ETH World: from Vision to Reality
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ETH World –
Achievements and impact

A solid infrastructure in the area of information and communication technologies (ICT) is essential for teaching and research. It is also an increasingly important advantage in the global competition between universities. ETH Zurich actively wants to help shape the developments and promote innovations in the field.

To this end, in the year 2000 ETH Zurich launched the strategic initiative ETH World, a programme to develop and introduce technology that advances communication and cooperation independent of time or place. The programme supports all ETH members in their core responsibilities – teaching, learning, research and administration.

Since the start of ETH World, some 40 projects have been carried out within the programme. This publication presents a selection of project results, achievements that make the benefits of ETH World apparent in everyday life. These projects have all contributed to the good infrastructure of ETH Zurich. They have developed virtual tools and services that can be widely used by all university members. Other projects aimed at more specialized target groups, as well as a number of activities with a research and exploration character, are documented on the ETH World website.

As a basic tenet, ETH World has systematically supported the networking of all projects. Activities that started independently of one another have thus been connected. Over time, a community has emerged that has carried the ETH World vision far beyond the individual projects.

ETH World has made a contribution towards implementing the vision of a University of the Future. The programme has also set the stage for important strategic developments. In the course of 2005, a strategy for the use of information and communication technologies in teaching, research and services at ETH Zurich has been developed. The implementation of this institutional ICT strategy will ensure that faculty, students and researchers will benefit from an outstanding infrastructure also in the long term.

Professor Bernhard Plattner
Programme Director, ETH World
www.ethworld.ethz.ch
Current information from the departments and laboratories, electronic journals from the ETH library, news from "ETH Life", and today’s menu at the Physics cafeteria: the various websites of ETH Zurich provide thousands of interesting bits of information – and beyond that, a large number of useful services. So, how do ETH members find all this information? How can they quickly access the sites and services that are important to them? The answer is "myETH", the personal web portal. It was created in a joint effort by the Library, Corporate Communications, the ICT Services and ETH World.

Collect and bundle

With myETH, all ETH members, students as well as employees, have a tool at their disposal that supports them in their daily tasks. The portal is a one-stop shop, bringing together information and applications spread over various websites and servers. These are bundled into so-called channels, which are tailored to the needs of each target group and presented in a compact format. Much of the content is dynamic, automatically updated at the source with the latest information.

The users no longer have to check their favourite sites for updates: the current information is already in their personal portal. And, they can edit their myETH pages and organize the channels according to their mood and desires – as well as their needs.

Useful information on many channels

Within a year of going online, more than half of the 20,000 ETH members have registered with myETH. Two dozen different channels are now available to choose from. For example, the library channel offers more than 7,000 electronic journals and access to some 200 databases, an “RSS Reader” feeds news from many external sources to the portal, and a very popular SMS channel lets users send text messages to any mobile phone.

The project has showcased all the benefits of a web portal. The selection of channels will be continuously enlarged. In particular, the offer of communication tools, such as Instant Messaging, will be expanded, and content from education and research will be increasingly integrated. In addition, opening myETH to external target groups such as alumni, potential students and media representatives, is being investigated.
Consistent and always up-to-date

Web Corporate Design and Web CMS – The ideal pair

Today, the web supports all large organizations in their core processes. It not only serves in gathering information, but in imparting it as well: communication and marketing are critical in the increasingly intense international competition. Ergo, the web is extremely important for ETH Zurich. However, to serve this purpose effectively, the information on the web must be current and easy to find. For the image of the institution it is also important that the web presence is unique and coherent. To fulfil these needs, the web presence of ETH Zurich was redesigned.

As a result, ETH Zurich today has an attractive Web Corporate Design (CD): clear, stylish and simple. The ETH Web Office developed the design together with an external partner. The layout, navigation and structure of all ETH websites are now uniform, making it easy to find one’s way in the information offered. The Web Corporate Design thus defines what the websites look like. The organizational unit responsible determines the content of each site. They need to keep the many thousands of web pages up-to-date, so editing must be simple and efficient. A Content Management System (CMS) that separates content and graphic design makes this possible.

**Editing web pages: as easy as writing a letter**

ETH Zurich’s Web CMS is based on the open-source platform Zope/Silva and was developed by the ICT Services. With the system, modifying and updating complex websites is as easy as writing a letter. The system functions on the same principle as modern authoring systems. The content can be entered using a web browser, and edited or updated when needed, all without any programming knowledge. In addition, the system can automatically generate formatted pages that import their contents from other sources, such as central databases.

**Flexible roles**

Managing pages in the Web CMS is divided into various roles. Those responsible for the texts concentrate on the content. The editorial staff publish the documents on the web. They can also define the life-span of a page or cancel a publication. The site management team is responsible for the layout and navigation structure of all the pages on a particular website. The responsibility for single pages or for part of a website can also be distributed. Authentication of those involved is done over the central user administration of the ICT Services.

The demand for the new services is big. Just two years after the project started, over 200 websites of ETH Zurich are online with the new Web Corporate Design and the Web CMS. Another 100 websites are in the process of changing over. Further developments planned include making the Web Corporate Design more modular and therefore more flexible, in order to better incorporate the individual needs of the units.
ETH Zurich is simply too large for the 20,000 university members to know what each colleague is working on. Many outsiders are also interested in what happens on campus. Luckily, web-based communication provides a medium for quick and efficient information. Seizing this opportunity, ETH Zurich’s Corporate Communications has created “ETH Life” as a daily web publication. Since November 2000, every working day “ETH Life” informs about the events that reflect the diversity of the scientific, social and cultural life at ETH Zurich.

Up-to-date every morning
The “ETH Life” team work with an easy-to-use application for publishing on the Internet. Using a web editor, the editorial team assemble the finished texts and pictures to articles. These are then uploaded onto the “ETH Life” server in a tailor-made content management system. Because the data is in XML format, interfaces to other web applications are easy to establish and other websites can take up “ETH Life” articles. As a digital publication, “ETH Life” can also complement articles with streamed videos.

Promptly at six o’clock each morning, the server switches the news of the day online. At the same time, an e-mail alert is sent to those who have subscribed with a short description and links to the new articles. When unexpected events occur, “ETH Life” can react immediately as the website can be updated any time. A reader forum, the press review “ETH in the Media”, information on current events and an archive round out the offer. The editorial team is independent and does not represent the official opinion of ETH Zurich. This means that “ETH Life” can contribute to opinion-forming and exchange among university members.

Promoting and extending the community
The arguments for having a web publication are persuasive. First, “ETH Life” offers inside information about the institution for its own members. Second, it is a window that makes life at ETH Zurich visible to the outside. External firms and specialists gain easier access to the world of the university. Third, the media and interested members of the public can receive information about the institution directly. This makes them part of an extended ETH community. With “ETH Life”, the weekly English edition “ETH Life International”, and the monthly paper edition “ETH Life Print”, the university provides a media pool that satisfies the most varied needs. No wonder it has won a loyal reading public both within the institution and beyond. Final proof is provided by the 14,000 weekly hits on the “ETH Life” site.
Web applications facilitate many of the administrative processes at a university. Because of the critical nature of many of these processes, it is vital that the applications function reliably. It must also be simple and cost-effective to adapt them to new requirements. A good example: the online student registration system must not break down when all students at ETH Zurich log on at the start of the semester. Also, it must be possible to make modifications quickly if there are changes in the academic calendar. The ICT Services have recognized these needs: as part of the project “IT Building Blocks” they have built a basic web infrastructure that is modern, open and secure. This ensures that administrative web applications are easy to develop and are available at all times.

Applications with special features

Today, the basic web infrastructure of ETH Zurich has three layers: Uppermost is the familiar web user interface, handling the dialogue with the user via a browser. The bottom layer is the central database server. Between these two lies the middleware. Here is where the actual programs run, constructed of individual software modules. Some of the modules, the IT Building Blocks, are special in that they can be used in a variety of applications. They fulfill quite different functions. A rather small building block, for example, extracts information from a central database. Large building blocks can handle very complex functions, such as searching for and displaying lists of lectures and classes.

The IT Building Blocks have already been successfully used in several administrative applications, such as the online student registration system. The students use this service to sign up for classes, lectures, exercises or labs. They can also use it to find out where they stand in their studies. The web application eDoz lets faculty members issue attendance confirmation certificates electronically, report exam results or coordinate their teaching schedules. And with the electronic course catalogue, the Rector’s Office uses a uniform web platform to manage the entire programme offering of ETH Zurich.

Reduced programming and maintenance effort

The basic web infrastructure functions reliably and smoothly. At certain times, the online student registration system and the eDoz application are used around the clock. Paper forms are about to become a thing of the past. Thanks to the use of the IT Building Blocks, other applications can be developed with less effort. Last, but not least, the Administrative IT Support team also benefits because the web applications can be efficiently and consistently maintained. The innovations made possible by the IT Building Blocks project are bringing positive results to many users. No wonder that more and more web applications are created using this basic infrastructure.
Fast and flexible publication
ETH E-Collection – The publication platform of the ETH-Bibliothek

The situation was unsatisfactory: scientific documents, such as reports, dissertations, conference proceedings, diploma and semester theses were difficult to track down. Access to the full texts was possible only in exceptional cases. This limited the use of these extensive scientific sources. Therefore, the library decided to build an alternative digital publication platform that would ensure both archiving and uncomplicated access to these documents, with long-term stability and high quality. Thanks to the support of ETH World, this platform, the “ETH E-Collection”, was swiftly developed. Today it already has 6,000 scientific documents available.

Publications in full text online
Early on, the ETH-Bibliothek took its first steps on the digital parquet, beyond the online catalogue NEBIS and providing access to purchased materials. In an early project, ETH dissertations were prepared as full-text documents for the Internet. Thanks to this preparation, in August 2001 further material in the form of reports and conference proceedings was already available online. And, since October 2003, the standardized metadata can be exchanged over the Open Archives Initiative Protocol with other document servers worldwide.

Comparable projects were often not successful because of insufficient document submissions. Learning from this experience, the team responsible for the E-Collection from the very beginning made efforts to acquire electronic documents within ETH Zurich. The various marketing activities, such as personal conversations, flyers or information days soon bore fruit. The number of submitted documents grew rapidly.

Worldwide access to the E-Collection
Today, researchers from all over the globe access full texts in the E-Collection on average 12,000 times per month. Since the launch, access to ETH dissertations has grown ten times. All web pages in the E-Collection are available in both German and English, and the documents can be found using a variety of criteria. The electronic documents are also integrated in the library catalogue NEBIS, which continues to be a useful tool.

The potential to expand the E-Collection is not yet exhausted. Today, many scientific journals allow authors to publish preprints of their reviewed papers on their own document server. The paper is then available worldwide immediately, also for those who cannot afford subscriptions to expensive journals.

The next step will be to extend the E-Collection to all institutions in the ETH Domain. And, as the scientific journals – still the most important information source for researchers – continue to get more expensive, in-house publication activities could be an attractive alternative.
A picture says more than a thousand words. This is also true in science – education and research can hardly be conceived of without complex visualizations such as photos, diagrams, charts and drawings. Since many visualizations can be used again and again, a comprehensive central image information system would be ideal. And that is exactly what the Library has in mind with the project “E-Pics”. Started in autumn 2001, the project envisages a high-quality collection of image documents that can be used with a platform-independent web browser. This image information system, with features analogue to a document management system, will be continuously expanded and centrally controlled, with the content managed locally.

Flexible classification, safeguarded copyrights
Not all that difficult a task, one might think. At ETH Zurich, however, with the differing needs of its various disciplines, flexible solutions are required. What for one is a must, another considers to be superfluous. The various laboratories and research groups need to be able to establish the metadata of the images according to their own criteria. Chemists, for example, have quite different demands from architects. The issues around copyrights pose a similar problem. All E-Pics users need to be able to decide individually which rights particular user groups will have to their images – who can view which picture in what resolution and size, who can download images and who might even have write access. The authorization takes place through the usual ETH password.

Of course, the image material can also be integrated into various applications, for example, in the ETH Web CMS, in Powerpoint presentations, or as learning objects in the Dynamic Learning Content Management System (dLCMS). The E-Pics system has open interfaces. The image files can be stored locally or centrally. If centrally stored, high data security can be guaranteed. The ICT Services perform regular backups and can thus guarantee long-term, stable access to the image collection.

For everyone who works with images
The E-Pics prototype has already been tested in exercises at the Institute for History and Theory of Architecture. With success: slide shows, for example, could be flexibly assembled using the new tool. In addition, the search and display of the image files was very fast. For ETH-wide implementation, the project has settled on a product of the company Canto, for which the company Interaktion has developed a user-friendly web interface. By the end of the project, E-Pics aims to become a tool that can be used anywhere where ETH members work with images. The response to the plan is extremely positive.

Teacher, take your pic
E-Pics – Interactive image information system for ETH Zurich
The need for digital videos for communication in research and teaching is increasing. But, because of the many steps involved, the manual production of synchronized video and slide presentations is very time consuming and prone to mistakes. That is why the NET – Network for Educational Technology, together with ETH spin-off company Solutionpark Streaming, developed the software PLAY as part of the project “Video Streaming”.

Streaming is the continuous transmission of digital video or audio signals over the Internet. The PLAY application makes it easy to enrich video recordings of presentations with other media, such as slide presentations, pictures or web pages, and to create synchronized rich-media presentations automatically.

A very normal lecture
The new service has been available since 2003 at ETH Zurich. Seminars, lectures or major events can easily be recorded for rich-media webcasts. The new technology requires no special hardware as PLAY is platform independent. It can be installed and run on almost any computer with an Internet connection and a web browser. In addition, the set-up for a recording is straightforward and easy. If desired, the Video Services team can be present to give advice. Another comforting feature of the new application is that speakers can hold their lectures as normal – no special knowledge of the technology is needed.

Broadcasts live and on demand
All in all, the response to this service has been very positive and the demand is rising. To date, over 50 events have been streamed, either live or as a recording – or both. While preparing for exams, students can view a lecture again to clarify any tricky points. Recordings of conference or symposium presentations also enjoy great popularity: the top runners have been viewed as much as 400 times. As early as 2002, the annual media conference of the Executive Board was transmitted live on the web. And, a whole series of live productions related to the 150th anniversary of ETH Zurich are going on in 2005.

The video streaming service is complemented by two further components: “Free Cutting” and a video production service. With the Free Cutting service, video beginners or ambitious amateurs can edit films, burn DVDs or produce their own video clips on four workstations under professional guidance. The video production service produces high-quality films for ETH Zurich. As their next step, the Video Services team plan to set up a branch at the Hönggerberg campus. And finally, beckoning in the distance is the building of a multimedia centre, featuring media consultations, workshops and the very latest technology.

Present while absent
PLAY – Web-based production environment for video streaming

http://www.videoservices.ethz.ch/
Virtual eye contact
Videoconferences save time and travel costs

It gets ever easier to stay informed about the latest developments in science and technology worldwide. Information is published in scientific journals or on the Internet. But scientific communication is not just reporting facts and results. A great deal of time and money is invested in meetings, exchange projects or conferences – also at ETH Zurich.

Time and money can be saved, however, through discussions without direct meetings. NET – Network for Educational Technology and the ICT Services have extended the palette of communication tools at ETH Zurich with a new technology: videoconferencing.

Basic level or top quality
In its simplest form, virtual eye contact is a videoconference between two people. This is possible from the participant’s own desk. An Internet connection, a webcam, an audio headset and a piece of software installed on the computer are all that is needed for communicating face-to-face.

The next level, videoconferencing for groups of up to ten people needs somewhat more powerful devices and software. With the available technology, project meetings or doctoral examinations, for instance, can be held even when one or more persons are abroad. Thanks to mobile equipment, this kind of videoconferencing is now possible in every meeting room at ETH Zurich.

NET and the ICT Services offer a special service for national and international cooperation in education: conferences between lecture halls with several video streams of high quality. In addition, application sharing makes it possible to use software jointly at the participating locations. NET supports these conferences in specially equipped auditoria. These are used for the transmission of lectures, continuing education seminars and other events both nationally and internationally.

Ready for the scientific daily routine
The new service offers still more: a multipoint conferencing unit can support virtual meetings with several participants in multiple locations. In extreme cases, researchers at ETH Zurich can exchange information at any time with colleagues on all five continents. The technology installed at ETH Zurich is internationally compatible.

Videoconferencing is perhaps not yet as easy as using the telephone, but its reputation as a highly complicated technology is finally disappearing. The service is ready to be part of the scientific daily routine. The infrastructure is available campus-wide and is already intensively used by bright minds at ETH Zurich.
Students need to study: they have to do exercises, gather measurement data, write project reports. But the times when books and writing paper sufficed are long gone, so the rush on the central computer rooms was large – and places rare. The goal of the project “Neptun – Laptops for Learning” is therefore to give all students at ETH Zurich access to their own laptop computer and to support this personal work tool with complementary infrastructure and services. The combination of these two measures can make studying and working more flexible and efficient.

Known and loved across the campus

Today, according to a conservative estimate, three-quarters of all students at ETH Zurich have their own laptop. Around two-thirds of these computers were purchased through the Neptun project. A survey also showed that the project is known to nearly all students and they recommend it to their peers. ETH students entitled to a scholarship can receive financial support from Neptun to purchase a laptop. In the meantime, the Neptun offer is also open to members of other universities. The success of this project shows in the steady increase in sales figures. In four years, the service has become so well established that ETH Zurich – and the entire Swiss higher education sector – would not want to miss it. Since the start of the project in autumn 2001, over 10 000 laptops have been purchased by students and staff of ETH Zurich; in all of Switzerland about 18 000 units have been sold.

Flexible work with mobile computers …

Neptun – Laptops for Learning

For many students today, having their own laptop is a matter of course. But, which one? The offer is enormous and without intensive comparisons, it is hard to get an overview. Neptun helps students choose a laptop with an above-average price/performance ratio. To this purpose, the Neptun team uses a standardized process for a thorough test of the various computers on the market. These benchmark tests include, besides the technical specifications, performance factors that are not immediately apparent. For example, the effective operation time of the batteries, the guarantee period or the compatibility with the ETH infrastructure such as the wireless LAN. Based on the test results, a limited number of Windows/Linux and Mac OS laptop models are selected and recommended.

Neptun as a market factor

The sale of Neptun laptops is concentrated into two short periods at the beginning of each semester. This time focus permits efficient marketing campaigns. Multilingual posters, flyers, internal media, and letters to new students ensure that the offer is noticed. Successfully, as Neptun has become an important market player in the higher education computing market in Switzerland.

Today, the most important laptop providers want to work with ETH Zurich, even though the negotiated sales
price is under market price. The manufacturers even agree to comply with two important conditions: the price of the laptops may not be changed during the sales period and no changes may be made to the technical specifications of the delivered models. The limited sales periods are also an advantage for the suppliers because they bundle the orders. Neptun can thus ensure problem-free processing of the sales. The cooperation with the providers is very close. They regard the project as a model for other national markets. Neptun has become a role model for educational institutions beyond the borders of Switzerland. Within ETH Zurich, the Neptun team works intensively with student organizations, the IT Support Groups and other relevant services.

Complementary infrastructure contributes to success

Neptun is not simply a sales programme with good products and attractive conditions. The complementary infrastructure is nearly as important for the success of the programme at ETH Zurich. Services such as access to the campus-wide wireless network, docking stations and printing facilities turn the laptops into attractive mobile work stations. A practical addition has been lockers where students can safely store their laptops during breaks – a small facility greatly appreciated by the students. Today, the needs of mobile computing are routinely considered at ETH Zurich when planning lecture hall renovations, reconstructions and other building projects.

The procurement and distribution of software has been another success factor of the Neptun project. Neptun customers can choose between Mac OS, Linux, Windows and Dualboot (Windows/Linux) as operating systems. Students receive their preferred operating system, including software applications, on a DVD as a simple-to-install system image. All ETH members with a Neptun computer can update their system software at any time, and they are notified of updates by e-mail. Students also benefit from a download service for software for which ETH Zurich has a campus licence. In future, paid-for software will also be offered – naturally, at favourable conditions.

The Neptun concept sets a precedent

The lessons and experiences of the Neptun project have set a precedent throughout ETH Zurich. It has kicked off further developments in the area of information and communication technologies. The ICT Services plan to use the model of concentrated sales campaigns with fixed sales periods, good prices and well defined processes for other product groups. And, analogue to the Neptun concept, a software installation solution for the equipment in the computer rooms and for desktop computers of staff members is being developed.

... on campus and throughout the world
The run on the fixed student workstations with network access at ETH Zurich was enormous. Just 1000 workstations were available for 12 000 students. The space for more computers simply was not there, so another solution had to be found. There are many potential locations for mobile working: cafeterias, libraries, study corners, classrooms. If students had their own laptops and simple access to the network, the workstation problem would be solved. Pursuing this idea, the ICT Services launched the projects “Neptun” and “Wireless LAN” (Local Areas Network) to promote the purchase and wireless use of mobile computers.

The wireless LAN boom
The wireless LAN was a booming success from the beginning, with the project immediately taking off at great speed. In autumn 2001, the first 45 access points were already in operation and by the end of the project in May 2002, this number had tripled. By 2005 the number had grown to 250. Parallel to this development, security issues were given special attention, because data traffic in a wireless LAN can be intercepted and recorded fairly easily. The solution was a Virtual Private Network (VPN). This technology makes it possible to authenticate the users and encrypt the transferred data.

The wireless LAN is still hugely popular. To date, the use of the new infrastructure has doubled every year. In November 2004, the top month till now, 6 700 persons logged on about 125 000 times for a total of over 200 000 hours on the wireless network. In 2005, the number will again be significantly higher. Already one-fourth of all ETH properties are equipped with hotspots, which makes wireless access to the network possible campus-wide. The Wireless LAN project has decidedly had a far-reaching effect on the way students work and how they deal with information technology.

ETH wireless LAN showing the way
The development of a wireless LAN at ETH Zurich was groundbreaking in Switzerland. The security concept implemented in Zurich has become the standard for Swiss universities. This means that ETH members visiting another Swiss university still have seamless access to the network. In addition, the system developed for this project is very tolerant of quite diverse computer models and operating systems – a point not to be underestimated at a research university.

But the ICT Services are not resting on their laurels. Plans already exist to cover ETH Zurich even more extensively, because not only the students, but also staff members have acquired a taste for the new technology. The ICT Services also have new applications in the works that should further stabilize the connections, multiply the data transmission rates and improve the authentication scheme.

Connected everywhere on campus

Wireless LAN – The ubiquitous local area network of ETH Zurich
The lecture hall of the future

Building IP integrates new technology into the classroom

ETH Zurich has well over 100 lecture halls. Most of them are equipped with a lot of technology: cameras, computer projectors, audio equipment, recorders, ceiling lights, climate control. In order to operate all of these from a central control desk, a separate control function used to be necessary for each piece of equipment. The costs were considerable. The project “Building IP” wants to simplify, unify and expand the control and operation of this infrastructure. What should emerge from the effort is a Lecture Hall of the Future, in which all the equipment, the students, the teachers and the learning content are linked by the Internet.

One could even call this lecture hall “intelligent”. It notices, for example, which equipment is installed. The room functions much like a computer, immediately registering any additional hardware that is connected. The equipment itself is controlled by software developed in the project. It resides on a central Facility Server, but is not immediately visible. The users communicate with the software through a simple interface, a touch-screen panel. Using this graphic interface, the teacher can now call up services such as “video image”, “projection”, “sound” or “information”. Authorization takes place using the usual ETH password.

Total concept replaces stand-alone solutions

The concept of a total solution instead of individual applications is attractive. First, the operation and control software can be moved from one Facility Server to another, from one lecture hall to the next without incurring additional licence fees; the central logic is always the same. The control functions are independent of the specific features of the equipment. In addition, the Internet-based network offers many possible interfaces to other ETH services which are also based upon Internet technology.

Everything under digital control

Of course, the Internet-based solution requires that the connected machines are controlled by digital signals. At its simplest this is hardware that communicates directly over the Internet and can process digital information, such as MP3 files or image signals. Many of these products are already on the market and can be purchased at a reasonable price. If a piece of equipment cannot yet be controlled via the Internet, it is enabled for network use with the help of an attached PC and specially developed software.

This Lecture Hall of the Future is already a reality in the form of a prototype in two rooms at the Department of Architecture. In the second part of the project, the successful innovations are being further developed and installed in a lecture hall in the HIl building on the Hönggerberg campus. In addition, Internet-based services such as online room reservation or videoconferencing will be linked with the Facility Server. In this way logistic problems of the past can be solved and new applications can be integrated.

http://www.building-ip.ethz.ch/
The web is becoming increasingly important, also for teaching and learning. Many lecturers at ETH Zurich want to augment their lessons with web-based materials. But, an Internet course is time-consuming to produce and therefore expensive. In addition, it is hardly possible to use it in another context. However, these times will soon be over, when courses will be put together using the “dynamic Learning Content Management System” (dLCMS). This web application gives teachers access to a central content management system for learning materials. These can be shared with others and used again and again.

Change the paradigm of teaching
In order to achieve this, a new pedagogic approach is needed. Some specialists even speak of a paradigm shift in the handling of learning materials. Instead of seeing a course as an inseparable entity, a modular principle is applied: the learning content is divided into small self-contained units, so-called Learning Objects. These are the basic building blocks for the learning content. When they are categorized according to their function and content, they can also be accessed by others and re-used.

One important prerequisite for this is to separate the content from the graphic design, something which is possible with a content management system (CMS). For the design, one has the flexibility to fall back on layout or design templates. In addition, dLCMS is a further development of the Web CMS of ETH Zurich, so it can be seamlessly integrated into the web infrastructure. This is another advantage for ETH users: they can transfer their knowledge of the Web CMS to the dLCMS.

Impressive coherence
The dLCMS tool is based on three elements. Firstly, the opportunity to compile a collection of Learning Objects that, in addition to classic content, also can contain multimedia and interactive components such as animation, elements for self-evaluation and simulations with analyses. Second, the Learning Objects can be simply and flexibly assembled. Finally, the course can be exported to a learning management system that the students can work with.

The test with a prototype system was a success. Four courses were put together and tested by teachers/authors and student users. The students said they were impressed with the coherence of the course. And better still: the teachers had the impression that the modular construction lead to a better instructional approach. This finding erased the last fears that the quality of the teaching would suffer under this method.

Learning units for the web
dLCMS – dynamic Learning Content Management System

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One important prerequisite for this is to separate the content from the graphic design, something which is possible with a content management system (CMS). For the design, one has the flexibility to fall back on layout or design templates. In addition, dLCMS is a further development of the Web CMS of ETH Zurich, so it can be seamlessly integrated into the web infrastructure. This is another advantage for ETH users: they can transfer their knowledge of the Web CMS to the dLCMS.

Impressive coherence
The dLCMS tool is based on three elements. Firstly, the opportunity to compile a collection of Learning Objects that, in addition to classic content, also can contain multimedia and interactive components such as animation, elements for self-evaluation and simulations with analyses. Second, the Learning Objects can be simply and flexibly assembled. Finally, the course can be exported to a learning management system that the students can work with.

The test with a prototype system was a success. Four courses were put together and tested by teachers/authors and student users. The students said they were impressed with the coherence of the course. And better still: the teachers had the impression that the modular construction lead to a better instructional approach. This finding erased the last fears that the quality of the teaching would suffer under this method.
Scientists also have to be managers. They have to manage their knowledge and their information, such as their references from the scientific literature. Often these reference lists contain several hundred, or even thousands of entries. These are normally regarded as the property of the individual researcher. Within many research groups the result is that the same bibliographic information is collected countless times, then stored locally and managed individually. The project “Shared References” (ShaRef), launched in the middle of 2004, promises to reduce this tedious task. The goal is to build a common database for scientific references.

A survey done before the project started showed just how great the need really is: a good half of the ETH members collecting references would be ready to share their references with others for mutual use – online and with the possibility of offline access. Since then, the ShaRef project has made great steps forward.

Simply successful
The basic concept of ShaRef is very simple: references are stored on a central server in a standard format (XML). The ShaRef software supports a wide range of data formats as well as commercially available specialized applications for creating documents. Access to the database takes place using a Java program or with any browser, so the application is platform-independent.

ShaRef will make it possible for researchers and students to create their own collection of bibliographical and reference information. Existing collections can easily be imported. The information can also be annotated, the commentary being attached to the corresponding bibliographic entry. The data model even includes the possibility of cross references, analogue to hypertext. The finished bibliography can then be managed with the purpose of writing a document and shared with others. The owner retains control and can establish the access rights to his or her literature lists at any time.

One of the first ShaRef products is the conversion tool “Bibconvert”. This tool can convert data from literature references in various formats into a desired target format. This is very important for the import and export of bibliographies. With the new ShaRef application, it will be possible for the first time to draw up institution-wide publication lists. And, because the ShaRef software has a well-documented open-source structure, its application is not limited only to ETH or scientific work. ShaRef can be implemented anywhere where reference data is being managed and where authors are willing to share their knowledge.

Building common knowledge
ShaRef – Sharing scientific references
A scientific operation the size of ETH Zurich needs to be well managed. Its core activities are, however, research and education – the administration should be as lean as possible. This is the goal of the project “personETH” of the Personnel Department. The project has developed a web application which makes the human resources (HR) services more transparent and supports them electronically. Launched in January 2003 and finished in March 2004, this project has great potential.

The time-consuming search for the right forms and supporting paragraphs is now a thing of the past. Thanks to the clear navigation on the new website of the Personnel Department, all the standard personnel management processes can be found quickly: from hiring and appointment to the monthly salary pay statement, and on up to the termination of employment.

The descriptions of the processes are clear and in tabular form – as comprehensive as necessary and as brief as possible. The relevant forms are linked to the corresponding process description and are available for download as PDF or Word documents.

**Paperless human resources management**

The overarching goal of the project is the development of a paperless human resources management system. All standard processes between employees, managers and the HR staff should one day be processed electronically. As a pilot project, a web-based workflow application was developed for the processing of hourly-wage pay.

In a first phase, the application was tested in the Library. The experience was very satisfactory. Today, this web application is in use campus-wide. The delivery times of the internal mail and the transport time of the forms have thus become irrelevant for processing wage payments.

The HR persons can make the required entries independent of time and place, they just log into the system. Authorization takes place using the normal ETH password. The Personnel Department can monitor the process step-by-step and check at any time in which phase the report of a particular unit is. At the same time, the quality of the process has improved because the data is now entered just once – at the source.

**Faster, simpler, more transparent**

**PersonETH – Human resources management over the web**

The first step of a major project has been taken. The goal is to conduct all standard human resources management processes using workflow applications. As before, the Personnel Department wants to proceed pragmatically. The multiple needs of the teaching and research staff will flow into all future developments. But the important effect is that the administrative processes will become more efficient and faster – which means that ETH staff can devote their time to research and teaching.
Intuition plays an essential part in discovery and insight. But, knowledge and perception are the starting points of every insight. Especially perception can, however, be severely limited if based only on two-dimensional images of three-dimensional objects. To address this challenge, the Computer Graphics Laboratory launched the project “3-D Web Content” in early 2004. The project has developed new technology with the help of which objects can easily be captured as virtual 3-D objects and published on the Internet. The intuitive understanding of complex objects viewed on a computer screen becomes easier, much to the benefit of research and teaching.

No need for expensive hardware

From image acquisition, to editing and local display, up to the web-based interactive visualization, the new technology is simple to use. And, the new process requires no expensive hardware. An LCD projector, available at every lab at ETH Zurich, a turntable and a standard digital camera are all that is needed.

The process is based on structured light: various striped patterns are projected from a fixed angle on the object. The camera takes pictures and, using the turntable, the object is rotated into the next position. The software controls the acquisition process and calculates the three-dimensional model. Even complex items can be digitalized in a relatively short time.

The next step is just as easy. Using the software Pointshops3D, which the Computer Graphics Laboratory had developed earlier, the local point-based 3-D images can easily be prepared, adapted, edited and, if necessary, remodelled. The image of the object is saved in such a format that it can be integrated directly into a website. The observer of the virtual 3-D object can then interact with it, viewing it from any direction or distance. The required browser plug-in was developed by the ETH spin-off company Cyfex AG. It is available for Windows and Linux operating systems and can be downloaded free from the Internet.

Simple acquisition with low memory requirement

The first test runs with a prototype were successful. For example, fossils from the Geological and Palaeontological Collection of ETH Zurich were visualized in high resolution and good colour quality. By the end of the project, non-experts will be able to handle the acquisition of 3-D web content after having attended an introductory training session. Another advantage of the new process is that the file size of the point-based 3-D model is relatively low. The interactive visualization of the objects is therefore quick – not only when using broadband Internet, but also on slow data connections.

Three dimensions, now easy as pie

User-friendly acquisition and visualization of 3-D web content
A good infrastructure is crucial for world-class research and teaching. At ETH Zurich, the infrastructure is outstanding, something that is recognized worldwide. Modern means of information and communication technology are an important part of this infrastructure. ETH World promotes the further development of these facilities through two approaches. On the one hand, through projects carried out by the departments, laboratories or other university units, on the other hand through technology exploration.

Recognizing potential, developing scenarios

The task of the exploration activities is to identify potential new technologies and to develop scenarios for their use in teaching, learning, research and management tasks. Technology exploration requires innovation, joy in discovery, and creativity, but also error tolerance and freedom from group conventions and routines. And, although technology-driven, the exploration is always focused on potential users.

The starting points for exploration are the technological innovations on the one hand and the emerging communication and cooperation needs in scientific endeavours on the other. The exploration team takes inspiration from discussions with ETH members, best practices of other universities, and from observations of technological trends in contact with industry or at conferences. In the first phase, as many ideas as possible are evaluated. At this time, various stakeholder groups are linked up, for example, potential users, possible providers of future services, and external experts.

Minimizing the risk of wrong investments

During the evaluation process, the visions and ideas mature into concrete scenarios. Someone must then be found who wants to provide the potential new service. Only now a prototype is built and field tests are carried out. If the outcome is positive, then the potential provider can decide if and how to convert the prototype into a new service. On request, the exploration team will accompany this transfer process, after which their task is completed.

One successful example of the technology exploration approach is the project PolyPhone. This project, which investigates the use of Internet telephony at ETH Zurich, intends to introduce a new service. All ETH members will in future have a personal telephone number, by which they can be reached from the Internet as well as from the regular telephone network. In addition to voice communication, the service will also make it possible to communicate by video or instant messaging. PolyPhone will be integrated into the offering of the ICT Services.

The technology exploration approach offers an essential benefit for providers of new services. The process minimizes the risk of bad investments and relieves future providers of much of the preparatory work.
Virtual space cannot and should not replace the physical world. New technologies enable collaboration independent of time and place, but people still have the need for direct contact with each other. Especially in change processes, the opportunity for intense communication in personal discussions is a decisive factor for success. With the goal of supporting the teaching, learning, research and the management tasks of ETH Zurich with new tools and services, ETH World is to a considerably extent part of such a change process.

Physical meetings complement virtual space
To promote interaction among all the project stakeholders, the Programme Management of ETH World regularly organizes information and networking events. Here staff and students can familiarize themselves with current developments and exchange ideas with each other. With these events, ETH World wishes to draw attention to the possibilities of the new technologies and motivate all ETH members to apply these in their activities. Every semester Info Lunches are organized on both campuses, Zentrum and Hönggerberg. Here, themes of broad interest are presented. Over a buffet lunch the participants can discuss with the project coordinators and with colleagues.

ETH World covers many decentrally conducted projects and each project involves several persons. The goals of the ETH World programme are thus pursued by a large developer community. The academic culture at ETH Zurich includes the far reaching autonomy of the departments and laboratories, so collaboration between projects is based to a large extent on voluntary activities. Through networking, ETH World seeks to ensure that the members of the project community are aware of one another and that an exchange of knowledge and experience takes place. In addition, the Programme Management actively attempts to identify synergy and establish links between projects. Through this community building, ETH World contributes to a better cost/benefit ratio of the projects and activities.

Showcase for new technologies
The pace of development in the area of information and communication technologies is very fast. In order to induce innovation in academic activities, new technologies need to be applied in existing operational processes or in new areas. In monthly Technology Showcase events, ETH World presents interesting technologies in order to explore the newest trends and make them known to potential users. In a series of "Explore!" workshops, interested persons from both within and outside the institution get together to deepen their knowledge about selected topics.

One big family
ETH World is more than the sum of its individual projects
This brochure and the accompanying video clips present selected projects and activities of ETH World. Further information is available on the website www.ethworld.ethz.ch/projects or from the contact persons of the individual projects.

**3-D Web Content – User-friendly Acquisition and Visualization of 3-D Web Content**
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**Building IP – Integrated Building Services**
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**E-PICS – Interactive Picture Information System for Teaching and Research at ETH Zurich**
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**Neptun – Laptops for Learning**
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* also as video
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