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Exploration Programme: Corporate Technology
Explores Future Telecommunications

Virtual Enterprise Services for SMCs

Many small and medium companies have learned to concentrate on their core competence or what they do best. This allows them to outsource a number of processes. While outsourcing is the act of placing non-key competencies outside the company, insourcing is a way of adding external skills to your company. With the new information technology available these days, flexible and dynamic insourcing can be realized and, more importantly, integrated with the existing business processes in a seamless fashion.

Exploration Programme "Business Services"

This programme investigates the technological area relevant for business communication services and explores the possibilities for Swisscom to position itself successfully in the information era. It focuses on small and medium companies, exploring new ways for them to master business processes, especially by using virtual structures. The virtual enterprise is therefore the core element of investigation within the programme. Another important task is to explore the future of electronic commerce and search for a complete portfolio of integrated business support services to assist the modern business society of the new millennium. With the Exploration Programme, Corporate Technology is exploring telecommunication technologies and new service possibilities in projects with a long-term focus of 2–3 years. The goal is to build up expertise, enabling active innovation support.

Having the appropriate information technology in place, an insourced entity generally becomes a part of the outbound information network that comprises the company's partners, often referred to as the Extranet. Enabling communication and colla-

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boration among many organizations, the Extranet represents the most important communications technology to support the concept of a virtual enterprise. An inherent property of the virtual enterprise is that it splits the value chain into its constituent processes, which, in turn, are being performed in different locations and possibly by different companies. It is the information technology that glues these pieces together again. Furthermore, having new competencies insourced

can lead to new processes within the virtual enterprise that did not previously exist. Therefore, the information technology for the virtual enterprise must quickly and dynamically adapt to new process structures and interactions.

The VEGA Initiative

Virtual enterprises generic applications (VEGA) is both the name of the platform and of the research initiative in which it is developed. Started in early 1997, the initiative conducted a series of industry surveys in order to study both Internet penetration and the potential for virtual enterprises in particular industries within Switzerland such as advertising, microelectronics, multimedia, and information technology. More detailed information about this industry survey were presented in the comtec article Softwaresystem

für virtuelle Unternehmen, which was issued in February 1998 (comtec 2/98). The study served to identify target business sectors in which we believed to have useful information on the development of a software system that supports virtual enterprises. Although VEGA has always been considered a cross-industry tool, focusing on one business sector in the beginning has helped reduce the

complexity and narrow the scope, thereby accelerating the development of the platform. It is our goal to provide a platform that can be used for any kind of collaboration regardless of the industries involved.

Regarding design, several constraints have guided the development of the platform from the very beginning.

- *Generic platform:* The system will support virtual enterprises across industry boundaries.
- *Browser-only application:* Users will only need Internet access and a Web browser and no further installation is necessary.
- *Competence market service:* Users of the platform will have an overview of what other users – which actually represent other companies – are present in the system. It will be possible to look for specific knowledge within the community, creating a virtual form of the yellow pages. This registry is a marketplace for expertise and competence need to startup virtual enterprises.
- *Project management support:* Users will have the opportunity to form joint groups so they can work on common activities, called projects. Repositories and supporting co-operation tools help foster close interaction among the group members.

In brief, VEGA is designed to integrate the steps that lead to successful collaboration among business partners in a virtual enterprise. Starting with a virtual marketplace, where companies expose their offerings in terms of either competence or products, individual companies are brought together to collaborate in a common meeting point (Fig. 1).

For many reasons, VEGA has been especially tailored for small and medium-sized companies (SMCs). First, SMCs are an ideal target for a virtual collaboration platform, as small businesses tend to be flexible both in terms of management and operations due to their moderate size. Second, this category of enterprise can normally not afford to develop and run their own specialized information applications. Therefore, information technology services are often candidates for buy-in. Third and most important to us, SMCs are the predominant enterprise category within Switzerland: 99.8% of the Swiss companies have a staff count less than 250 according to official statistics. However, VEGA does not preclude large companies from using it. In fact, they could find it useful to implement collaboration among various corporate sites and departments that are possibly distributed across the country or even worldwide.

VEGA Software Design

The VEGA software architecture follows a layered reference model not explained further here. For those interested in this underlying model we would like to point out that the VEGA reference model thoroughly discussed in the previously mentioned comtec article *Softwaresystem für virtuelle Unternehmen*. The layers are not there for software engineering purposes alone; they also reflect the fact that the user can navigate between different contextual levels (Fig. 2). The purpose of these levels will become clearer in due course.

Business Community

The first stop on the road to your own virtual enterprise is the VEGA portal page that constitutes a number of community services. Becoming a member of the community is very easy: simply click into the VEGA homepage and start the registration facility, so you and your company are made known to the others. During registration, users provide information about the company, including staff count and what competencies and products it offers. After registration is completed, users are granted access to the upper layers, i.e. the partnership layer and the project layer (see below). The business community will attract new users and increase the size of the community. Furthermore, it will promote community sense and somewhat bind users so they want to stay in. Among the services, we find the following.

- The newsletter that reports about the latest developments, including new services and service announcements for all users;
- The event agenda that informs about public events, such as seminars, talks, conferences, exhibitions, etc. that might be of interest to the community;
- A *related-web-pages* (links) service that keeps an updated list of interesting links, brought in and rated by the community members themselves;
- The system information service which reports bugs and provides workarounds for users.

Having entered the company profile, calls and bids can be published in the competence market server, a front-end connected to the database. Users can search for company profiles using keywords pertaining to domains such as the industry sector, competence, certifi-

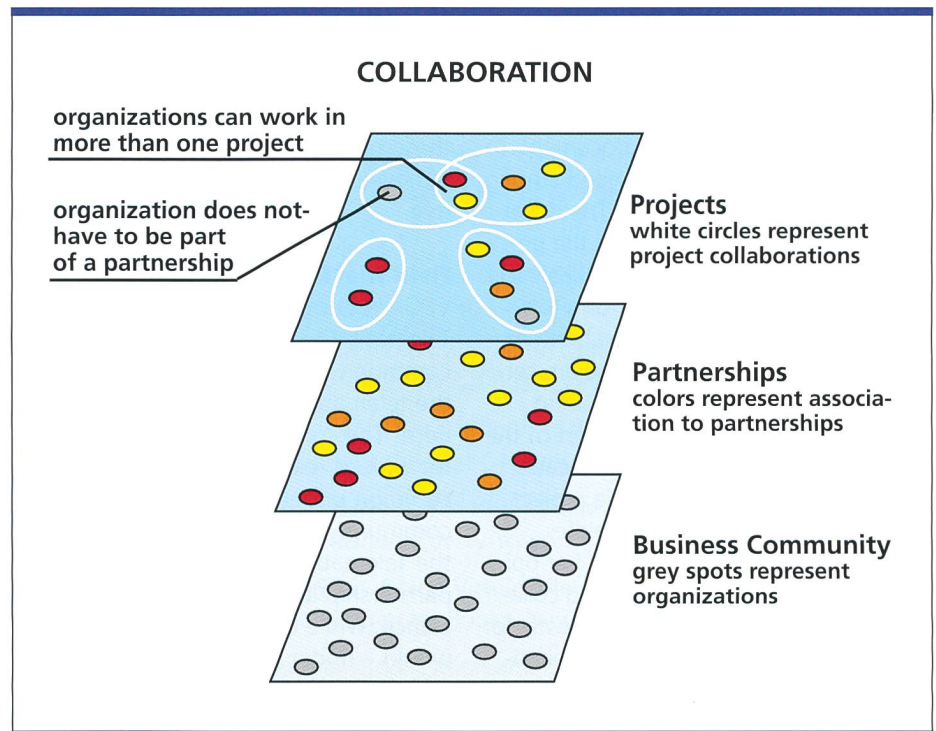


Fig. 1. Virtual collaboration.

cates, or any other property that one or the other company may have listed in their profile. The search engine will prompt a list of possible candidate companies, with best matches first, along with a rating of how good the match is. These companies, in turn, are part of the community which is why they were found. This simple fact raises an important issue: the mechanics of the competence market can only come into play after a certain amount of information has been entered into the user database. Therefore, content is vital! This is one of the many reasons why VEGA has soon left the labs and been brought into a real environment (see Section "Field Trial Findings").

Partnerships

This layer implements a secure virtual space for a group of users. It is called secure because the partnership space is accessible only to the members of a specific business network, rather than to the entire community. Such rather informal business networks are possibly already existing outside the virtual space, and known to the world for some time. This can be a reason why member companies may want to transfer the business network's identity into the virtual space using the services of the partnership layer.

Using VEGA, partnerships are created dynamically on behalf of the initiating user, and there is no interaction needed with the platform operator to do this. The initiator is given the power over his or her group, including the capability to invite other parties into or expel them from the group. This administrative privilege power can be handed over to another member.

Projects

Community members can open yet another type of closed space in order to carry out projects, where collaboration is supported by dedicated project management services. In essence, it is a project space with a smart document repository that serves as a common synchronization point for the partners. The functionality of this layer includes the following.

- *Project Initiation*: The initiating user becomes the owner of project management privileges and therefore acts as a project leader as far as the platform is concerned. He or she can invite other registered parties to join the project team.
- *Project Set-up*: Immediately after the project space has been created, the project leader could nominate a selection of tools that the team shall use for collaboration, e.g., text processor type, spreadsheet application type, and so

forth. The selection of tools mainly boils down to agreeing over a set of common document processing applications, such as Word™, Excel™, or PowerPoint™ for all project documents that are going to be exchanged among the project team members. The driver here is interoperability within the project. This kind of document is likely to be created outside the platform (offline, so to speak) and then submitted to the project. However, there are certain documents manipulated using VEGA directly (online) in support of the project's structure. The project leader selects from a list of available project document styles, called templates, those that best suit – in his or her opinion – the nature of the desired collaboration. Templates are used mostly for project management, such as invitations, agendas, work-packages, task allocations, etc., in order to keep the project running smoothly.

- **Project Completion:** After a project is finished, the project leader would close it down, freeing platform resources for other projects. In order to archive the project outputs – mainly documents – the project leader uses the completion function to tidy up the project and create an archive for later use. This project archive is brought into the partnership layer to allow later referencing and document retrieval.

Being the project leader is equivalent to having certain privileges for the project space allocated on the platform. The project leader can hand over these privileges to another member, removing himself from the leadership role.

Field Trial Findings

VEGA is currently being tested by the Telematik Cluster Espace Mittelland, a community of more than 100 SMCs of the telematics sector in the area of Bern. The community has been chosen for various reasons, including their common understanding as being a community of interest. Conceptually, the Telematik Cluster would fit into the partnership layer as a particular instance, while the community layer would – under ideal circumstances – reflect the entire IT industry. This field test is underway to determine the following.

- An ability to observe community dynamics;
- To increase the VEGA database and foster content;
- To validate design concepts;
- To validate user interface design;
- To raise the platform's recognition factor within the industry.

VEGA was placed online in September 1998. A steady flow of user feedback began soon after the service was launched. It included comments about the platform's usability, usefulness, and ideas for functionality that users seem to miss desperately. Based on these findings, the VEGA platform is constantly being improved to satisfy user-friendliness and usability to the highest degree possible. Currently, VEGA is being post-moderated by the operator. Moderation has proved to be a high priority activity when putting community services onto the net. Moderation is partly used to enforce usage policy, called Netiquette, a set of policy rules to ensure that contributions of any kind by the users are of a serious and non-offending nature to the others. Flaming, accusing, and other practices with the aim of discrediting business opponents are not allowed, and occurrences of violations are detected and removed from the public space. Fortunately, such incorrect behavior has not yet happened, and there have been no reasons for the moderator to intervene.

Another important reason for moderation is user confidence. Users are much more willing to participate if the discussion is kept on a lively level through a chair. Ideally, the moderator possesses social qualities such as respect for the arguments of minority groups, and the ability to tighten and reshape discussions that otherwise would go out of bounds. Doing so, moderation is no longer limited to enforcing policy rules but bears the job of keeping users tied to the site. We are confident that this will prove useful in continuing to raise user loyalty and attract new users until eventually the so called net-effect comes into play, bringing more and more users into the community.

Operating VEGA currently requires the equivalent of about 2 full-time staff, organized in different support processes, such as helpdesk, community moderation, problem report assessment, priority scheduling, and bug fixing, to name a few.

Conclusions

VEGA is an Internet server that supports companies in their effort to organize themselves into virtual enterprises. The architecture of the platform follows a layered approach, providing integrated support from community creation up to the project level, where co-operation services support inter-company collaboration. Great effort has been placed on the competence market service where the VEGA community exchanges bids and calls in order to bring business partners together. Another focal point is co-operation support, an integrated suite of project management services to assist co-operation in the virtual space. Through ongoing recording and evaluation of user behavior, combined with regular personal face-to-face interviews, VEGA services are constantly adapted. Apart from modifying and improving existing specifications, the prototype is progressively extended to implement the whole range of services. Finally, we aim at transferring the generic structural elements into other industry sectors, so that VEGA becomes a cross-industry tool in the end.

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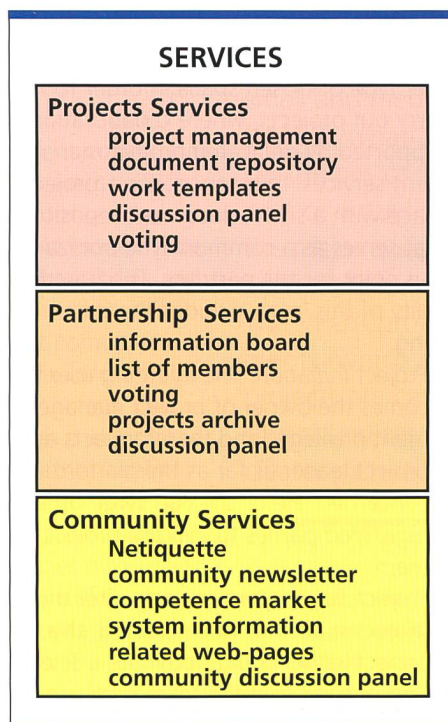


Fig. 2. VEGA layered services.

Zusammenfassung

Dienst für virtuelle Unternehmen

Die moderne Kommunikationstechnologie wird schon in naher Zukunft zum wirtschaftlichen Erfolgsfaktor werden, ganz besonders für die kleinen und mittelgrossen Betriebe. Die Konzentration auf eigene Kernkompetenzen und die Fähigkeit, rasch und flexibel zielgerichtete Kooperationen einzugehen, werden für diese Betriebe zum Differenzierungsfaktor werden. Letzteres mündet im sog. virtuellen Unternehmen, einer modernen Form des Teamworks, das erst mit modernster Informationstechnologie effizient umgesetzt werden kann. Die stetig wachsende Zahl von Internetanschlüssen – ganz besonders bei den KMU – macht es möglich, dass virtuelle Unternehmen rasch formiert werden können und die Zusammenarbeit durchgehend unterstützt wird. Der VEGA Internet Dienst hat genau dieses zum Ziel. Es unterstützt die KMU in ihrem Bestreben, Partnerschaften aufzubauen, und (zeitlich begrenzte) Kooperationen auf einer gemeinsamen Plattform zu unterstützen.



Marc Zweiacker studied computer science at the ETH in Zurich. In 1991, he started working for PTT Forschung und Entwicklung that evolved into Swisscom

Corporate Technology in 1997. Since 1997, he is the Exploration Programme manager for Business Services, with major personal interests in the area of business process support through state-of-the-art information technology.

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