voluntary to enter information into this field.

All contributions (knowledge references, feedbacks, and discussion postings) of the respective member are listed on a separate page, which is linked from the member page.

Furthermore, several interaction functions can be found on the own member page, such as managing own alert settings, editing the 'About me' data, toggling between presentation and default mode, and (during an incentive measure, see chapter 5) accessing the individual RefCoins balance.

4.3 Frequent Communication

To keep up the momentum, a newsletter called *References@SBT Newsflash* is sent to all community members every 6-8 weeks. This e-mail not only introduces new application features, but also highlights recent and particularly worthwhile contributions, introduces certain community members, and shows the latest urgent requests (see chapter 2.3). It can be observed that in the days after sending a newsletter, the activity in terms of accessing the site and making new contributions significantly increases, e.g. more new knowledge references and more answers to urgent requests as usual.

5. Incentive Measures

Using References@SBT is currently voluntary for most readers and contributors. In the long term, knowledge sharing and thus the active participation in KM systems and communities should be an integral part of working processes, business target agreements and/or HR-based staff incentive systems (e.g. annual bonus).

To quickly increase the amount of contributions, especially during the initial phase, two reward competitions have been arranged up to now. Within a limited observation period (twice respectively a four months period), the users have been able to collect points (so-called RefCoins) for performing certain actions, e.g. contributing a new knowledge reference, giving feedback, or answering an urgent request. The 10-15 top-users in terms of accumulated RefCoins have been awarded. According to the following table 2, the contribution activity significantly boosted during the incentive measures.

Table 2. Impact of incentive measures on the contribution activity. The total observation period is from March 2005 to February 2007 (24 months).

	# new knowledge references	duration in months	Ø contrib. per month
with incentive measure	344	8	43.0
w/o incentive measure	494	16	30.9
total	838	24	34.9

According to performed interviews (Müller, 2006), users feel the highest motivation, if acknowledgement and plaudit directly come from the top-management. Therefore, the winners have been invited to an award ceremony, where the prizes together with official award certificates were handed over to the award winners by the CEO of SBT in person. Furthermore, an article of the ceremony and the pictures of the winners were published in SBT's employee magazine and additionally released in the intranet news.

6. Benefit for Siemens Building Technologies

It is hard to quantify the business impact of a KM system. Here are some subjective and spontaneous feedbacks about immediate benefits:

- "I think References@SBT is a great idea! It will be particularly useful as we try and position cross-SBT opportunities, and multi-business unit offerings to our customers" (by a member of the Canadian SBT management, October 2005).
- "Big thanks to my colleague Thorsten for his information. I posted my question onto the discussion board and the following day had all the required information, including drawings and potential suppliers. Yesterday a problem, today a solution" (by a British user, who quickly received a valuable answer on his urgent request from a colleague in Germany, September 2006).
- "Sieht toll aus, unglaublich. Können Sie auch das Blaue vom Himmel runterprogrammieren?" (by a very active Austrian user, who suggested a feature improvement, which was immediately implemented, January 2007).

In October/November 2006, a user survey was performed. Both registered members and unregistered users could judge their benefit of using References@SBT for their daily work. In total, 739 responders participated, as it can be seen in the following tables.

Table 3. Answers to the qualitative question: "How helpful is References@SBT for your daily work?"

answer	amount	percentage
very helpful	83	11.2%
predominantly helpful	149	20.2%
partially helpful	393	53.2%
regrettably not helpful	114	15.4%

According to table 3, References@SBT is to a certain degree **helpful for 84.6%** of the responders. If "several days" are set to 3 days and "one or several hours" are set to 0.5 days in the following table 4, the answers result in time savings of **425 working days** for all 739 responders or in average 0.6 working days per responder. Given the fact that only a part of all users participated in the survey, the total time savings are much higher.

Table 4. Answers to the quantitative question: "By (re-) using the information found in References@SBT, how much working time could you save (estimated)?"

answer	amount	percentage
several days	59	8.0%
one day	66	8.9%
one or several hours	365	49.4%
no time savings	249	33.7%

Mainly, saved working time means saved costs, which leads to a higher profitability. Besides that, the reuse of knowledge found in References@SBT can also result in a faster reaction to customer's questions and/or an improved quality of the implemented solution or performed service - and thus in a higher customer satisfaction.

7. Lessons Learned

After about two years productive deployment of References@SBT, the following lessons learned can be summarized:

- Always focus on the user community (not on the application).
- Never stop to address, moderate and motivate the user community.
- Ensure continuous attention and support of the top-management.
- Provide a self-explanatory application with an intuitive usability and a state-of-the-art look-and-feel. Avoid bulky manuals and time-consuming trainings as preconditions for successful use.
- Provide multiple communication channels, e.g. several web entry points, discussion forums, RSS feeds, e-mail notification, download to Excel. Allow the users to interact with the application according to their personal preferences.
- Get contributions of colleagues directly involved with first-hand knowledge (e.g. execution of customer projects, implementation of solutions, carrying out of services). "Content that matters is king!"
- Let the users immediately benefit from the content found in the database. Make the content easy reusable in the users' daily work.

Acknowledgements

The author wants to thank Jens-Uwe Reuffurth and Thomas Schott for their continuous support of establishing, maintaining, enhancing and improving References@SBT. Furthermore, the author appreciates the continuous encouragement by the divisional SES management, in particular Bernd Haetzel, Peter Löffler, Thomas Stöffler, Jens Wegmann, and Zoltan Wirth, and their willingness to provide and sponsor a group-wide service. Special thanks goes to Heinrich Hiesinger (CEO of SBT), who brought in invaluable top-management support and personally awarded the best contributors.

References

Akçay, Z., Amdi, J., Haddad, M., Miceli, F., Schott T., and Thoma, S. (2006): *Best practice usage of a global project and solution reference database in Siemens Building Technologies*. Siemens-internal report.

CCI (2007): Homepage of the MIT Center for Collective Intelligence: <http://cci.mit.edu/>

Clasohm, C. (2002): *Knowledge Management System Siemens ShareNet*. Online documentation, see: <http://www.clasohm.com/cv/ccm-kms.html>

Hariharan, A. (2005): *360 Degree Knowledge Management*. Journal of Knowledge Management Practice, May 2005, see: <http://www.tlinc.com/articl86.htm>

Henderson, K. (2004): *SQL Server Connection Basics*. Microsoft online documentation, see: [http://msdn2.microsoft.com/en-us/library/aa175395\(sql.80\).aspx](http://msdn2.microsoft.com/en-us/library/aa175395(sql.80).aspx)

Müller, J., Baumann, F., Manuth, A., and Meinert, R. (2004): *Learn and Change Faster by Leveraging and Capitalizing Knowledge in Siemens: The 'Com ShareNet' Case Study*. Proceedings "Thailand International Conference on Knowledge Management 2004: KM for Innovation and Change", Bangkok, Thailand, pp. 41-49.

Müller, S. (2006): *Anreizsysteme für eine Wissensmanagement-Applikation bei der Siemens Building Technologies* (in German). Fachhochschule der Wirtschaft Bergisch-Gladbach, Diploma Thesis.