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R. Traunmüller, E. Straub (eds.)

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Creating New Applications in Business, Administration and Society

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Preface

The aim of the series of the annually organized CON-conferences is to discuss the state of the art in connecivity in informatics. This year's conference is marked by two particular characteristics. Firstly, CON '95 is the 10th event of the joint Austro-Hungarian Conference organised by the Austrian Computer Society (OCG) and Hungarian John von Neumann Society (JvNS) and, second, CON '95 coincides with the 20th anniversary of the Austrian Computer Society .

Thus CON '95 has set the goal to provide a broader scope: to anticipate the developments to derive from the merger of computer and communication; to illustrate the wide range of new applications and services; and to discuss the future prospects of conductivity.

These new applications and services include totally new created ones as well as existing applications that have been basically improved. They all have in common that they will bring revolutionary changes to business, administration and society .

The broad scope of the conference is reflected in a wide range of relevant topics under consideration:
novel applications and products evolving from connectivity;
emerging forms of professional and public services as well as the support for new public management;
prospects of an IT-infrastructure (information highway) and of multimedial environments;
novel office systems and new ways of teleworking based on computer supported cooperative work;
computer based learning and means to support disabled persons;
high level application design and advanced user interface layout;
changes in work practices and decision processes provoked by connectivity;;
organisational reengineering, social impacts, and legal frameworks.

The congress format has been chosen to give wide opportunity for the exchange of ideas. Plenary sessions with invited contributions set the frame whereas parallel sessions allow in-depth professional discussion. Both conference days are closed with panels focusing on the role of creativity and considering the perspectives of connectivity.

Distinctive credit has to be given to the members of the Programme Committee: G. Chroust, G. Haring, G. Kappel, V. Risak, A.M. Tjoa, E. Straub, B. Dömölki and D. Sima. The editors are

grateful to the Austrian Computer Society (OCG) and Hungarian John von Neumann Society (JvNS) for support in general and to W. Grafendorfer and M. Toth. of the Organising Committee in particular.

R. Traunmüller

Gy. Kovacs

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A Public Terminal Application in the City of Vienna

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1. Introduction

The project presented in this paper started in Vienna in 1993.
For the first time in the City of Vienna information technology was used for direct-communication with the citizens - and it became a full success.
The subject of this first municipal project on "Public Terminal Application" was "Housing Information". It was initiated by two politicians: Helmut Zilk as Mayor and Rudolf Edlinger as Executive City Alderman for Housing Matters.

2. Facts and Problems

The City of Vienna at present owns about 230,000 flats. These flats are intended - at comparatively low rates - for those citizens who cannot afford the free market housing prices.
Additionally, about 7,000 flats are built per year. But on the other hand, there are approximately 16,500 applicants waiting for the assignment of a flat.

Although for the last years housing assignment was already based on transparent rules performed by computer programs, people even then did not believe in the fairness and justness of the assignment process. So the process of assignment still was considered a very ticklish one.
Another problem lay in the structure of the "Department of Housing" itself. It was organized as a centralized office, where a lot of interested parties had to queue up and wait for a long time - mostly asking the same basic questions over and over.

3. Objectives

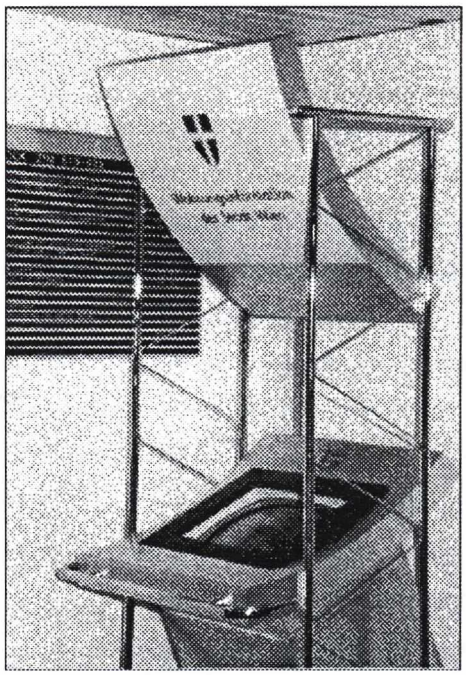
A way for more transparency of the assignment procedure combined with the possibility for an ongoing review by the client had to be found. Additionally, an easy-to-use way had to be offered to the citizens for getting general, instant, complete and up to date information.

4. Solution

Citizens obtain the necessary informations directly by way of a computer terminal. The "Department of Housing" was being evolved into a customer oriented "Housing Counselling", its function and site being decentralized from one central office to 18 local offices dispersed all over the city. The local offices are now supported with public terminals offering information on the assignment procedure and on basic housing questions in a self-service way.
As a partner with experience on multimedia the City of Vienna chose *City Info* who developed this system in cooperation with the Department of Housing and with the MD-ADV, the EDP department. This system as well as the stations was named "TIP?!TAP".

5. Technical Background

Machine:	PS/2 9577/ONG 486 DX2, 66 MHZ
Memory:	24 MB
Harddisc:	540 MB-HD
Operating System:	OS2 2.1
DB-System:	DB2
MultiMedia-SW:	IBM-Ultimedia-Builder
Monitor:	MICRO-VETEK 20" (Touch Screen)



6. Problems

Solutions for two serious problems had to be to considered:

- Many of the prospective clients are not used to handling computers, so a kind of restraint inhibiting them in the use of a terminal had to be overcome.
- The possibility of vandalism had to be faced.

7. Requirements

Considering the circumstances, the system had to be designed for ease-of-use, with an intuitive layout, with instructions easy to understand and easy to handle, apt even for people without any experience on computers.

The public terminals had to be provided with a solid protection cover and installed in a "secure" place, preferably in the same building where the housing counselling offices are located.

8. Implementation

Choosing a step by step approach we started phase 1 in 1993 by installing 4 stations in a stand alone mode (updated two-weekly via disc).
In phase 2 in 1994 the terminal mode was changed from stand alone to online, so updating could be done at any time. The number of stations installed were raised to 8, one of them being installed as a mobile station directly connected with a printer.
In phase 3 printers will be getting installed at 4 permanent stations till the end of 1995; further-more, 16 mobile stations will be provided with directly connected printers.
During these steps our offer of information was enlarged as well:
In phase 1 we started giving information on

- Assigning of Council Housing
- Exact Ranking on the Waiting list
- Assisted rented, Cooperative and Owner-occupied Flats
- Offer of Housing Options.

In phase 2 we added information on

- Assistance in Case of Imminent Homelessness
- Housing Improvement
- Financial and Legal Assistance
- Swapping of Council Flats.

In phase 3 further information is shown on

- Urban Development Projects
- Special Offers for Holders of Assignment Numbers
- the Possibility of Application for Projects under Construction.

9. Operating Details

Operation of the public terminals is done simply by touching the screen; no other instrument is needed (no keyboard, no mouse etc.).The system is available beyond the opening hours of the housing counselling offices (but limited by the opening hours of

the building), the use is free of charge. Personally relative informations - for example on the prospective date of assignment and the ranking in the waiting list - are protected by a personal password based on the assignment number. Thus information on these sensitive points is accessible for the holder of the assignment number only.

Example for the Touch Screen Monitor Mask

10. Evaluating the Success

To measure the success of the system a sample of users was questioned after phase 1. In general, it was agreed that the "Housing Information System" saved time. The counselling offices have been relieved of a lot of routine activities; using the system intensively, people actually began to put trust into the objective assignment procedure of housing.

The high-grade acceptance by the citizens is shown by the following figures:

Effective handling	95%
Easy use	91%
Successful search for data	84%
Useful counselling	75%
Quick information at one's leisure	71%

The survey demonstrated subjects for improvement, too. People asked for

- more detailed information especially on new building projects like site plans, layouts, prices, financing;
- installation of printers;
- more terminals.

The utilization of the system was 100% during the office hours (Mon-Fri 8.00 am - 1.00 pm, Thu 3.30 pm - 5.30 pm) and approximately 33% at all other times.

11. Critical Success Factors

The following items proved themselves as CSF's:

- Intuitive Interaction Process;
- Aptness even for Non Expert Users;
- Up-to-the-point Information;
- Greater Access to Information;
- Personal Capacity Saving Distribution of Information;
- Sense of Personal Success for Users.

12. Practical Hints

Lead by the experiences made in this project let me offer the following advices:

- Put up the terminals in places easy to be found.
- Invest in design!

- Arrange the terminals to capture the customer´s attention, but adapt them to the place of installation as well.
- Keep in mind the needs of handicapped people when designing the system.
- Use no-glare screens!
- Use high picture contrast!
- Let the information be target oriented and up to date.
- Leave no blind alleys on the information way: It is very annoying to find pointers to empty screens just saying: "Sorry - this page is under construction".

13. Technical Requirements

- Provide for 100% availability and response time not greater than 3 sec. These are key-factors for the acceptance of the system.
- If you bring touch screens into use bear in mind the necessity of exact positioning.
- Use multimedia capability to allow intuitive user guidance - you have no chance to train the clients.
- Pay great attention on selecting the appropriate script sizes for the screen layout.

14. Outlook

When we started we just wanted to create a system for answering general basic questions on the subject of housing. But step by step, more information and knowledge was added to the system. And then we had to face the situation that people using the system have sometimes more, and more actual information, than the housing counsellors themselves.

So we felt compelled to expand the system for the use of the housing counsellors themselves. In that step we shall use World Wide Web (WWW) tools at first on an internal server. But later on we might easily move the data to an external WWW server and provide housing information for interested users of the internet society and .....

..... but this will be another story.

On the Increasing Role of Linguistic Subsystems in Office and Business Applications

Gábor Prószéky

[1]

The well-known word-processors, desktop publishing systems, presentation systems are usually supported by spelling checkers, hyphenators, thesauri and, more recently, grammar checkers. The number of the potential office and business applications is increasing, and new applications need new type of linguistic support. Just to mention some areas where linguistic applications have more and more importance:

- intelligent 'find and replace' in word-processing,
- "noiseless" free text search,
- intelligent data base indexing,
- high level correction in OCR,
- language oracle in hand-writing recognition,
- correct segmentation in spoken language systems,
- intelligent dictionary look-up,
- linguistic support for "real" automatic extraction and document-indexing,
- selection and categorization of faxes and emails by "reading" them,
- synchronized handling of different language versions of translated documents,

  support of the translator's activity by workbenches, etc.

From the above list it is clear that wordlist-based, non-linguistic software solutions cannot be applied. If the above modules are, however, based on different linguistic and/or software strategies, their integration into office and business automation systems of the near future would cause useless multiplication of very similar resources. Consequently, only high-level language engineering programs are able to cope with the problems listed. In the paper, the research and development strategy of MorphoLogic, leader of the Hungarian language industry, is introduced, and a rather wide area of concrete MorphoLogic-applications integrated to products of multi-national software companies is shown.

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1 MorphoLogic

1. Tools that need language tools

There is a continuously broadening set of office applications that needs language engineering support. A few years ago, word-processors and desktop publishing systems have been chosen as the most important application area of natural language processing tools. Mainly hyphenation and spell-checking have been provided for them. Later, other programs like thesaurus and grammar checker have been added to them. At the same time, spreadsheets and presentation systems began to use spelling modules. 1-2 years ago, spell-checkers were added to some database systems, as well, but commercial applications of lingware modules in text search have not appeared. The reason is quite easy to understand: spellers and hyphenators (as well as thesauruses and other lexicons) have generally been based on wordlists and linguistic algorithms have not been applied. More complex applications would have needed some more sophistication than a simple dictionary look-up. Linguistic tools treating natural languages have been computationally (and financially) expensive enough not to be applied in mass applications. This era is over: more and more important lingware tools are used by commercial office applications.

2. Application areas in the office

In the last few years an increasing number of electronic services has appeared, and the need for software tools that know some linguistic information began to increase, as well. According to estimations, a workforce of nearly 10 million man-years is concerned with drafting and intellectual processing of documents in Europe. This means that one third of production costs in high technology industries are attributed to document creation and management (CEC 1992). Therefore, office automation systems of the near future might typically include, among others

- recognition tools,
- multilingual writing aids,
- high level text search utilities,
- translation support.

Let us sketch a typical office or business application and talk about the modules in which linguistic support would increase the efficiency of its usage.

Mail

A rather large amount of information arrives to a businessman's desk via networks. Secretaries are in general, however, left out from the communication, because *mails* are sent to the addressee directly. An "electronic secretary" would be needed to read the incoming messages, annotate hem, select the

important ones, extract the most important information from the long ones, and, sometimes, reply them. This "secretary" program must understand the texts somehow, consequently has to have linguistic abilities.

Faxes

If the information to be elaborated arrives in the form of *faxes*, an optical character recognition system is needed to convert the graphical information into texts in order to be treated the same way as in case of electronic mails. Without knowing the linguistically possible combinations of the characters in the natural language in question[2], that is, without linguistic support, efficiency of the OCR system is much less that it might be. The same stands still for *hand-writing recognition* that can rely on much less exact optical information than character recognition.

Dictation

Another situation where a secretary is indispensable is *dictation*. No dictation system can work without linguistic support. To understand words and phrases and, mainly, to be able to segment the continuous speech, natural language modules have to be applied.

Text-producing

In *text-producing* the writer would like to create error-free texts, particularly if he or she is not a native speaker of the language in question. Traditional word-processors have to be enhanced with tools that are able to correct language problems more complicated than spelling errors.

Text search

Typical office application of computers is *text search*. There are no offices without information search. Because of the fact that running word-forms of most natural languages can radically differ from their lexical forms[3], the search tool in question ought to know some linguistics to find all the – formally even quite different --- occurrences of a single word or expression.

Multi-linguality

Multi-linguality is a keyword in most office and business environments. There is an increasing need of translation support. From bi-lingual dictionary handling to the ensured consistency of termi-

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[2] We suppose contiguous text here, and not tables with mainly numbers.

[3] Even in English: *be, is, was, were, been, being,* etc.

nology usage numerous areas can be listed here. Implementations of simple non-linguistic tools do not help the users, who, in general, know the natural language in question, but need very fast and exact support of the computer while working with texts in more than one language.

3. Linguistically sound solutions

From the above list it is clear that wordlist-based, non-linguistic software solutions cannot be applied. If the above modules are, however, based on different linguistic and/or software strategies, their integration into office and business automation systems of the near future would cause useless multiplication of the same resources. What is more, application of different linguistic resources for similar purposes would show a totally incompatible linguistic behavior of the different modules. Consequently, only well-defined, high-level language engineering programs are able to cope with the problems listed.

In what follows, research and development strategy of MorphoLogic, the leader of the Hungarian language industry, is introduced. There is a rather wide area of specific MorphoLogic-applications integrated to products of multi-national software companies.

MorphoLogic's main goals are to develop:

- a configurable language engineering platform — first for morphology and syntax — in order to describe different languages in a uniform way, and at the same time derive marketable lingware applications from them,
- implementation of all type of writing aids for a wide range of (mainly Eastern European) languages,
- implementation of linguistic modules supporting intelligent text processing,
- natural language modules supporting different recognition systems,
- a set of intelligent aids for translators.

Let us enumerate the concrete applications following from the above general goals:

1. *Recognition tools*: high level correction in OCR, language oracle in hand-writing recognition, correct segmentation in spoken language systems,
2. *Multilingual writing aids*, that is, spelling checkers, hyphenators, thesauri and, more recently, proof-readers, grammar checkers and tools designed for non-native speakers/writers to produce "real" error-free texts

3. High level *text search utilities*: ensured efficient and accurate retrieval of text, that is, intelligent 'find and replace' in word-processing, "noiseless" free text search, intelligent indexing in data base applications

4. *Translation support*, that is, intelligent dictionary look-up, synchronized handling of different language versions of translated documents, support of the translator's activity by workbenches, controlled sub-language, ensured consistency of terminology usage, etc.

4. MorphoLogic projects for a uniform linguistic toolkit

The running projects of MorphoLogic cover development of a reversible, string-based unification morpho-syntactic formalism with an object-oriented implementation.

♦ Description formalism

The *Humor* project for the development and implementation of a string based, reversible, unification morphology started in 1991. The Research Institute for Linguistics is a very important partner in it, because the first real users of the morpho-syntactic systems to be commercialized are linguists of a corpus-based lexicographical project aiming at the Historical Dictionary of Hungarian. Humor implementations consist of both a morphological analyzer and a morphological generator. Derivational and inflectional affixes and compounding are fully supported.

♦ Linguistically sound proofing tools

The *Helyesek* project's main subject is producing high-level writing aids, like morphology-based spell-checkers, syntax-based grammar-checkers, hyphenators, inflectional thesauri, mainly for morphologically complex (agglutinative, highly inflectional) languages. The project started in 1991, and the first commercially available products were the spell-checker *Helyes-e?* and the hyphenator *Helyesel*; both are available as end-user product or as OEM package. We note here that MorphoLogic developed — for specific purposes — another type of spellers called *Helyeske* running very fast even if comparing with word-list based systems. The *Helyes-e?* system consists of lexicons and algorithmic parts that makes the program able to handle billions of possible words. It is very important in case of agglutinative languages (Hungarian, Turkish, etc.), but other inflectional languages (Polish, Rumanian, Ukrainian, etc.) can effectively be processed this way. Proposals for corrections can be customized by the user, thus it can easily be adapted to output texts of OCR programs, hand-writing

and speech recognition systems where error-types are quite different from the typical typing errors. *Helyesel* hyphenates any word-form with the help of the same morphological segmentation algorithm. It is useful in case of languages where list based models do not work because morpheme boundaries override the usual hyphenation points. Hyphenation with optional letter-insertion or letter-change is also supported. The speller/hyphenator's commercial versions are available from DOS, Windows, Windows NT, Windows 95 and Macintosh applications. Different versions of *Helyes-e?* are supplied with the well-known word-processing packages, Word, WordPerfect, AmiPro, etc. MorphoLogic supports the most wide-spread DTP packages, PageMaker, Corel Ventura, Quark Xpress, as well. MorphoLogic introduced this year *Helyesebb*, a brand new grammar and style checker enhancing the capabilities of *Helyes-e?* beyond the word boundary. MorphoLogic developed later a special inflectional thesaurus called *Helyette*. It is able to offer synonyms for inflected words and writes the adequately inflected forms of the chosen entries. Language independent, but its first realization works with Hungarian the suffix system of which is very complex. The system is a combination of a morphological analyzer, the synonym dictionary itself, and a morphological generator. The algorithmic part based on *Humor*, the same core engine used by the speller finds the lexical base of the input word form, stores the inflectional information, offers the synonyms of the stem, and then generates the morpho-phonologically adequate combination of the chosen synonym and the stored inflectional information.

- **Linguistically supported text search**

The *HelyesLem* project is aiming at the implementation of linguistic modules supporting intelligent text analysis, free text search and data base indexing. *HelyesLem* is a stemming module that gives every possible stem of the input word. It is not a trivial task for languages with productive compounding and extensive use of productive derivational suffixes, like Hungarian and German. The first version of this system was integrated into Verity's Topic, and adaptation to several other systems is under development.

- **Intelligent dictionaries for translation support**

The *MoBiDic* project for the development of intelligent bi-lingual dictionaries using morphological knowledge (towards machine-aided translation) started in 1993. The name *MoBiDic* covers a series of bi-lingual dictionaries. All the source language modules contain morphological analyzers to find the adequate lexical entries in the lexicon instead of the letter-wise alphabetic neighbors of the

text words. It can also be used as terminology management system that allows the user to create dictionaries.

♦ **Towards a multi-level linguistic toolkit**

The most recent project started in 1994 is *HumorESK*. It introduces a new notion, finite syntax, and an object-oriented parser based on it. Its novelty is that, unlike other parsers, it uses the main ideas of the morphological analyzer. Furthermore, it can be applied for the description of any linguistic level.

5. Conclusion

A rather wide area of linguistic software packages and their role in office and business applications have been shown. The implementations of the MorphoLogic linguistic toolkit consist of a single linguistic engine and two types of enhancements: language specific and application specific modules (see *Fig. 1*). Besides saving work space it provides the user with a uniform treatment of language specific phenomena. Because of the increasing role of intelligent text processing tools in office and business applications the development strategy we have shown seems the only possible way for the multi-purpose lingware systems of the future's offices.

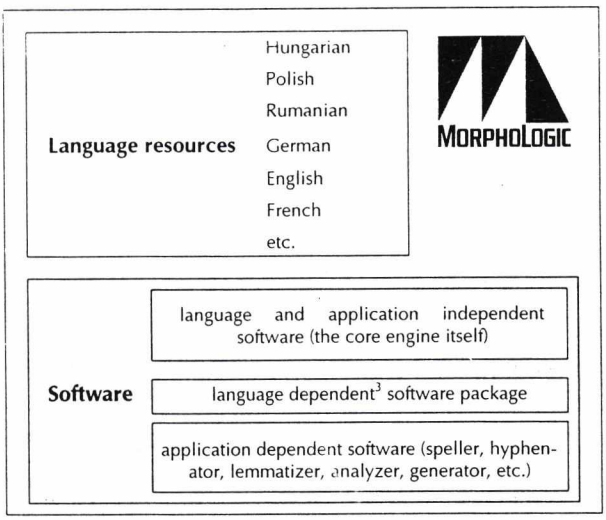

Fig. 1. Modules of the MorphoLogic linguistic toolkit

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Toolkit Support for the Development of Groupware Applications

Tom Gross, Markus Wöhrenschimmel*

Abstract. *The development of several groupware applications showed that most of them use large sets of data. As GroupKit, the toolkit we are using, does neither support internal nor external databases, all data had to be stored in files. So the data were unstructured, inconsistent and access was slow, because for each access the data files had to be reprise. Therefore, we designed and implemented a generic database interface for GroupKit. With this generic database interface the strengths of GroupKit can be utilised and GroupKit applications can easily be connected to any kind of database system offering a C or C++ Interface.*

1 Introduction

Without any doubt it is rather inefficient to build each groupware application from scratch. Therefore several toolkits have been developed within the last few years, which provide some basic and commonly needed components for groupware applications. GroupKit is the toolkit we are using. The development of several groupware applications with it, showed that most of them use large sets of data. As GroupKit, does neither support internal nor external databases, all data had to be stored in files. So the data were unstructured, inconsistent and access was slow, because for each access the data files had to be reprised. Therefore, we designed and implemented a generic database interface for GroupKit. This paper will describe the extended toolkit, called EXTRABASE.

In the next chapter we give an overview of the different categories of groupware systems. The third chapter introduces some toolkits for the construction of groupware systems. This helps in the characterisation of the field of application of EXTRABASE later on. The fourth and fifth chapter describe the basic functionality of GroupKit, i.e. the toolkit we used as a basis for EXTRABASE, and state some experiences we have had. In the sixth chapter we give a characterisation of EXTRABASE. In the seventh and eighth chapter we describe its concept and implementation. We conclude with some remarks about our future work in this area.

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2 CSCW and Groupware

The term computer-supported cooperative work was coined by Greif and Cashman in 1984. In August 1984 the first workshop, sponsored by DEC, took place at MIT. According to Greif computer-supported collaborative work relates to all aspects of how large and small groups can collaborate using computer technology and she emphasises that "... it is not simply electronic mail." [9].

Since the term CSCW exists, a large quantity of systems has been built in this area, which are commonly called groupware systems. To obtain a general view of this bulk of systems, several categorisations for the systems have been introduced. The most commonly used categorisation is the so-called groupware matrix, where the systems are placed within a matrix with a temporal and a geographical dimension: The systems can be built for collaboration at the same time or at different times, the users of the systems can be located at the same place or collaborate remotely. Fig. 1 shows this matrix.

	Same Time	*Different Time Predictable*	*Different Time Unpredictable*
Same Place	Meeting Facilitation	(Work Shifts)	(Team Rooms)
Different Place Predictable	Whiteboarding, Desktop or Video Conferencing	Electronic, Voice Mail	Collaborative Writing
Different Place Unpredictable	(Broadcast Seminars)	Computer Conferences	Workflow Management

Fig.1: Groupware Matrix [10]

Subsequently short descriptions of some relevant systems of the different matrix fields are given. The systems which are mentioned in parenthesis, are of minor importance for our approach and we therefore do not go into details of them.

There are many Electronic Meeting Room Systems, i.e. systems for meeting facilitation, but they are all very similar. Representatives are the DOLPHIN system, which was built at the GMD IPSI Darmstadt [20], and the Collaborative Management Room developed at the University of Arizona [15] [22]. In these systems the users collaborate synchronously and within the same room. Each actor can use several tools, e.g. for session management and planing, for organisational memory and for group interaction.

Another category are Whiteboarding, Desktop Conferencing and Video Conferencing Systems, where the users collaborate synchronously, but are located at different sites. However, their sites are

predictable in the sense that each user knows, where the others are situated. In Whiteboarding Systems the participants share a common whiteboard. Depending on the interaction protocol, they can write and/or draw synchronously or one by one [17]. Desktop Conferencing Systems do not only offer a shared whiteboard but also all kinds of desktop publishing software, which formerly have been used individually by single users. Desktop Conferencing Systems, which are extended by video connections between the participants, are called Video Conferencing Systems [23] [21].

The different forms of mail systems represent a further category. Electronic Mail Systems offer the possibility of sending ASCII text files, Voice Mail Systems can also handle sounds, and MIME based mailing systems can handle all kinds of multi-media mails. The senders and the recipients of these mails can be at the same place, but usually the recipients are at different places, which are predictable in terms of the mailing addresses. According to the underlying metaphor of conventional letters, the participants cooperate at different times, which are predictable because the sender can usually estimate by when the recipient(s) will receive the dispatched mail.

The category of Collaborative Writing Systems, also known as Co-authoring tools, supports an asynchronous co-authoring process. With the help of these systems several remote co-authors can work on the same document [14].

Computer Conference Systems are similar to Electronic Mailing Systems. The difference is that the electronic mails are not posted to single persons, but to a conferencing system, which groups the messages into so-called conferences. Users can subscribe to certain conferences of interest and read and reply to the messages of these conferences.

Workflow Management Systems are supposed to support and partly automate highly structured business processes. The idea is to relieve the users of boring routine activities, so that there remains more time for highly intellectual tasks [1].

Although each of these categories has distinctive features, there are some commonalties. Frameworks and toolkits have been developed to support the construction of groupware systems by providing some of these commonly needed services and parts of the functionality of groupware systems. In the next chapter we will present some examples of toolkits.

3 Toolkits for the Construction of Groupware Systems

Some examples of groupware toolkits are LIZA, Rendezvous, DistEdit, and GroupKit. The extensible groupware toolkit LIZA was developed at MCC. The conferencing applications developed with LIZA consist of active objects and run as clients of a LIZA server. They can communicate via

UNIX sockets. It supports the construction of applications for same time and any place cooperation, i.e. Meeting Room, Whiteboarding and Desktop Conferencing Systems [8].

Rendezvous supports three dimensions of sharing between the participants: sharing of underlying information, sharing of views, and sharing of access. It consists of a start-up architecture for managing the network connectivity and of a run-time architecture for managing the multi-user session. The run-time architecture was built with the user interface management system MEL, which is a language extension of Common Lisp. Rendezvous is an architecture for creating synchronous multi-user applications [16].

DistEdit is a toolkit that can be used to build interactive group editors for distributed environments. It is able to support different editors simultaneously, has some special mechanisms guaranteeing fault-tolerance against machine crashes, and frees the groupware application developers from the handling of communication protocols. DistEdit uses ISIS [3] as communication package, which deals with low level communication. Applications with same time and different, but predictable, places can be built with it [13].

GroupKit was developed by Roseman and Greenberg at the University of Calgary. It is implemented in the Tool Command Language Tcl, which is an interpreted scripting language and Tk, an associated X windows interface toolkit. Both of them are string oriented. Furthermore a Tcl extension for distributed programming, Tcl-DP, is used as basis for the inter-process communication. GroupKit only runs on UNIX machines. With GroupKit same time and any place multi-user applications can be constructed [19]. GroupKit is the toolkit we are working and experimenting with. It served as a basic platform for the implementation of EXTRABASE and will therefore be described in the next chapter.

4 GroupKit as the Basis of EXTRABASE

For our purpose, i.e. the construction of EXTRABASE, the run-time architecture is the most important aspect of GroupKit. At runtime GroupKit consists of a number of base processes and application specific processes, which communicate via UNIX sockets.

The base processes consist of one central registrar and one registrar client per participating user. The registrar mainly interconnects the different registrar clients. The registrar clients are responsible for communication and representation. The communication part manages the information exchange between the respective registrar client and the user. It contains information about the activities of all participants and allows the communication with the GroupKit runtime system, e.g. start a new conference application or join an existing one. The representation part manages the user interface of the respective owner of the registration client.

An application specific process is started, whenever a user starts a conference application or joins an existing one. Each application process is connected to the registrar client of the user, who started the conference application and to all existing application processes of the same conference application of the registrar clients of other users. This means that the conference applications communicate directly, no registrar or registrar clients are involved. The whole system represents an open protocol, i.e. a client-server architecture where the server, or registrar, is passive and only handles registration and where the clients, or registrar clients, control the server [18]. Fig.2 shows the run-time architecture of GroupKit.

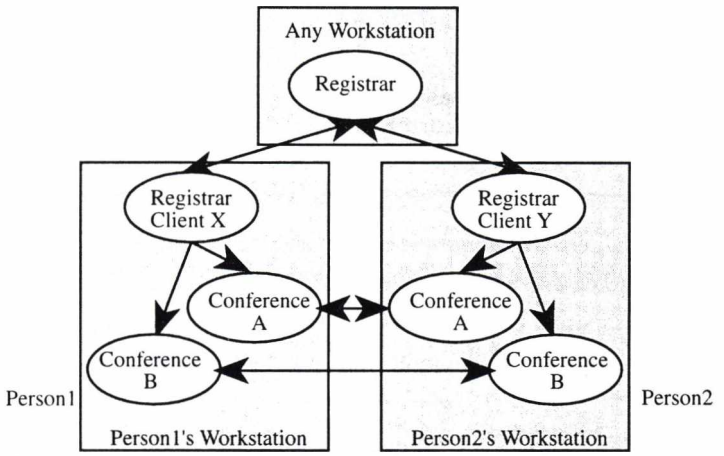

Fig.2: GroupKit Run-time Architecture [18]

5 Experiences with GroupKit

Many of the groupware applications we built, handle large sets of data, which can only be stored in files, because the GroupKit architecture does not contain a proper database system nor offer an interface to any external database system. Consequently most of the applications have either bad performance, because the data have to be kept in files and data access from files is rather slow, or if performance is essential or the data were too complex to be stored in files, the database connection had to be reimplemented for each application. Furthermore, GroupKit does not offer special support mechanisms for user roles. In standard GroupKit applications any user can join a conference by opening a registrar client on the port of an ongoing conference and by selecting this conference application from the list of active conference applications. As for many groupware applications this situation is not desirable, login mechanisms based on accounts and passwords are needed.

Currently we are developing and implementing extensions of GroupKit to provide these mechanisms in GroupKit. In the remainder of this paper we will present our prototype called EXTRABASE, which stands for extending GroupKit with databases.

6 Characterisation of EXTRABASE

EXTRABASE is best suited for the construction of groupware systems with synchronous cooperation between participants, who can be situated face to face or at geographically distributed but predictable locations. So the supported groupware categories are Whiteboarding Systems, Desktop Conferencing Systems, and Meeting Room Systems. In Fig.1 they are characterised by a grey background. Examples of systems, which can rather easily be built are shared text editors, shared graphical editors, shared sketch pads, and brainstorming tools. The construction of other categories of systems is not impossible, but is not so well supported.

EXTRABASE offers several special features to the developers of groupware systems, who use this toolkit, and it preserves all the advantages of GroupKit:

- The developers of groupware applications with EXTRABASE do not have to deal with basic *communication* services. EXTRABASE provides them and the developers only have to know the commands for dispatching Tcl scripts between the applications.
- EXTRABASE does not impose a certain *protocol*.. The developers can decide, which kind of protocol they want to implement in their application, e.g. turn around protocol, token protocol, chaos protocol, etc.
- Another important feature of groupware applications is the provision of *awareness* about the presence and activities of others. EXTRABASE e.g. supports multi-user scrollbars, i.e. scrollbars with several slides. The users can see their own slide representing their own position and the slides of the other participants representing their positions. Furthermore telepointers are provided. Therefore, each user can not only track her own mouse and its movement but also the mice of the other participants and their movements according to the WYSIWIS, what-you-see-is-what-I-see, principle.
- EXTRABASE provides some important *extensions* of Tcl/Tk for shared applications. As in Tcl/Tk complex data structures can only be stored in lists and it is sometimes desirable to store them in record data types, EXTRABASE provides so-called keyed lists which manage these complex data structures. Furthermore Tk only supports the construction of simple widgets, whereas especially in groupware applications complex widgets dominate. EXTRABASE allows the combination of several simple widgets to more complex widgets. These complex widgets can be treated as a single widget, which facilitates the structuring of complex interfaces with large widget hierarchies.
- The user interface of the *registrar clients* is both easy to handle and easy to learn. Furthermore newly developed applications can easily be added to it as an entry in a menu list. They can be started by selecting this entry of the menu list.

- As GroupKit and EXTRABASE are implemented in Tcl and the X window toolkit Tk, the development of user interfaces is rather easy. As Tcl and Tk are interpretative programming languages, rapid *prototyping* of groupware applications and their user interfaces is well supported.

7 The Concept of EXTRABASE

We designed and implemented a generic database interface for GroupKit called EXTRABASE. With this generic database interface GroupKit applications can easily be connected to any type of database management system. The idea of EXTRABASE was triggered by a shared Computer Aided Design drawing tool, which we constructed. For the complex CAD data storage within files would be impossible. Nevertheless this would be the only solution in the original GroupKit. The most efficient solution is to store the graphical objects in an object-oriented database system. Instead of developing an application-specific connection between GroupKit and an object-oriented database system, we decided to build a more generic and reusable connection. Consequently this extension of GroupKit should enable the connection between GroupKit and any kind and any number of relational and/or object-oriented database systems. Access to these database systems should be possible by any conference application which runs within the extended GroupKit runtime system.

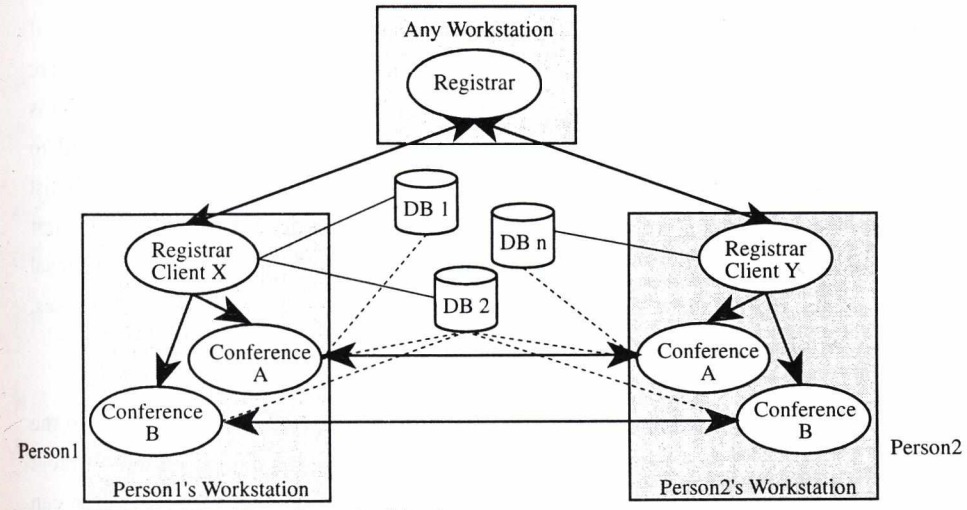

Fig.3: EXTRABASE Run-time Architecture

Fig.3 shows an example of the run-time architecture of the EXTRABASE system. In this example two users, Person1 and Person2, are logged into the EXTRABASE run-time system. Both users participate in conference A and B. Person1 provides the data of databases 1 and 2, Person2 provides the data of database n. In this manner both person1 and person2 and anyone, who will connect to the

GroupKit run-time system in future, can access these data no matter which conference application s/he starts or joins.

The integration of a database system into the GroupKit run-time system has to be done by the database administrator before run-time. S/he has to embed a set of database access commands into a server module, which handles database access. It is also possible to implement special schedule or transaction mechanisms in the server module. After these initialisations the database administrator can integrate the database into the EXTRABASE run-time system and the users of any EXTRABASE application can access this database system thereupon. This way each user can integrate any number of databases into the EXTRABASE run-time system and provide their data to the users of any conference application, which runs within the extended EXTRABASE run-time system.

8 The Implementation of EXTRABASE

In order to understand the architecture of EXTRABASE, it is necessary to know more details about how conference participants and conference applications are administrated within the GroupKit run-time system.

Whenever a user enters the GroupKit run-time system, i.e. s/he starts a registrar client, s/he is added to a user list. This user list contains all users within the GroupKit run-time system, the location of their hosts, etc., and it is kept at the central registrar. The active conference applications are administrated in a conference list in the same way. Within the EXTRABASE system a third list is kept in the registrar, which contains information about the database systems, connected to EXTRABASE during run-time. Whenever a new registrar client is started, it receives the database list together with the user list and the conference list from the registrar. As soon as a user, i.e. a registrar client, starts a new conference application or joins an existing one, the database list is sent to the local application process. Since the database list holds information about the location of all databases, applications can easily send commands to them via the server module.

The server manages the database access and receives, transforms and forwards the results to the requesting application process. The transformation is necessary to bring the data from the different types of database systems into a common format. This way any active conference application can access any connected database system.

In order to implement database access, it was necessary to extend the command set of Tcl. Using the programming languages C or C++, we extended the Tcl interpreter. This way we implemented all database relevant actions as Tcl commands.

9 Future work

We are planning to introduce the notion and handling of roles into GroupKit. This will help us to be able to manage data access in database systems according to roles, which each user can take. In a tutoring graphical editor a tutor could e.g. have read and write access on any data, whereas a student could have read access to all data and write access only to data of minor importance. Furthermore we are investigating how to optimally visualise the data of the connected database systems.

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Executive Information System - The Manager´s Dream
Glory and Penury of EIS

Petr Doucek[1]

Abstract
There are some very important problems and questions, that must be solved for computer supported managerial work in practice. The common denomination for their solution is to develop various information systems for tactical and strategic management and for decision making process. Information systems being used in practice now have a trend to support managerial work only with very few functions. They do not provide data structures for any rationalisation of decision making on longer time horizons. Executive Information Systems should fill this gap and should prepare a new generation of information systems based on multidimensional databases.

1. INTRODUCTION

Typical classification of Business Intelligent Systems is shown in the *Figure 1*. No one information system can be called Business Intelligent System without a human being taking part in the decision support process. Only by data evaluation process information arise and this information is used by a human for a decision process. Data and evaluated information are "only" support for an individual decision process. Without information systems at various levels of business structure is not possible to get required effectiveness and efficiency in management process. According to a type and a level of data or information processing and a level of management Business Intelligent Systems can be classified as follow:

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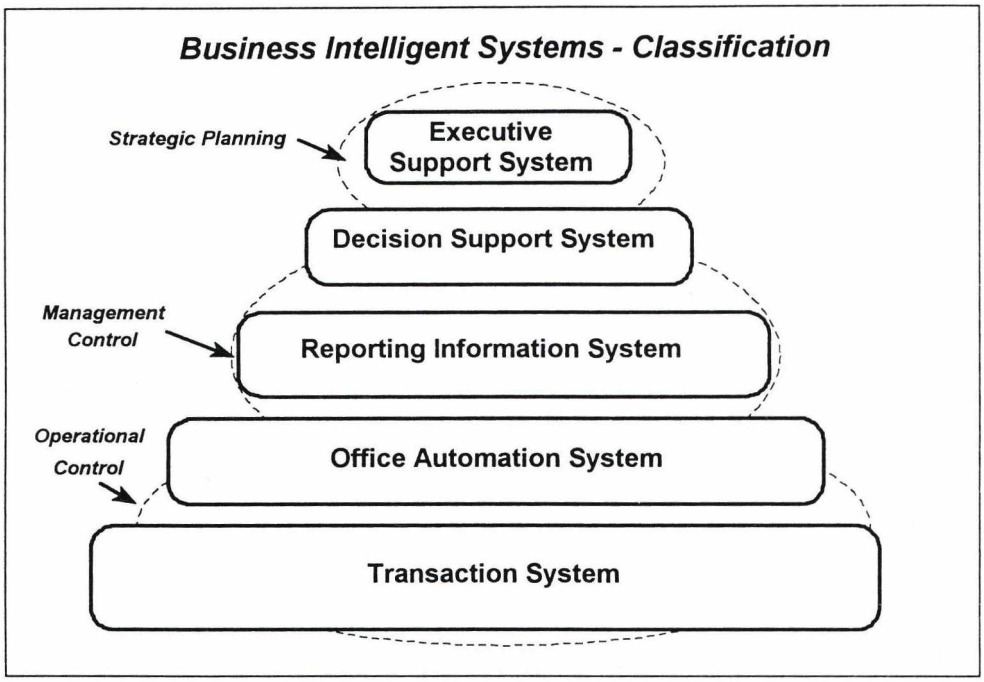

Figure 1. Business Intelligent Systems - Classification

The lowest level of a firm information system is the level for data interchange (**Transaction System**) in a classical form (according to literature)- data entering, it's management, preparing and perform data interchange between various computers or networks. There is expected that problems connected with the development and maintenance of Transaction Systems will be in few years easily controlled and become a routine engineering work.

Next level in the pyramid is level of the **Office Automation Systems** - these systems are supporting basic office activities - electronic mail, documents interchange, electronic conferences, etc.

Reporting Information Systems is a group of applications that are determined for the implementation of basic activities of any firm - for example accounting, staffing, finance, budget, new products development, production management, etc. The main function area of those information systems is in operational control and management control. This level of management information systems is on a start of a great boom. There is very big absence of this kind of software applications on our market.

Decision Support Systems are determined for the level lying between top and middle management. They are developed more for middle management level as for a top one. By them

are covered activities of a management control and also a small part of a strategic planning - data preparation and its aggregation into global characteristics.

Group of **Executive Information Systems** is prepared for top management of a firm and for strategic planning. Time horizon of this strategic planning is usually about 3-5 or even more years, but there are also information systems that used in preparing perspectives for ten or more years. Of course the reliability of prepared data is decreasing with increasing time horizon.

These systems should offer multidimensional view at data. Data must be investigated from rather different points of view, from different cross-tables - sections. The same aggregated data must be extended in various forms - the same form (screen, printer output) can not be given to a sales manager and to an accountant.

2. CONDITIONS FOR EIS APPLICATION DEVELOPMENT

To develop some EIS application is a serious problem in our practice. Development of EIS application is about the same process as development of the other similar applications, but there are some special factors and features for this application type.

2.1. Technological Support

In the past period, SQL-based relational databases have been promoted as the database standard. Like all technologies, relational databases have their limits and for some types of application - as for EIS - other kind of databases must be used. Relational databases are good at retrieving a small number of records. Their disadvantage lies in retrieving a large number of records and summarising them 'in-flight'. Unfortunately, there are managerial applications of this kind.

To overcome all these weakness in EIS data structure E.F.Codd in 1983 theoretically formulated a conception of multidimensional database. The two dimensional database can be described as a matrix in *Figure 2*, where both dimensions are variables of the model and cells are related to the values of those dimensions. Multidimensional database will be represented by a multidimensional space, where cells are filled with values. This approach allows rework those data with more effectiveness and efficiency - summarise data in various data dimension "in-flight".

Two Dimensional Database

Region	Product			
	Screws	Nuts	Bolts	Washers
Northern Moravia	230	150	340	450
Southern Moravia	250	200	350	390
Czech	180	210	80	303
Prague	91	23	300	89

Figure 2. Two Dimensional Database Concept

This technology has its own limits and borders too. Limits are in the capability of computer technique to keep all necessary cells in a memory. For example we have five dimensions (product, customer, region, affiliation and month), each dimension has ten possible values. It does mean, that for this very simple model is to prepare 100.000 blank cells. A 16-dimensional database with only five members in each dimension would have over 152 billion cells.

The last but not a least condition for developing of EIS is to transform or rework data from all information systems of a firm. Technological support should prepare a communication base (interface), where all kind of data files could be read, "understood" and prepared for reworking and modelling. Actual trends in data sharing and data connection for managerial information systems are:

- a managerial application should be able to use data from other applications without a dependence on a type of this application and on a file format,
- an application should model a transform data and by this model approach will produce an analysis of existing trends in a firm,
- an application must have a perfect graphical user interface for the presentation of results,
- an application should dispose with very simple navigation process - the best with intuitive navigation process.

2.2. Organisational Support

Organisational support lies in managing workflow in an organisation and also in managing, developing and keeping up-to-date data structures. In organisational support can also be aggregated all functions of lower level information systems. This function seems to be very easy, but in reality there are some problems to realise it. Main difficulties and problems are:

- All "old" information systems in a firm have their history of an development and maintenance. It does mean, that each system has a documentation more or less corresponding with reality. Depending on quality of this documentation, developers of EIS are able to define relations between files (data), that will be shared by both systems.
- Each information system was developed in a different "period of computer technology" with a little different external and internal conditions, knowledge of information technology, knowledge of the firm information system, etc.
- Workflow management is connected to an information flow management and also to a management control process. During development of an EIS application, it is important to re-evaluate existing data flows and prepare a map of new ones. An EIS implementation must not become a tool for "legalise" old (in several cases non-functional) data flow structure.

3. IMPLEMENTATION OF EIS IN PRACTICE

The concrete implementation depends on the qualification level of the top management in the firm. Of course, that if the management does not know anything about EIS and about capabilities of progressive information technologies, no one can suppose, that will be an easy target to implement such kind of products in this firm. There are some very serious factors, that influence at EIS application putting into work:

Managerial Factors

- Abilities to indicate information needs,
- Corresponding knowledge of information technologies,
- Capability to use IS/IT,
- Managerial employees qualification level,
- Quality of firm data supporting EIS.

Developer Factors

- Right decomposition of the EIS,
- Choosing a relevant technology and application interface,
- Useful integration of various information technologies and user's platforms,
- Complementary services - consulting, further development, etc.

4. CONCLUSIONS

EIS managerial applications are very needed in practice, but there are some problems, that have to be solved before these EIS applications will be put into work. There are two main groups of factors having influence on EIS development and implementation:

- Managerial Factors,
- Developer Factors

In the conditions of our republic developers of EIS applications are better prepared to implement this kind of information systems as managers are able to accept its offers. But this situation will change in a few years.

The most perspective technology for development of EIS seems to be a multidimensional concept of a database theoretically based on OLAP technology as shown in [1]. Advantages of this concept are laying in an easy capability to summarise required data in various cross-tables (cuts thought a multidimensional database) and in very simple navigation in the data structures. All data are put into a large multidimensional matrix (space).

During EIS exploitation will appear advantages of this data store in a form of cross-tables and in a relative easy data aggregation.

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New Application in Public Administration

"OMFB-NKR" - System of International Relations

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Abstract

The reform processes in Hungary have thrown the gates wide open to international research and development relations. Hungarian researchers can now join European multilateral projects like the EU Framework Programmes, EUREKA, COST, CERN, NATO etc. At the same time, they can rely as a reference on the intergovernmental bilateral scientific and technological cooperations launched nearly thirty years ago and developing at an increasing pace ever since. Information waiting to be processed and disseminated is flooded to OMFB, which is a government agency authorized with the management, financing and coordination of these relations. The paper dwells on the information system developed by OMFB to handle this information, on the tools used in development, on the information supply and furthermore on the opportunities and limits of developing the system further.

1. OMFB - National Committee for Technological Development - a government agency with national authority - supervised by the Minister of Industry and Trade.
2. SoftCare Gmk - A software development company
3. Multidata Kft - A software development company

"OMFB-NKR" - System of International Relations

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Dr. I. Gergely (Multidata)

1. Introduction

The reform processes in Hungary have thrown the gates wide open to international research and development relations. In various resolutions, the Hungarian Government underlined the responsibility of OMFB's President in the management, financing and coordination of these relations. Changing to the market economy which made competition dominant also in this sphere, has been and is demanding that involved Hungarian researchers receive information in increasingly wider circles about international possibilities, bidding conditions and on the programmes and projects in progress. On such grounds, OMFB launched the development of an information system of international scientific and technological relations (OMFB-NKR) and this motivated OMFB to publish systemized information also through the computerized network of the Information Infrastructure Development Programme (IIF) in addition to making it available through the INTERNET network.

The investment on our own was justified by the fact that an object-oriented programme suitable for the purpose was not available through commercial channels. The adaptation of systsems used by foreign partner institutions, acquiring eligibility for further development, performing the matching to the tasks and then the "homologization" of the system would have required much more material and time input and would have entailed a higher risk than the development of a "tailor-made" system. In spite of all this, OMFB-NKR is sufficiently general to be applied by any institution dealing with the management, financing and/or coordination of a bidding system.

2. Function and substance of OMFB-NKR

2.1 Function

OMFB-NKR registers the invitations for bilateral and multilateral international bids managed, coordinated and/or financed by or through the intermediation of OMFB, the received BIDs (PÁLYÁZAT), the approved PROJECTs (PROJEKT), and the VENUEs (RENDEZVÉNY) organized by or through it. It tracks the EVENTs (ESEMÉNY) representing the changes in status and the COST (KÖLTSÉG) utilization. It registers the PERSONs (SZEMÉLY) and INSTITUTIONs (INTÉZMÉNY) responsible for and participating in the international activities mentioned above, as well as the TRIPs (UTAZÁS) associated with the programmes. It stores the international research and development DOCUMENTs (IRAT). The system is suitable for providing information which assists the preparation of decision making within OMFB and in the government committees dealing with scientific and technological issues. And last but not least, the system ensures the provision of up-to-date information to the Hungarian research and development community on the possibilities and conditions of international cooperations, the projects in progress, and the Hungarian and foreign government agencies (persons) responsible for building contacts.

2.2 Information sources

- publications of the government agencies responsible for supervising science and research in the given relation, as well as the information materials from the European Union, COST, EUREKA, CERN, NATO etc.,
- the information given by the science and technology (S&T) attachès working in the given relation,
- bilateral intergovernmental agreements and work plans, OMFB's related invitations for bids, the EC, PHARE (ACCORD) programme, CERN, NATO invitations,
- protocols of bilateral intergovernmental joint committees and multilateral coordination committees

2.3 Potential range of users

- researchers and experts dealing with basic and applied research, as well as technological development,
- managers and associates working at the scientific policy, research organization and international departments as well as project managers with national authority,
- contributors to the decision making and preparation process of Hungarian research and development biddings,
- the employees of institutions dealing with technology transfer and with the management of research and development.

2.4 Range of data stored

- the documents, publications and invitations for bids of bilateral and multilateral intergovernmental science and technology (S&T) cooperations handled by OMFB,
- bilateral and multilateral international S&T biddings and projects supported and/or managed by OMFB,
- researchers, experts, project managers and international partners participating in the cooperations,
- international S&T venues organized by and/or with the participation of OMFB,
- cost utilization data of international activities financed by OMFB.

3. OMFB-NKR Software System

3.1 System requirements

- storing and managing great amount of structured data
- easy management of objects (PROJECT. PERSON, INSTITUTION etc.) and connections between objects,
- easy modification of objects and connections,
- easy modification, changing of code values of object characteristics,
- unified, easy-to-learn user interface,
- flexible searching options,
- various reports,
- network operation - simultaneous activity of several users,
- development vs. operation under different data base management systems - easy migration to new DBMS,
- off-line communication with external data manipulations systems.

3.2 Objects and connections

The core of system entities is ACTIVITY (AKTIVITÁS) which is the generalization of activities related to launching and maintaining international relations. Such activities are BIDDING (PÁLYÁZAT), PROJECT (PROJEKT), VENUE (RENDEZVÉNY), COORDINATION (KOORDINÁCIÓ), NEGOTIATION (TÁRGYALÁS), TASK (FELADAT) and INFORMATION (TÁJÉKOZTATÁS). With this core are the EVENTs necessary for activity management associated, that is the fundamental activities and changes in status taking place simultaneously in the maintaining of international contacts, as well as the PERSONs (SZEMÉLY) and INSTITUTIONs (INTÉZMÉNY) taking part in the activities, their TRIPs (UTAZÁS) and the related DOCUMENTs (IRAT).

The object connections contains informations asssociated with the ACTIVITY (AKTIVITÁS). Of these, the most important are the ACT-PARTICIPANT (AKT-RÉSZTVEVŐ) linking ACTIVITY (AKTIVITÁS) with the PERSON (SZEMÉLY) participating in it, PERS-INT (SZEM-INT) referring to the application of PERSONs (SZEMÉLY), COST-ITEM (KTG-TÉTEL) including the cost items of ACTIVITY (AKTIVITÁS), EVENTs (ESEMÉNY) and TRIPs (UTAZÁS), and ACT-CLASSIFY (AKT-BESOROL) containing the classification of ACTIVITIES (AKTIVITÁS) as per scientific sectors. The object connections enable the handling of the PROBLEMs (AKT-PROBLEM) related to the ACTIVITY (AKTIVITÁS) or the relations among the various activities (AKT-AKTIVITÁS).

The abouve mentioned obejcts are completed by objects of "technical" caracter (CODE, PARAM-eters etc.)

3.3 *Realization*

The OMFB-NKR is operating in the following environment
- PC 386 DX40 and PC 486DX266 under DOS 6.22
- NOVELL NetWare 4.01
- Windows 3.10
- System Architect CASE
- GUPTA
- SQL Base, ORACLE 7 DBMS

4. Service

4.1 Service within OMFB

The screan oriented queries enable the simple retrieval of data (objects) and relations, simple creation of connections between data objects, te report creation and system administrator's activities.

The BASIC REPORTs (ALAPRIPORT) enable the comprehensive retrieval of the data stored in OMFB-NKR and arranged into the specified attributes (e.g. all PERSONs (SZEMÉLY) according to names, all ACTIVITIES (AKTIVITÁS) according to relation and character etc.).

In PARAMETERED RETRIEVALs (PARAMETRIZÁLT LEKÉRDEZÉS) it is possible to specify various conditions and parameters (e.g. relation, time, duration,

phase, type etc.). The report printed as a result of the retrieval is arranged according to the attribute specified in the title of the report (e.g. BIDs that is PÁLYÁZAT submitted at the given time in the given relation, COST PROJECTs in progress etc.).

STATISTICAL REPORTs (STATISZTIKAI LEKÉRDEZÉS) process the information stored in the database from a statistical point of view (e.g. the number and ratio of bids submitted and accepted in the given relation at the given time in the given branch of science, the extent of requested and obtained subsidies etc.).

4.2 External service

Selected data, modified data can be transferred to external data manipulations system like office-automation systems or book-keeping systems.

Through the IIF and INTERNET network, up-to-date information can be obtained about the OMFB ANNOUNCEMENTS (OMFB HIRDETMÉNY), the invitations for BIDs (PÁLYÁZAT), the intergovernmental scientific and technological AGREEMENTs (MEGÁLLAPODÁS), cooperation WORKPLANs (MUNKATERV), PROJECTs managed, financed and/or coordinated by OMFB, VENUEs (RENDEZVÉNY) as well as about the Hungarian and foreign government PARTNERs responsible for the cooperation.

5. Adaptation possibilities, language, system boundaries

Although the basic reason for developing the system was the registering of and tracking the changes in the multifaceted tasks within international relations managed by OMFB, the system is appropriately general to handle any level (government, institution), function (state, private) the relations, cooperation, bidding and project system within the country. The starting point is always the accurate definition of the appropriate "ACTIVITY" (AKTIVITÁS), the correct standardization of "EVENTs" (ESEMÉNY) related to changes in the status of the activities, the unambiguous definition of the "roles" of the PERSONs and INSTITUTIONs contributing to the activity and so the system can be immediately adapted to the circumstances.

The system objects, the connections, attributes and screen menues as well as interrogations have Hungarian names. Thanks to handling text constants of different functions, the elaboration on a system plan level and the selected programming technique, the text displayed by the programme can be easily replaced - most of them without a change in the code - and the foreign language version of the OMFB-NKR can be prepared simply and rapidly.

OMFB-NKR has a structured database. Although the DOCUMENT (IRAT) database may include a limited (max 64 kB) text (contract texts, invitations, information, document summary abstracts) which can be retrieved by pre-specified keywords, the system may not be used for text retrieval and word processing. Because the "core" of the system is "ACTIVITY" (AKTIVITÁS), the system does not deal with the registration process of documents either. In the cost items of ACTIVITIES (AKTIVITÁS), the system stores the cost centre, cost category and cost types of the given activity as well as the status of use, but it does not perform book keeping functions. However, in all the three areas OMFB-NKR has identifiers which allow communication with the appropriate processing software systems.

HUNOR - a reengineered insurance application system of the Hungëria Biztosítî Co.

Tamës Komor[1]

In 1990 the insurance company Hungëria Biztosítî decided to replace its various, mostly PC-based local systems by a unified on-line system. After a short market research SYSTEM80, the application system of the Anglo-Elementar Insurance Company, was selected to be the basis of the new HUNOR system. HUNOR is an integrated on-line system, which supports client and policy handling, premium incasso, claim settlement and commission calculation for agents. Beside general reengineering problems hereby we discuss some special ones, caused by the differences between the Austrian and Hungarian environment.

1. The IS situation of the Hungëria Biztosítî in the late 80-s.

1.1. Local PC based systems.

1.2. Separate applications for each business line and some functions.

The above characteristics were typical in Hungary for finantial institutes like banks and insurance companies acting on a country-wide scale. The technical reason was the lack of teleprocessing hardware and software (COCOM embargo problems), on the other hand the organizational know-how of the currently founded institutes was weak.

[1] Hungëria Computing Ltd

By 1990 the political-economical situation in Hungary changed. Rapid development of telecommunication was expected, and new insurance companies were established on the Hungarian market, involving foreign investments. Hungëria Biztosîtî itself became partly the property of ALLIANZ (Germany). Growing competition in the insurance market could be foreseen.

2. Strategy.

Having analysed the situation the owner decided to change the IS of Hungëria Biztosîtî . The basic requirements for the new IS were the following.

- Countrywide, quick access to the information.
- Up-to-date and coherent finantial data about the business situation.
- Unified data processing for the various business lines and functions, with the policyholder in the center.

It was clear that the new IS system should be based on an on-line solution, therefore it was named "Hung ria On-line Rendszer", shortly HUNOR. ("rendszer" means system in Hungarian.)

The HUNOR project started to search for easy-to-install products and meanwhile considered the possibility of an inhouse development.

In the meantime the Hungarian government decided on the introduction of an obligatory third party car insurance starting on the 01.07.1991. Because of the short deadline for the introduction we started this business line in a rush. Of course the rushed development could not meet the requirements. It was a mixed solution, where policy handling was carried out in the existing local PC systems, but the premium incashment was implemented on a centralised mainfraim. The policy data were still being transferred to the central system by floppy transport while an on-line query of the central system was available from some significant offices around the country.

Parallelly, the HUNOR project tried to find an acceptable product on the market, but did not succeed. Furthermore it was questionable wheter the in-house development would succed on time, mainly because of the difficulties of the organisational reengineering problems. In this situation the adaptation of a working application system of an Allianz owned insurance company - the Austrian Anglo-Elementar Insurance company - was decided on.

This system, called SYSTEM80, met the requirements for the HUNOR system. The organisation and the scope of business lines of Anglo-Elementar was similar to that of Hung ria Biztos¡t¢, however, the business volume was a bit smaller. Of course there were also a lot of differences between the two companies, so a hard adaptation work was to come.

At the beginning of 1994 after the first project period of nearly two years the HUNOR system started to work with the motor third party insurance. Half a year later the motor Casco, and at the beginning of 1995 the private property insurances were started in the HUNOR system.

3. The characteristics of the HUNOR system and adaptation problems.

3.1. Technical data.

The HUNOR system is running on an IBM 9121/511 mainframe with 170 Gbyte disc capacity under MVS/ESA, the central repository of information is handled by IMS, terminals are controlled by TPX. The terminal network counts some 1500 PCs located in nearly 200 offices. For networking the public X.25 of the Hungarian PPT is used with additional leased lines for the most important policy handling offices. In peek hours of the daily business about 800 terminals are parallelly active, and some hundred thousands of IMS transactions are processed dayly. HUNOR maintains nearly 2,5 million contracts and 1,5 million policyholders. About one third of the contracts are modified and some hundred thousands of claim notifications are evaluated each year.

The system software and networking problems were discussed in [1], just before starting real production. The statements of that paper are still valid, while the capacity of some network elements has been increased.

3.2. On-line transactions and overnight batch processing.

3.2.1. HUNOR inherited the basic organization of SYSTEM80. During working hours the on-line transactions are used for queries and policy data modifications. However, data modifications are gethered in a so-called transient data base, which is completely independent of the central repository of information. The content of the transient data base is transferred into the central repository by overnight batch processing. There are two kinds of modifications. Most of the policy administration data can be viewed only the next day after modification, while finantial data such as cash premium payments or remittance of loss compensations can - and mostly should be - checked on the same day.

The one-day delay of accessing the policy data modifications causes some difficulties in policy administration, but there was no way to change this basic strategy of the system in the given time schedule. Once the users have achieved good working experience, only minor difficulties occure.

3.2.2. Furthermore, the batch processing part of the system provides furthermore the necessary facilities for the usual functions, such as

- document printing(policies, cheques for premium incasso, payment-demanding letters, e.t.c.)
- report generating
- producing postal payment order or GIRO remittance records
- importing data from the partner institutions
- periodical finantial processing
- system backup.

The only general problem with batch processing was the time limit. Most of the problems could be solved by increasing the originally estimated hardware capacity and operating resources. There was one exception: the manufacturing of payment slips, which problem could only be solved by changing the basic algorythm of the premium incashment subsystem. We will discuss this problem later.

3.3. The client is in the centre of the system.

This statement is relevant for business strategy and for the structure of the application system. The latter means that all contract data of a client is connected to the client data. The identification mechanism of the client in the HUNOR system was quite new for the Hungëria Biztosîtî. To identify a client an eleven-character-long match-code is used, which is built up from the leading characters of the name and address of the client. Part of the match-code is enough to find a client. It can happen of course, that different clients have the same match-code. This problem is solved in the system by an internal running number, however this running number cannot be seen by the users.

The practice shows that this system of identification is advantageous, because there is no need for special identification data for the clients, yet one can find a client easily.

There were two problems however with match-codes in HUNOR. The first one occured with data transfer from the old systems, where we did not have proper information for unambiguous identification of the clients. The second problem was that the users were not educated and motivated well enough to handle the match-codes intelligently enough.

3.4. Unified policy and claim settlement data structure .

A unified data structure is of course positive for the users and the maintenance of the system, but requires big compromises in product development and in administartion work-flow. In the past the separate business lines were controlled by separate departements of the Hungëria Biztosîtî, and there were various application systems in use. Unfortunately, the structure of the products and even some basic notions were not unified. The introduction of the HUNOR system involved a general overwiew of the basic notions, of product structures and of administration work-flow. It was difficult to find the best compromise, and with some products we did not succeed.

One of the typical problems can be spotted in the car insurance product. SYSTEM80 was prepared to handle the third party and the hull insurance within one contract. Hungëria does not use this feature of

the system, because we could not redefine the conditions for the two types of the car insurance in a unified set. It is partly based on the special legal regulations of Hungary for third party car insurance.

3.5. Continuous commission.

There are basicly two types of commission in the insurance business. The first one is calculated when aquiring a contract, and the second one continuously, during the whole life-time of a contract. In SYSTEM80 the continuous commission calculation was fully supported and preferred. Hungëria Biztosítî had exclusively used the acquiring commission in the past. The eighteen-month period we had till the end of 1993 was not enough to change the comission regulation. As a consequence the commission subsystem had to be left out from the HUNOR system just before starting real production in the beginning of 1994. Hungëria only decided to adopt the continuous commission calculation in the middle of 1994. Of course it was a more difficult job to insert this function into the system again.

3.6. Premium incashment.

This part of the original system had to be rewrited fully because Hungëria Biztosítî - just like other insurance companies in Hungary - is working in an environment other than that of the West Europien companies'.

Most clients do not have bank accounts at all, and the beginning GIRO system seems to need quite a long time to cover all types of banking transfers. Therefore the basic kind of premium incashment with Hungëria Biztosítî is the postal cheque. According to the legal regulation the third party car insurance and the house insurance tarif is changed at the beginning of each calendar year. Hungëria Biztositî handles over one and a half million such insurance contracts by postal payment transfer. The printing and posting of that amount of letters takes three to four weeks. And the clients need some more weeks to transfer the money by post.

The original system was based on issuing a postal cheque basicly monthly containing the debit balance, which should be settled in three weeks, before charging the contract with the next month premium. There was no way to change the premium charging algorythm of the original system, it would have been

equal to a totally new development. So the premium incashment system had to bee changed so that the clients are still supplied with postal cheques on time.

We implemented a mixed algorythm for payment incashment. The clients get postal cheques of about a monthly rate in advance for a six-month period called monthly-rated cheques. If the balance of a contract shows, that the client cannot settle the incasso by one monthly-rated checque, the system generates a so-called balance-rated checque. This slightly confused algorythm could work, if clients normally paid on time, and the staff of the insurance company handled the contract data practically without mistakes. Unfortunately, neither of the two conditions is fulfilled in practice, so we have to find another solution for premium incashment.

3.7. Language problems.

Language problem is a significant technical problem in the localisation of a foreign product. It is even more complicated in a case of a software system originally not defined for distribution.

The proper translation of the texts generated by the system on the screen or in the listings is not only a technical question, but requires a basic understanding of all notions used by the system. It was especially hard to adopt some notions of the original contract structure, because Hungëria Biztosítî devided his products into much more business lines than HUNOR was originally designed for. Another difficulty was to unify the claim settlement notions, which had to be done independently from the new application system just in order to get reliable finantial reports. Parallelly, a basic notion of claim settlement - the reserve for outstanding claims - changed in Hungary because of the new finantial regulation. The project successfully defined the proper notions for claim settlement, and therefore the adaptation of the claim settlement subsystem involved only minor rewriting of the software.

The language problem has some additional technical features in Hungary because of the rich alphabet. The fact that German language also has some accentuated letters made the job easier than it would have been with an English-based system. I must admit, though, that our users still come across German words and abbreviations sometimes.

Summary.

In spite of the remaining problems the development of HUNOR by adaptation of an outside working application has succeeded. Respecting the following rules (beside the general ones of system development) could have resulted in even greater success:

- Do not try to implement all imaginable user dreams and exceptions in a system originally designed for simple and coherent handling of the majority of the business.

- An application system planned for qualified, well-paid and disciplined users should be used by adequate staff.

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The BANK 24 Network: Offering Automated World-Class Banking Services

D. Henry

Our Vision...

BANK 24 Kft. is opening a new window for the Hungarian banking industry — automated electronic services. During the next three years, BANK 24 will install a nationwide network of more than 400 automatic teller machines (ATMs). This powerful network will offer banks an opportunity to provide outstanding retail services to their customers at a fraction of the cost of installing private ATM networks. This modern banking technology will be easily accessible, full featured and easy to use.

The concept that will revolutionize banking in Hungary...

In virtually every western country, banks have successfully used networks of ATMs to minimize costs and increase retail customer services. In these countries, customers with ATM cards can easily and quickly access their accounts (and receive cash) from ATMs located at their own banks, at different banks or from ATMs located in high-traffic areas that are not near any particular bank.

BANK 24 intends to help Hungarian banks offer these same convenient services to their customers at a considerable cost savings.

"We will build and install a network of 400 ATMs in the most-traveled areas of Budapest and in the five next largest cities in Hungary," says CEO Michael Brown. "And when banks partner with us, they can achieve three things. They'll enhance their services, build their marketing image and minimize costs by sharing in our economies of scale."

In turn, Hungarian cardholders who use the BANK 24 network will be rewarded with time savings, convenience and world-class customer service. In addition, international travelers with credit/debit cards such as VISA will be able to obtain cash advances through the BANK 24 network.

Both Hungarian and international cardholders will appreciate the easy-to-use multi-task functions of the BANK 24 ATMs. Each ATM boasts the most advanced IBM technology available in the world today. The ATMs are capable of performing the following functions:

- Cash Withdrawal,
- Account Balance Inquiry,
- Account transfer, and
- Bill paying

BANK 24 ATMs will be installed in locations selected for maximum convenience. Target locations include high-traffic centers of public transportation, retail centers, major corporations, petrol stations and everywhere customers need the convenience of fast banking transactions.

BANK 24 will begin ATM installations first quarter 1995. And by the end of '95, there will be 100 BANK 24 ATMs in Budapest. Our aggressive installation schedule for the next four years is outlined below:

Year	*Number Installed*	*Total Installed*
1995	70	70
1996	100	170
1997	160	330
1998	70	400

BANK 24 Initial Investors & Strategic Partners...

On July 19, 1994 BANK 24 became a Hungarian funded Kft. limited partnership. BANK 24's investors and strategic partners are outlined below with a description of their investments.

Investors	*Initial Equity Investment*
DST Systems	$1,000,000
Michael J. Brown (CEO)	$1,000,000
Financial Investors	$2,100,000
IBM Hungary	$1,000,000 of equipment (no ownership however)

In addition to these investments, BANK 24 has secured $10 million USD of equipment financing to cover the cost of the ATMs.
This is the final stage of our pre-roll-out strategy, and we currently are preparing for the first round of ATM installations.

What is our commitment to this region?

BANK 24 is committed to becoming a lasting contributor to the Hungarian banking industry. Just in the next four years, BANK 24 will invest more than $20 million USD into the Hungarian economy.

But more important, we already have invested in a group of Hungarians who will install, operate and maintain the network. We believe these people are the real key to success. And each of us are working to achieve the same goal: *excellence in everything we do.*

At BANK 24,
excellence is an aspiration,
an attitude ...
a way of life.

And we carry this attitude into every aspect of our business -- from technology to customer service. We are determined to do everything we do somehow better than it ever has been done before. This means, we will build a network that will be unequaled in technology and reliability anywhere in the world. And yes in the process, we hope to help revolutionize retail banking standards in Hungary.

Ad-hoc Task Management: the Missing Link in Groupware

M. Wolf, F. Saatzer, wolf office team

This paper discusses the significance of ad-hoc task management as a key concept in state-of-the-art groupware. Existing concepts and tools do not provide sufficient support for this area. It will be pointed out in what way ad-hoc task-management differs from proven workflow concepts and why the topic deserves an investigation in its own right. A task-oriented set of requirements is presented which emphasises task distribution within a workgroup, dynamic priorities of individual tasks, and user-specific views of tasks within an organisation. Furthermore, a comparison is presented between the approach described and proven methods such as electronic mail and workflow. The paper points out how ad-hoc task management needs to be investigated more deeply and how important it is to provide tool support in this area. A tool is introduced which meets the requirements listed in the paper.

Keywords - ad-hoc task management, groupware, dynamic priorities, computer supported co-operative work

1. Introduction

The term *Groupware* or *Workgroup Computing* has never been completely defined by academia or industry. More or less any product or technology which can be used in some way within a networked environment is referred to as "workgroup-...". There are workgroup printers, workgroup network switches, workgroup-network-systems, and many more. However, a more restricted use of the term could lead to a deeper understanding of the field and, in the long run, to better computer support in the form of tools. While academia and industry very much concentrate on the issue of workflow whose underlying principles are well-understood and described by now and while efforts in the workflow community begin to focus on higher-level issues such as the standardisation of tools and the creation of interfaces between individual platforms, ad-hoc task -management is still lacking a proven approach which may be supported by suitable tools at all.

This is an extremely unsatisfying situation since in each and every organisation, be it a small company of a few employees or a department of a large corporation, there is a large portion of work to do in the form of non-structured ad-hoc tasks, which cannot be assigned to strictly defined workflow processes. Existing workflow concepts do not offer the kind of support which would be required and the mere exchange of information via electronic mail between members of an organisation is essential but simply not sufficient for the implementation of efficient and reliable task management. In order to reliably carry out a simple task such as "Please call Mr. Smith after he has returned from his business trip - he tried to reach me today and I don't know what he wanted" we would probably need at least three tools in a typical office environment today: electronic mail, some calendar tool (preferably with a reminder function) and some sort of filing mechanism, in order to keep track of the task at the desks of the persons involved. In such a situation there are two possibilities: either the person who triggers the task does not keep track of it because it is simply too cumbersome, whereas the person who is supposed to carry out the task is likely to forget it in the first place.

2. Ad-hoc Task Management vs. Workflow

The workflow-approach aims at automating the repetitive, structured processes within an organisation, which can be executed according to clearly defined rules. Workflow-systems very much focus on so-called transaction-oriented processes. A good example is order processing of some large company. In principle, each incoming order passes through the same points within the organisation, the sequence of required processing steps is more or less the same all the time.

A workflow system incorporates a model of the entire set of processes within the organisation. Ideally, the model holds the complete structural and process-oriented information of an organisation. Generally, a workflow system comes with two main components, one for defining structure and processes and the other one, the engine, for executing the processes. To this end, the engine interprets the organisational model and forwards an individual task to the next point within the defined process. Thus, an individual task (e.g. a customer order which was triggered by an incoming fax) passes through the respective points within the organisation. In this way the workflow system takes care of the organisational issue of *who is doing what in which sequence*. A process may be represented by a single document or an entire set of documents (in the case of order

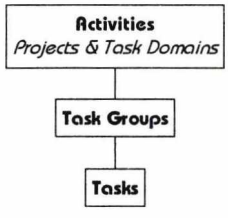
processing the customer's order, order confirmation, customs document, delivery note, ...)

Usually, the introduction of a workflow system requires a thorough analysis of the existing organisation. This, in turn, requires the tracing of each and every process through the entire organisation together with the tasks needed to carry out the complete process. The analysis of the existing structures may lead to some restructuring of an organisation.

Ad-hoc task management focuses on those activities (projects or permanent activities, respectively) which do not allow for any rigid flow definition. A good example of such an activity might be the project of a marketing department (e.g. organising a company's participation in a trade show) or key-account management by a team of sales people. The sheer number of tasks which need to be carried out in order to organise the participation in a trade show by a team cannot be carried out according to any predefined process. On the contrary, apart from a few special details such as registration with the organiser or the like only the project context lets you decide how and when to proceed with an individual task (who is to be called, when will the next project meeting take place....) The larger the number of tasks and the larger the team the more important it becomes to have an efficient mechanism at hand in order to keep an overview. However, in most organisations it is a common phenomenon that tasks which are not to be carried out in the context of some transaction-oriented processes often remain isolated on the desks of individuals without being linked to other activities and tasks within the organisation. But the main emphasis in task management should not be on supporting individual work, which is the goal of classic office automation, but much more on supporting co-operative work. In the field of ad-hoc task-management we also need to distribute tasks between team members and we need to decide on the sequence of carrying out tasks. In this aspect, ad-hoc task management does not differ from workflow-oriented concepts. However, we need to apply other mechanisms in order to get our work organised.

3. A Reference Model for Task Management

In order to be able to discuss the key aspects of task management we introduce a simple reference model.



At the highest level we place the *activities* which may be divided into two groups:

- projects
- task domains

A *project* is an activity which is carried out in order to reach a clearly defined goal. It is characterised by the fact that it starts and ends at defined points in time and passes through various phases. A *task domain* is an activity which is going on all the time without a defined termination.

At the lowest level we put the individual *tasks*. A task is an atomic (not-further-dividable) action carried out by a member of an organisation or team, such as making a phone call, composing a document (be it a contract or a written offer to a customer) or putting together some information for a customer.

In order to achieve a hierarchical structure it is a good idea to group tasks into *task groups*. This grouping can be repeated in a recursive way until you reach an activity at the topmost level.

4. Requirements for Ad-hoc Task Management

In order to implement efficient task management at an organisation the following requirements need to be fulfilled

- tasks must not be seen in isolation - each task belongs to a defined project or to some task domain within the organisation
- each person within the organisation must be able to see his or her tasks according to criteria defined by the user (urgency, priority, activities, ..)
- there must be an activity-oriented view: what is the status of a particular activity (which tasks belong to that activity, what is their status, who is in charge, who is participating,....)
- information must be reliably available to all persons within the team concerned with a particular

task. A team will work together successfully only, if each piece of information actually reaches all persons involved. This is particularly true, if some detail result is produced by a single team member. It would be more than annoying if a particular action is taken twice only because the relevant information does not reach all team members. It should not be necessary for persons concerned to be actively informed by some explicit information mechanism. Such information needs to be filed together with the respective task where it can be accessed by all team members. A one-time information sent out is not enough!

- The opposite requirement is that everybody within a team should actually see only what is relevant for his or her work. By keeping away unwanted (and unneeded) information everybody can concentrate more directly on the proper tasks. In a workflow system this concept is implemented in such a way as tasks are forwarded from one point in the flow to the next. Everybody "sees" only what is relevant to take immediate action. However, as we pointed out at the beginning, a work-flow system can cope only with such processes as obey rigid regulations.
- since tasks are not carried out in the context of sequential processes there need to be other methods for deciding on the sequence in which tasks are executed. To this end, information on the importance and urgency of tasks has to be taken as a means of establishing the priority of tasks within the entire set of tasks of an organisation.
- external documents need to be directly attached to ad-hoc tasks in order to have additional information readily available. The direct access to documents of all kinds saves time which can be used for actually carrying out a particular task.

Three of the issues listed above shall be looked at in greater detail:

4.1. Multiple Views

An essential quality of task management is the possibility to view information from two angles: on the one hand, there is the view on activities. A project manager or a department manager, for instance, will be interested in the current status of a project and the assigned tasks. The manager wants to be informed of the current status of each task and who is in charge of carrying out each task. On the other hand, each member of a workgroup is interested in his or her view as a personal cross-section through the entire pool of tasks.

Both these views should be a projection of exactly the same data in the task-management system. If the information on activities is separated from the information on tasks and if each team member

keeps his or her personal data on tasks, there will always be the danger of inconsistencies within the management system. Such an approach would require permanent updating and comparison between the task and the activity views.

4.2. Dynamic Priorities

Most people try to organise their work by bringing their tasks on their personal task list into a sequence which allows them to carry out each task on time. To this end, they assign levels of importance to their individual tasks such as *important*, *very important* or *not so important*. If we assume that the priority of a certain task tells us something about the sequence in which all tasks are to be completed a set of several fixed values is simply not enough to establish a meaningful sequence of tasks in which to carry them out.

Above all, we need to pay attention to how much time remains to complete the task. There is no reason why we should not complete a somewhat less important task before we actually tackle a more important one if there is still enough time left to do so. Therefore we need to pay attention to two other aspects. One is the due-date of a particular task the other is the estimated execution time.

If we take into account the three values - importance, remaining time, and estimated duration - we can calculate for each task an individual priority, which brings the entire set of tasks into a useful sequence. It is important to note that this dimensionless priority defines a sequence of execution for both the activity and personal views.

4.3. Keeping Track

An important issue in task management is keeping track of tasks, especially in terms of activities. Tasks are rarely, if ever, carried out immediately after the are defined. Tasks can either be scheduled for later execution, for execution within a specified period of time, or as background tasks, that is they should be executed as soon as resources become free. In this situation it is essential to keep track of such a task. In many organisations people organise their work by composing individual task lists which hardly meet this requirement.

5. Task Management and Electronic Mail

In the area of groupware, which is in general all kinds of software tools supporting co-operative work, at least one application has evolved which is widely used and contributes a lot to co-operative work: electronic mail.

Today, electronic mail is definitely the most popular and easiest-to-use to use groupware mechanism there is. An electronic mail system supports the transmission of messages, either *peer to peer* (that is, from a sender directly to a dedicated receiver) or *multi-cast* (that is to a group of persons, several receivers and/or several copies to others). The transmission is intended to either disseminate information, trigger some action, or request an answer/reaction.

If this electronic message is intended to invoke an action (Please call Mr. X) or pass on the responsibility to carry out an action (please complete the letter and send it to Mr. Y) we are dealing with task management.

First, the receiver has to take the new task into his or her own task management system (not an easy challenge if the own desktop is overloaded with work). In the most simple case one will transfer this new task in one's "personal" task management system, be it an expensive leather-bound Fil'o'Fax, or a simple task list created with the help of some word processing tool. No matter how efficient the system used, it is certain to exhibit some shortcomings:

- receiving and transferring tasks into the personal task list causes some effort and is unreliable.
- if a task cannot be carried out immediately (for whatever reason) it has to be kept track of for an uncertain period of time.
- tasks which are put on a stack of tasks to be taken care of later are in danger of slipping deeper and deeper into that stack until they remain uncompleted for good.
- the person who triggered the task will want to find out about the status of that task. In order to be able to do so that person needs to keep track of that particular task as well. The task is kept on stack twice.

The ideal situation is to define a task only once and then keep it in the task management system. Both the person who triggered the task and the „receiver" should stay connected to this single copy of the task.

This goal can be reached if the underlying mechanism is based on a data-base. Each task becomes an entry in this data-base and is linked to the respective activities and the team members who are in charge of carrying out the task. The main difference from a mail system would be that the transmission of information by putting it into peoples mail-boxes is done away with. The task together with its description and relevant parameters is put into a central repository with all team members concerned being linked to the task. In this way, each member of the organisation can compose his or her individual task list by simple database access.

This approach is, in a way, related to what a mail mechanism can achieve. By defining a task and putting it into a central repository and by attaching team members to that task each one can get the information (which are the tasks to which I have been linked to?) just as if the information were sent by mail. However, since the information about the task has not been distributed in the form of multiple copies, all the team members will access the original task and see its evolvement in the course of time. Electronic mail is a one-time piece of information, which can be filed or not by the receiver. At any rate, there is no linkage to the original task.

An optimal information flow would be implemented if task management is actually combined with some electronic mail. That means that each time a person is connected to a new task there is some automatic information that this connection has taken place. This will induce the person concerned to actively extract the relevant information from the task management system.

6. ContAct - CONtrol ACTivities

ContAct (Control Activities) is a data-base tool for the support of task management in small to medium-size organisations (teams, groups, departments, ...).

A workgroup will use ContAct for

- defining, maintaining, and archiving activities and tasks of all kinds,
- nominating teams and whoever will be in charge of carrying out tasks,
- attaching due-dates and levels of importance to tasks,
- attaching descriptions and status information, and, if need be, external documents,

- composing personal task lists sorted by dynamically computed priorities, in order to enable an optimal execution sequence for tasks by each team member,
- searching and filtering information, in order to access required information in a fast and reliable way.

ContAct contains all data for team members and managers to answer the question „who will carry out which task until what due-date". Each team member will immediately see which task is to be tackled next or which is the status of tasks being carried out. The approach in ContAct allows different views - either from the angle of a complete project (this is what the project manager is interested in: what status has the project reached?, which tasks have been completed, which tasks are still open?) or from the angle of the team member (which are MY next tasks, where are the priorities of my tasks?).

ContAct is based on a fully relational approach, in order to enable the linkage between activities, tasks, and teams.

7. Summary

We have attempted to show that ad-hoc task-management is an area deserving attention at a much higher level. A large portion of activities carried out in organisations of all kinds require a better understanding of the underlying principles in order to be able to introduce computer support. We have defined a set of basic requirements in order to be able to implement ad-hoc task-management. Presenting a special tool for task management we have pointed out how existing tool support in the form of workflow systems and electronic mail cannot meet all these requirements.

SAAS Municipial Management System (SAAS-MMS):

Integrated Information System for Municipial Governments

Dr. Erzsébet Lugosi[1]

Municipal governments are assuming major new authorities and responsibilities as a result of continuing and important social, legal, and political changes in Hungary, including, but not limited to demographic record maintenance, social welfare administration, local taxation. SAAS has responded to these changes by automating the key functions that municipal and district administrations must perform to fulfill their expanding responsibilities.

As part of a comprehensive municipal government automation program, SAAS has developed a Municipal Management System (SAAS-MMS) that significantly increases government efficiency by automating previously tedious, manual procedures. Using a system engineering approach, SAAS analyzed the entire administrative work of municipal government departments in a major local government and developed the SAAS-MMS as an integrated system composed of independent modules that handle critical government tasks, including document processing, demographic record maintenance, housing and public construction permissions and records, and financial administration. The SAAS-MMS uses an open architecture based on UNIX and runs on a variety of file-servers (Sun, Digital AXP, IBM RISC) supporting a distributed, heterogeneous (PC, workstations) architecture. The SAAS-MMS is designed to provide the user-friendly and reliable support so critical to sustain the high volume of work performed by the various local government administration offices.

Some important features of SAAS-MMS

- Integrated: SAAS-MMS is an integrated computer system composed of independent modules. The integrated system design ensures a uniform approach towards tasks. Other advantages include data base integrity, and efficient data base access and data handling from all workstations on the network.

[1] SAAS Kft.,Budapest, Hungary

- Modular: The system can be implemented in phases to reduce system cost and minimize disruption of local government work flow. SAAS creates a thorough system plan to ensure the delivered system is responsive to the priorities of the municipal government. There are two modules, the Executive Information and the System Functions modules which ensure the integrity of the system. The SAAS-MMS is easily tailored to provide the most important modules first. The system can be expanded or modified as user requirements change over time. There is almost no restriction for the implementation order of the following modules (but certainly exists a recommended implementation order):

- Document Processing
- Demography - Civil Registry
- Estate Matters
- Social Welfare Management
- Taxation
- Birth, marriage, and death Registration
- Inventory
- Executive Information
- Accounting and Finance
- Enterprise Registration
- Personnel records
- Technical Records
- Interface to Geographic Information Systems
- Public health and culture

- **Reliable database:** SAAS-MMS is based on ORACLE database which ensures the secure, reliable handling of large databases which exist at local governments.

- **Secure operation system:** SAAS-MMS runs on UNIX which is capable of managing a multy user environment very effectively.

- **High quality development environment:** SAAS-MMS was developed using ORACLE development tools. This ensures the transportability of the system to many different type of platforms.

- **Reliable:** SAAS-MMS is homogeneous, with a uniform structure uniting the independent modules. The system is rigorously tested before installation, with continued customer support.

- **Well-documented:** SAAS-MMS documentation is detailed to support user training and to ease system administration requirements.

- **User-friendly:** SAAS-MMS was designed from the viewpoint of the local government user, i.e., the system was defined by work to be done, and not the other way around.

Summarizing:

- There is a need in Municipal Governments for high quality, reliable software system developed using effective software technology
- SAAS has developed the SAAS-MMS, which provides a solution for Municipal Governments
- SAAS is open for recommendations how to distribute our system country-wide.

Structured Cabling: Installation at Category of 5th Level

Dr Nagy Ákos[1]

In the headline of this paper two special terms have come up: the structured cabling and the fifth level installation. Let see them one by one.

What thus it mean "structured cabling", the expression of this decade, what is shame not to know? The answer - the term itself - is very simple. The issue is, that by today the applying of computers at any workplaces is accepted, the work at most of these places wouldn't be realizable without computers. Maybe the computer network is also a similar evidence, even if we do not think of it in the most of cases. So, in the 50 - 70 percent of the average office workplaces, the electronics and the LAN, the local area networks, have won the battle. The difference between a clever leader and a dull one is that the clever sees the future. This is not an overstatement: what would be the planning, if not a kind of prophecy, "seeing the future"? We have to use that not only on the market, but also on areas of purchasing and investments within our enterprises. I mean, if we notice that the half part or more of our coworkers have become computer users in the last few years, we may well suppose the others also do so soon. If we notice that the half part or more of our offices have been supplied with computer network connections, we have good reason to believe that the other workplaces will follow them. Therefore, it is very reasonable - particularly if some moving or rebuilding offer good opportunity - to make our networks built up so, that every workplaces, at least potentially, can be connectable to one or more of the computer networks. So, we have to build up not unique terminations, but rather a network structure, similarly to the connectors of 220 Voltages in the office (where it is not an important question, whether each of them are used actually, or not).

Of course I know the counter-arguments, that the electric-network is planned and used by clever guys, who know something about unifying or even about standards. Based on that, I can buy safely an electric typewriter or coffee-percolator of any manufacturer, each of them will

[1] X-BYTE Computertechnics Ltd.

work surely, supplied by the existing connectors. The essence of this argument is clear, but there may arise some problem even in this field too, since at least two kinds of connectors and three kinds of plugs are used in our country (and then the other countries are leaved out of consideration). As we will see, the phantasy of the electric specialists is not so rich than the practical tricks of planners of data-transmitting hardwares. Some dozen of different connecting possibilities at the electric network seem to be nothing, compared to the cavalcade of data-transmittion systems. You can find here 50 Ohms coaxial cable, 93 Ohms coaxial cable, 75 Ohms coaxial cable (elder IBM systems), there are shielded cables for the V 24, twisted pairs and STP, and there is twinax what is not the same than the double coax, e.t.c.
And then there are BNC connectors, TNC connectors, data connectors and ADDO Stecker, DIN plug and D-Sub (cannon). I guess, this is just enough at first.

So, we can be impressed that the good leader has not only the ability to see the future, but is able to find an exact prophecy about the network at the planning of his office-building: what kind of computer system would be good to order? (Because ordering is essential, if he is a good leader, and he looks clearly, the way to the network is not the hardware-specialist colleagues who improve the PC-s well. No, Ladies and Gentlemen, the good leader knows exactly, that the network is a similar - or more - complicated thing, than the winchester, and its reliability is at least so important as the server's one. The good leader gives the work to pros, since he is also a pro.)

O.K., an order is existing. Order, but for what? What kind of network for? Kommt Zeit, kommt Rat! - Germans say, or a littlebit longer: "Where the needs are bigger, the help is closer!". Of course, in our case it is not philantropy! This is a business, a hard one. You can believe me - we are living from this.

Because what have happened in the largest institutes of telecommunication of the word, really? They have developed a universal cable type, connecting units and adapters so, that a complete system has been created. Then - because nowadays this is not enough to the success - they offer good money for advertising specialists for selling this extraordinary idea, all around the world. In this work (and research) the AT&T from US, and its research institute, the Bell Laboratories have got leading role.

For today they have had numeruous followers, as:

- Northern Telecom

- MODE-TAP

- Reichle de Massari

- ITT

- Siemens

- Bull,

mentioned only the most famuous ones. The IBM has taken over the system of Reichle, named as "ACS". (Advanced Cabling System, this name refers to the former name "ICS', the IBM Cabling System.)

Stop it! Stop it! - You could claim again; I promised a talk about a unified system, and in spite of that there is a terrible diversified collection in the air. Please, don't be discouraged, this is only a variety of names of systems. For example in this room we are also numeruous as people, but in the reality we are composed only from two parts: Ladies and Gentlemen. (There are cases with some uncertainties, but let them out of the picture.)

The situation is exactly the same. Essentially two different systems are existing today: the shielded and the unshielded one. Both of them practically use four twisted-pair cable for data transmission and RJ45 type connections. One of the gang covers this cable with a shielding foil, and is convinced that in this case the noise resistance and the electromagnetic emission features are better. The other gang lays the wire-pairs into a plastic jacket, and claims the same. Both sides bring a lot of measurements and test results from laboratories to prove its own truth, and to distroy ridiculous statement of the rival. I don't want to play the role of the judge, the X-BYTE's answer is: we can install both systems, the unshielded one will be installed by us according to the prescriptions and training of AT&T, and the shielded one will

be done according to the IBM's licence and education. The best way to decide this dilemma is, if we ask our clients what they wish. Personally I think so, that both systems have advantages and therefore the right to exist.

I guess, the expression "structured" has been discussed just enough. Maybe for the sake of a better understanding, let see the figure 1.

Figure 1: **CONSTRUCTION OF A STRUCTURED CABLING SYSTEM**

(1) Horizontal subsystem
(2) Administration subsystem
(3) Wall-mounted socket
(4) Workplace termination subsystem
(5) Backbone subsystem
(6) Equipment subsystem
(7) Interbuilding subsystem

After these let us see, whether what could mean the damned expression "category of fifth level"?

The next figure shows the development of twisted-pair cables in the last twenty years.

Figure 2.: **Development of the UTP**

(1) Date
(2) Application
(3) Speed of data transmission
(4) voice, phone

What has happened in the meantime? Why they couldn't communicate with higher speed already in 1975?
Well, the speed was restricted by two factors: the attenuation and the crosstalking. Both of them have been overcome by the development of technics.

These two factors are explained on the Figure 3., although it is hard to believe, they need explanation at all.

Figure 3: NEAR END CROSSTALKING (NEXT)

(1) weak received signal
(2) strong transmitted signal

* the best important LAN parameter
* small NEXT, big numeric value (e.g. 45 dB)
* huge NEXT, small numeric value (e.g. 20 dB)

ATTENUATION

(1) Signal-source
(2) Receiver

Figure 4 shows the features of a "good" cable, if we want it to use for a higher speed signal-transmission.

(1) Frequency
(2) Category
(3) Attenuation
(4) NEXT

Figure 5 explains, how the EIA/TIA standards summarize the cable types. (The EIA is an abbreviation of Electronic Industries Association, and the TIA refers to Telecommunication Industry Association. The abbreviation UL means Underwriter Laboratories.)

Figure 5: **Categories of the EIA/TIA**

Category 1: Function of this is the communication and energy-transmission. Requirement for capacity there is no prescribed in the EIA/TIA 568 standard. UL level is 1.

Category 2: This is a UTP with small capacity. Special applications are: voice and data at small speed. It is not detailed in the EIA/TIA 568 or TSB40. UL level is 2.

Category 3: Application: UTP cable with 16 MHz transmission caracteristics. Special applications are the 4 Mbps Token Ring and the 10 BASE-T.

Category 4: Application: UTP cable with 20 MHz transmission caracteristics. Special applications are the 16 Mbps Token Ring and low loss 10 BASE-T.

Category 5: Application: UTP cable with 100 MHz transmission caracteristics. Special applications are the 16 Mbps Token Ring, the TP-PMD and CCDI.

But here could come the big misunderstanding. Ladies and Gentlemen, do you think that there is sufficient to buy cable of Category 5, and the others of course, as wall-mounted socket, patch panel, patch cable, and by these units a network of Category 5 is ready to work with a TP-DDI or CDDI at 100 MHz? (Please, watch over that, these two nominations are brand names only, one of them is the CHIPCOM's, the other is the CRESCENDO Comm. Co.'s brand name.) But let's go back to the original question! Are we convinced, that the network know everything, what the dealer declares or what is guaranted by the purchased elements apiece?

So, as you know well, the answer is: NO! Because these elements have to be coupled to each other, and as we know from our system's technology studies, the whole is not only a simple summarization of its parts.

An example: on the next figure (Figure 6) you can see two RJ 45 connecting units.

Figure 6: RJ 45

(1) for multi-pairs cables
(2) for single-pair cables

These two types are similar, but just one of them is good for the multi-pairs cables, while the other is for the single-pair cables. An other thing: of course everybody knows that there is no branch in the network, what could be longer than 105 meters. What means 90 meters in the wall, 2 x 5 meters for the (supposed) swinging and patch cables, and 5 meters have to be counted down as cable equivalent for connections. An other evident thing is, that we not install used units, not only for the sake of our business reputation, but also because the used parts cannot guarantee a transmission of Category 5. As I told, these are evident, maybe there is no need to talk about them.

But there are more refined tricks, too! Let us see the cable, itself. As we know, it is composed from four twisted pairs, covered by a plastic jacket. The arrangement within the cable is, that the four pairs run on the four edge of a square. Well, but what is then, if a bend is needed somewhere along the cable? In the case of a coax cable we know well, that the bending radius is critical, since the too small curve destroys the geometry. But what is with UTP? You think, in this case everything is O.K., the cable can be bent free. Free? Please, let's see what happen within the cable at bending! (Figure 7)

Figure 7:

(1) in straight line
(2) twisted pairs
(3) in bend

It's clear, if in bend the cable is stretched, or if we don't take care with the bandage at the bend, the network will not refer as Category 5, since its geometry will not possess the supposed cable capacities. Even it could happen too, that immediately after the construction, problems will not come up, but after some years the cable will become flattened. Of course this is bad, because we build up a Category 5 level - and it is paid by the customers - with the purposes,

that during the next some years a larger transmission speed could be achieved. That is the reason, why a long-lasting guarantee and a reliable firm are important. The firm, which cannot allow itself to get bad reputation on the market. Because in the business, if somebody wants to achieve prolonged success for himself - and not a quick money-making -, the quality must be the first. At the same time, the quality needs a lot of additional works. Numerous oddments must be taken into consideration, and the people must trust in that, the investments will bring their interests. Now, we have fight for the ISO 9000 already since 7 months. The auditores will come soon. What to say? The invested money and energy were really considerable.

Every care and good advices enhance the chance. If you wish a Category 5 level, beside the guarantees and good reputation you have to demand the whole measurement of the network with the appropriate instruments. Today already there is such a portable tester, what is able to show at a single termination, whether is it passed the exam, or not? These series of measurements, proved by the instrument's protocol, are extremely essential.

As we have seen, the proper materials do not assure inevitably the appropriate results. It's enough, if a cable section is untwisted longer with some centimetres than the necessity (NEXT!), or if a connection is not crimped tightly (ATTENUATION!), or if the cable is stretched with too large strength in a bend (GEOMETRY!). In these cases the installator cannot achive only bad marks.

Obviously, none of you thought, that I can list the all professional tricks of this field within this short time limit, but maybe at now each of you can understand, why the X-BYTE had become so glad, when on some tuesday an entrepreneur called us, that he had to construct a UTP network of Category 5 level, with 20 termination on the weekend. He wanted us to teach him quickly to everything we knew, because he trusted nobody, except his own hand and team. Of course, we refused that.

!

Introducing Vision4networking

Elemer Toth[1]

Typically, a networking project is developed in phases that are similar to a general systems development life cycle, except that the "traditional" programming and conversion phases are not applicable in networking development. The modules of *Vision4networking* contain phases that cover one or more of the specific network threads.

The software product, Vision4networking, is made by the American Deloitte & Touche Tohmatsu International.

IDOM + Deloitte & Touche Tohmatsu International

IDOM is a dynamically growing and result oriented group of companies with a profile in information consulting. The leader of this group is IDOM[2] SA information consultancy based in Geneva.

Since 1993 the principal shareholder of IDOM is Deloitte & Touche Tohmatsu International (DTTI), which is one of the biggest auditing and consulting firms in the world. The cooperation between DTTI and IDOM is beneficial to both partners, since IDOM became the #1 solution provider in information technology services for DTTI in Central and Eastern Europe, and on the other hand highly experienced experts are available for IDOM provided by DTTI.

IDOM has a wide network of companies with more than 200 employees in 6 countries of Eastern Europe. Presently there are IDOM branch offices in Poland, Slovakia, Czech Republic, Slovenia,

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[1], Director of IDOM NIS

[2] IDOM stands for: Innovation et Développment en Organisation et Management (French)

Bulgaria and Hungary. There are firms operating in the USA, that belong to IDOM. Even in London, there is an IDOM office.

IDOM has not only achieved success in the area of information technology, but also became significant as a consultancy.

IDOM has been acknowledged by different national and international financial institutions such as Worldbank, PHARE and the UK Know How Fund.

IDOM Rt., based in Budapest, is the most significant member of the IDOM group as far as the number of employees and earnings.

The primary purpose of IDOM Network Integration Services (NIS) is to provide independent engineering and consulting services in the areas of implementing and operating computer networks.

The market operation of NIS helps

- integrate the equipment and services available locally into a network system (including the connection between customers and distributors),
- import the highest quality products of the international market,
- define the optimum level of expenses, such as the costs of acquiring, implementing, operating and maintaining a system, considering the customer's special circumstances,
- the professional growth.

4Front

Was developed by DTTI, it is being improved constantly and its methodology is being used in DTTI's business deals.

4Front versus SSADM

SSADM (which stands for the Structured Systems Analysis and Design Methodology) Version 4 is structured as follows:

SSADM Modul	SSADM Stages	Main document
Feasibility study	*Stage 0.* - Feasibility	Feasibility report
Requirement analysis	*Stage 1.* - Testing of the present environment	
	Stage 2. - Business system options	Requirement analysis
Requirement specification	*Stage 3.* - Requirement specification	Requirement specification
Specification of the logical system	*Stage 4.* - Selection of technical equipment	
	Stage 5. - Preparing the logical plan	Logical system specification
Physical planning	*Stage 6.* - Physical planning	Physical system design

Roughly:

- SSADM Stages 1 to 5 is equivalent to 4FRONT*designer*;
- SSADM Stage 6 is equivalent to 4FRONT*builder* Phases 1-5;
- SSADM Stage 0, Feasibility, is equivalent either to an individual project being developed in *Plan4development* or to 4FRONT*designer* Phase 1.

Advantages of SSADM

- it is free, although you do have to buy the manuals;
- it is well established, meaning that there are lots of education and consultancy providers available;
- the link between task and technique is much stronger in SSADM than in 4FRONT, which allows for a more rigorous definition of deliverables, quality criteria etc.
- there are several SSADM specific CASE tools.

Advantages of 4FRONT

- it covers the full development life cycle from strategy to implementation;
- it copes with package, bespoke and hybrid developments;
- it covers different life cycle models, such as RAD and Client/Server;
- it is designed as a multi-project and multi-system methodology, whereas SSADM is specifically single-project/single system;
- it is more flexible in implementation, being easier (at least in theory) to customise for different engagements;
- it is easier to accommodate existing standards and software;
- it provides more support both within the method (e.g. key considerations, exhibits, etc.) and additional to it (e.g. estimating guides, industry models, etc.).

4Front + Computer Assurance Services

Besides the 4Front methodology, DTTI has developed a new method, the Computer Assurance Services (CAS), which is able to follow the whole business operation of a company through the use of information tools (including the effects of a temporary or final failure of a piece of equipment).

4Front + CAS versus Vision4networking

The business contents of the exchanged information and its meaning for the participants in the network is not the primary focus for the network. The network infrastructure takes care only of the physical transmission of traffic between network nodes and "system data" such as record headers. However, specific content attributes which are necessary for correct information transport ("network data") are relevant in the design and implementation phases of the network.

Therefore, *Vision4networking* does not include activities that cover the establishment of the contents of information to be exchanged, since that aspect is covered under 4FRONT or 4FRONT *Client/Server Application Development and CAS.*

Definition of Networking

There are many meanings of the word "Network". *Network* in the context of *Vision4networking* refers to the network infrastructure that supports the flow of data, text, voice, images, multimedia and other information between users, information systems and office systems.

Network infrastructure includes:

- Communication-enabling applications and services (E-Mail, File Transfer)
- Value added network services (database access)
- Local and Metropolitan Area Networks (hardware and software)
- Wide Area Networks including transmission services (fixed and wireless), digital communications hardware and software (routers, switches, bridges, gateways)
- (Integrated) digital voice systems

Vision4networking

Networking in the context of *Vision4networking* refers to the **planning, design** and **implementation** of the network infrastructure or aspects of it, including the:

- **Business functionality** of the network: its strategic corporate objectives, user applications, value added services
- Network **technology**: architecture, competing technologies, transmission concepts, public versus private network, topology, protocols, bandwidth, network operating system
- **Operations management** practice: regulatory environment, network management organization, workflow management, vendor management, outsourcing, training
- **Procurement** strategy and **cost optimization** : value added network services, transmission services, telecommunications operators service level agreements
- **Performance optimization**: utilization, availability, connectivity
- **Network protection optimization**: continuity (availability and recoverability), integrity, confidentiality

A network could be planned and designed only to support basic needs (**increase internal efficiency**), but should also be planned and designed as a strategic asset, providing competitive advantage to the corporation (**improve external effectiveness**). In the latter case, the network should be more integrated with the business functions than in the first case and will be more complex and expensive.

The *Vision4networking* is based on the following path themes:

- Full Network Life Cycle Support
- Network Operations Management

    ⇒ Legal and Regulatory Environment

    ⇒ Management Aspects (Configuration and Naming, Problem Solving, Accounting)

    ⇒ Organization (structure, staffing)

    ⇒ Network Operating System

- Network Cost Optimization

    ⇒ Vendor Tradeoffs

    ⇒ Tariff Anomalies (standard versus customized)

    ⇒ Hub and Node Locations

    ⇒ Multiplexing

- Network Performance Optimization

  ⇒ Delay - Response Time

  ⇒ Utilization/Throughput

  ⇒ Availability (uptime, backup and recovery)

  ⇒ Connectivity and Access (sites, hubs)

- Network Protection

  ⇒ Auditability

  ⇒ Robustness

  ⇒ Connectivity and access

  ⇒ Non-repudiation

  ⇒ Redundancy

  ⇒ Trusted domains

  ⇒ Stability and Availability

  ⇒ Trust of End Points, Paths and Nodes

Support of 4FRONT *Client/Server Application Development*

Vision4networking supports the complete development of networks, from planning (*Plan4networking*), through design (*Design4networking*) and implementation (*Implement4networking*). All *Vision4networking* modules can be applied individually.

Vision4networking supports development of data networks, voice networks, and hybrid networks. For data and voice information types, a dedicated support library of reference templates and diagrams, checklists and expertise concepts and techniques is available.

Integrated Library System and the Internet

Maria Vajda
Product Manager IQSOFT Intelligent Software Co. Ltd

Recently there are major changes in two fields of library automation. On the one hand, the range of documents which can be catalogued widened due to new technology (multimedia tools) and that changed the quality of cataloguing as well.
As multimedia tools became widespread, electronic magazines, digitalized music and full-text documents appeared beside traditional printed documents in library catalogues. Good quality picture archives, which are even capable of storing whole collections, can be retrieved and displayed at desk-top workstations.
The catalogue is an integrated repository of multi media information. Typical media types can be handled as:

- Books
- Serials
- Videos
- Sound Recordings
- Full Text Documents
- Images
- Community Information
- Networked Information - eg Word-wide-web pages, Gopher services etc

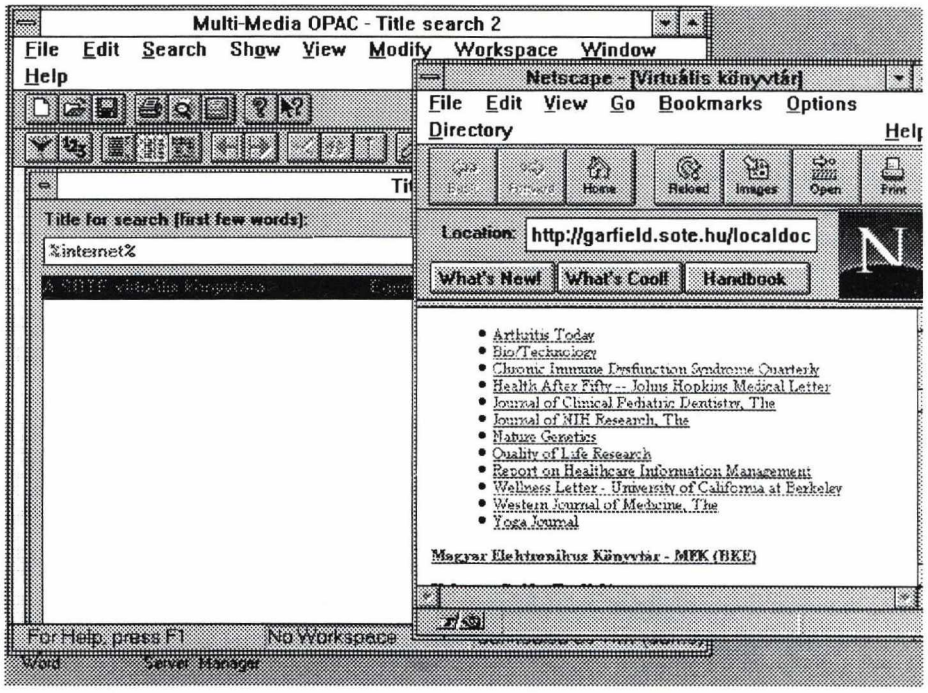
The ability to store and inter-relate these different information types in a unified catalogue adds new value to the information and to the service that library can provide.

On the other hand, the number of electronic and multimedia catalogues which can be accessed from one single workstation quickly increases.
Integrated library systems integrate the resources of the worldnet - thus creating virtual libraries which can be treated as one unified catalogue. This might solve the much debated problem of divided or union catalogue.

Using internet resources raise a lot of questions in the topic of standards, copyright, different character sets , etc.

ANSI Z39.50 is an international standard who's purpose is to provide a standardised enquiry mechanism to databases on networked computers. It is an open mechanism to query heterogenouse libray catalogues.
Technically speaking Z39.50 is an application protocol which allows one computer system (the 'client') to search and retrieve information from another computer system (the 'server'). It is a standard, enabling a single client to retrieve information from databases different types in a consistent way.
It contains several possibilities, at implementation has to decided which functions'll be used as relevant. This gives the so called 'Profile'. Only systems with the same profiles can communicate each other.
For library systems there exist a profile for search and retrieve.

In the crowded marketplace there is an up-to-date integrated library system : Oracle Libraries.
It is more than a standard library housekeeping system. Any type of information may be stored and retrieved, including full text as well as multi- media information. In the same way that the site may be catalogue internally created documents, they may also catalogued internet documents.
The information on the internet is linked into context with local material and retrieved easily via end-users :
In example below after the title search in the library system, we access the linked www page from the internet on site. It enables the user access to the library's store of information and provided an in-context gateway to other information sources.



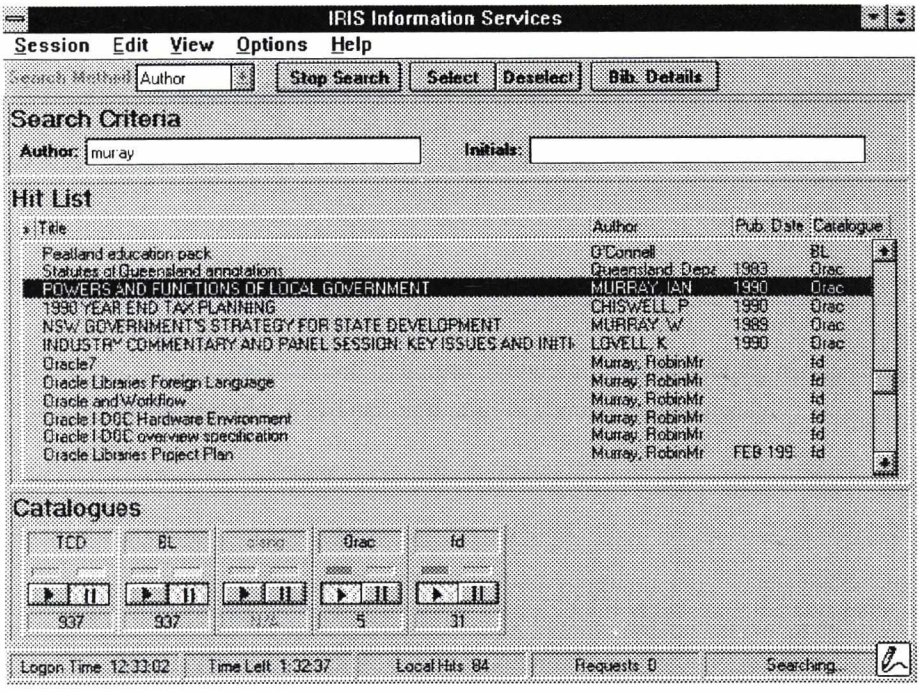
The librarian can link in the catalogue the entries of different type and location of documents. For example, search on 'archeology' may retrieve books on archeology, images of archeological dig and internet resources of archeology.
A million new users a week are accessing the internet, which is not only vast but includes information of varying quality and usefulness, hence the familiar "trash or treasure".

A typical mission statement for a library or information service might be :

'To provide access to the widest possible range of recorded knowledge'.

Oracle Libraries enables the information as if it was stored in the own library.
Tipically the server system will be the holding a library catalogue.
Whitin the WWW the client (eg. Mosaic or Netscape) is 'dumb' - it knows nothing about the information it is displaying. It displays information exactly as the server tells it to, all intelligence is at the server end.
If the user queries two separate library web server sites information will be displayed differently from each. There is no possibility of the client using the information passed to it for further activity. The WWW offers tremendous potential for offering wide area library services, but does not offer any capabilities for any real interworking between libraries.

The concept of distributed system is one where data and services may be provided from many different places, but to the user it appears as a single logical system - that is the phisical distribution is completely hidden. This model is highly applicable to the library world where already exist a collection of on-line catalogues.
The first example of such a distributed library service is in Ireland, named Oracle Libraries IRIS module.



It allows the users to enter a search once and transparently search catalogues parallely six of the best library in Ireland.
The user's single search transparency initiates a Z39.50 conversation with each catalogue. Z39.50 removes the heterogenity of interfaces, search mechanism etc. and

the results collects into a single result list. Having found an item of interest the user may request a document delivery and the item is dispatched to them.
Z39.50 should be implemented at the heart of almost all library functions not only for OPAC.
It allows new models of library service, allows small manageable and specialised phisical catalogues to be created and see them as one huge logical database.

CIM - The Next Decade

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Abstract. *Changing market influences force more and more companies to use new promissing strategies such as Computer Integrated Manufacturing. In this connection the integration of technology, organisation and personnel comes in the centre of interest. The increasing importance of personnel in the field of CIM leads to an intensified attention concerning the training of employees, students and pupils int the next decades.*

Key Words: *CIM, qualification, CIM-laboratories, model factories*

1. The focus of CIM

August-Wilhelm Scheer [4] characterizes Computer Integrated Manufacturing as the integrated information processing for operational and technical tasks of a production company.

Recently definitions of CIM do not only consider the CIM-system as a component of the production area, but also the integration of the company into its environment.

CIM as a rationalization strategy has seen a semantic change. CIM is not only the computer aided integration of different operational function areas, as it is often done in companies, but is often equated with a change of structure of the organisation. Therefore planning a CIM-system does not only mean to solve technical problems, but also the integration of technology, organisation and personnel.

Unfortunately, companies do hardly pay attention to this integral co-operation between technical, organisational, and personal aspects. Technically oriented rationalization perspectives and not the staff

members are in the centre of the planning. The secret of successful and integral planning especially lies in the coordination of technology and personnel.
Whether it is possible to plan and realize the triad technology, organisation, and personnel in an integrated way depends on the qualification of all participants. The qualification of staff members does not only gain in significance because of the new production technologies, but also by the use of new forms of organisation in the company, which are required by the new technology.

The centralized and taylorized organisation with a consequent division of labour is going to be replaced by decentralized and qualified production work as a consequence of the changing market requirements and the new technologies. Qualified production work is characterized by a small functional and professional division of labour. A production island represents a typical concept of a qualified work structure. Decentralized solutions in contrast to technically oriented concepts take the limitations, respectively the limited efficiency, of technical solutions into consideration. Only technical solutions in connection with qualified staff members will lead to the desired effects such as an increase in productivity and flexibility.

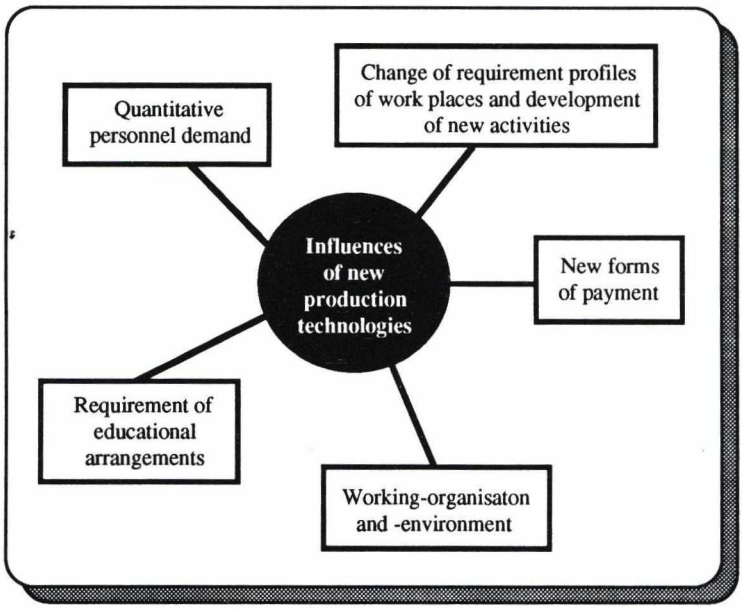

Fig. 1. Influences on the triad

2. Changing influences on production companies

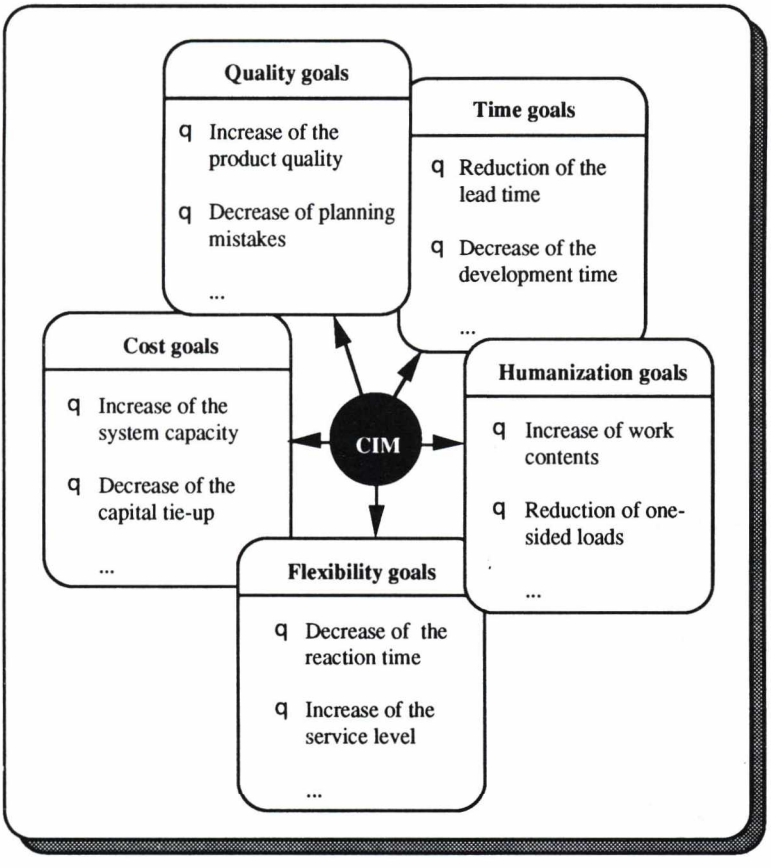

Fig. 2. Goals of CIM

The transformation of the market from a selling market into a buyers' market leads to major changes in a substantial number of companies. These changes can be devided into the following two groups:

- external changes = changes of the market
- internal changes = in-house (internal) changes

As a result of the higher international competition and the rapid technological change the product life cycle is getting shorter and shorter. Customers also demand a shortening of delivery time and higher reliability.

On the other hand, the most significant changes inside the company are the intensified use of electronic control mechanisms for machine tools or whole production systems, the increasing use of electronic data processing, the expansion of known production processes and the development of new ones.

For the reasons of these heterogeneous influences the companies are forced to produce goods of a high technical standard in small quantities and in numerous variants. One strategy to meet these requirements is to implement a CIM-system in the company. CIM-systems support the following goals shown in Fig.2

If it is possible to reach so many goals with one strategy, the question, what CIM really means, arises almost automatically.

3.The need for new qualifications

After a survey about the demand of the increasing employee qualification the question arises which qualification requirements are relevant when a company decides to implement a CIM-system.

As mentioned before, the use of more and more complex information and production technologies and the installation of new organisational structures lead to an increasing demand for qualified employees. To a high degree this is true of the characteristics which enable staff members to independent and technical acting and to an intensified co-operation and communication between employees. Expensive and complex technical systems require fast diagnosis competence in order to find the reason for a breakdown, to eliminate it quickly and to ensure a departmental overlapping co-operation between different employees.

It is remarkable that at the establishment of new technologies, and therefore also CIM-systems, the demand for functional and extra-functional qualifications are dependent on time [1].

The importance of functional qualification increases with the use of the new technology. However, extra-functional qualifications or key qualifications are more important during the planning and installation phase, because employees must be prepared for new requirements such as independent and technical acting. They enable employees to really use their specialized knowledge.

Therefore these qualifications are especially important for a CIM-implementation. They are responsible for employee's acquisition of that acting competence, which is closely connected to the

expansion of the decision and acting margin. As a consequence the personnel must obtain a general view of the existing production connection and of the new reorganisation by training arrangements.

A complete acting competence, which is the basic requirement for the professional acting ability, consists of a specialized, methodological, social and learning competence [1].

The specialized competence can primarily be assigned to the functional qualifications and the social, methodological and learning competence to the extra-functional qualifications.

Qualifications about profession, equipment and data processing are integrated in the specialized competence. Therefore these qualifications enable employees to handle machines and equipments in an efficient and secure way. The teaching of knowledge, which is not limited to tasks of one department, gains in significance. Here the close connection to other competencies like the methodological competence can also be seen.

The ability to think in an abstract, systematical and logical way, as well as the planning, decision and problem solving talent are integrated in the methodological competence. A well trained methodological competence is especially required for the systematical search, identification and elimination of faults.

Social competence is the ability to notice ones necessity to work in a co-operative way, to also articulate complex facts and so on. Therefore it is the basis of a departmentally internal and departmentally overlapping co-operation in a company. This departmentally overlapping co-operation grows on the basis of the increasing complexity of the production and information technology. Social or personal abilities like the co-operation and communication talents are not directly teachable. These abilities must be acquired by sensibilization in a group learning process.

The ability to get qualified and the willingness to understand the professional activity as a permanent learning process is meant by learning competence. On the basis of the rapid changing qualification requirements the learning competence gains in significance.

4. Training actions and consequences

New demands for the qualification actions

Based on these facts, listed before, the following demands for qualification actions can be identified: The structuring of the learning methods has to occur in such a way that it stimulates the motivation of the learner.

•The learning contents must not only comprise the understanding of the functions but also the procedure. By that means the ability to think in a more flexible way, to analyse and to solve problems can be improved.
•The use of specific forms of organisation for learning purposes shall intensify teamwork and therefore also increases the social competence.
•The working material should help to teach both specialized knowledge and strategies for problem solving.

Key requirement for the correct and specific structure of qualification actions is a thorough knowledge of qualification demands, which can be identified centralized on the basis of organisational data or decentralized on different internal planning positions.

Formation of training groups

In order to be able to offer employees an overall qualification, they should be comprehended into homogeneous training groups. In this manner both an individual adaptation of the learning depth respectively of the training unit to the group and the training at the right time will be enabled.

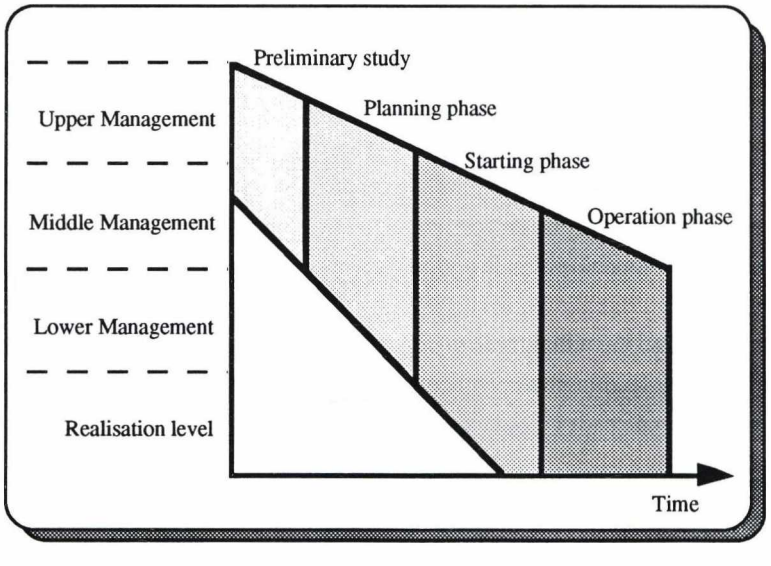

Fig. 3. Qualification arrangements dependent on the time

As it can be seen in Fig. 3 the qualification of the personnel should occur from top to bottom. During the first stages, that means in the preliminary study and in the planning phase, the upper hierarchical

levels should be trained primarily, whereas during the starting and operating phases especially the lower hierarchical levels should be educated.

However, there are not only differences in the timing of the training demands of the single training groups but also in the training and learning contents.

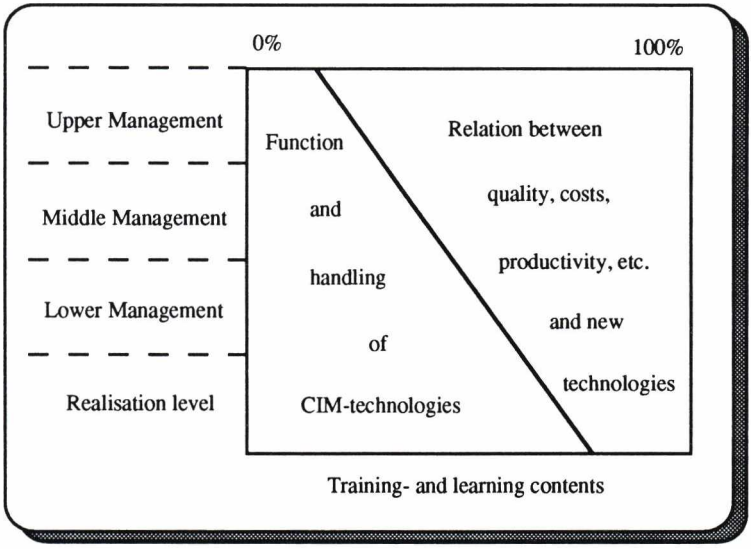

Fig. 4. Differences in training contents

At lower hierarchical levels the function and use of CIM-technology is most important, whereas at higher levels the individual and economic effects of the technologies are placed into the foreground [3].

Extensive training program

A training program can be called extensive if it offers professional knowledge, the basis of data processing, system-specialized knowledge, departmental overlapping knowledge and social qualifications.

A modular structure of the single training units seems to be optimal for the realization of such a comprehensive training program and the individual adaptation to the different training groups. Thus the timely and technical co-ordination of training priorities on single learning and qualification goals can be granted.

For a well designed and balanced training program it is important that there also exist the possibility to gain practical experience with the new technology besides theoretical training. Neither an exclusive practical training (corresponds to learning by doing) nor an exclusive theoretical training can be seen as adequate for an extensive training [1].

Motivation for and during the training

The motivation of employees for and during the training is a further requirement for the successful realization of a training program [1].

+Motivation during training and continued education
It is for instance possible to increase the motivation of learners or to avoid a passive behaviour of participants by the use of specific learning instruments. Enclosed audio-visual supported lecture methods like videos, transparencies and especially simulation programs and CIM laboratories are particularly appropriate.

+Motivation for training and continued education
Because employee training only makes sense, if employees are prepared for it, it is not enough to motivate staff members with a well-organised course structure. Rather it is important to make the way to a higher learning competence palatable with a financial stimulus, with an exemption for training, and so on.

Training environment

First of all the room where the training takes place should correspond to the above mentioned requirements. Second, it is profitable for a company that it falls back on both external and internal training actions, especially if they want to use a CIM-laboratory for training purposes. By that means it is possible to avoid high costs of an exclusively external training and the danger of a "company blindness" by using an exclusively internal training and to benefit from the advantages of internal and external training (like an exchange of experiences, the use of different learning facilities, training on the job, the consideration of specific necessities,...).

5. Systematization of CIM-laboratories from a technical point of view

Because organisational and technical innovations need highly qualified employees and because there are only few people on the labour market who correspond to these requirements, companies have to

care for an individual internal training or they must claim the assistance of external training centres. On the other hand such training centres like universities and technical colleges should try to decrease this lack of qualified people on the labour market.

Traditional professional training and internal training contain a premature specialization, a poor consideration of tactical activities and a concentration on manual work like the item machining. Furthermore, such trainings do not emphasize enough methodical thinking and planning. As a consequence of these wrong training priorities and because of starting the training too late, employees are overcharged. This fact in connection with a modest problem solving ability and a limited social competence of staff members can lead to serious problems for a company. The desired increase in productivity would for instance not be possible due to reduced capacity and higher idle times [1].

On the other hand the education at universities is concentrating exclusively on teaching theoretical knowledge by frontal instruction. Therefore the collection of practical experience and the transformation of theoretical knowledge is not possible for students.

In order to overcome these deficiencies the simulation on a physical model has proven to be a useful learning material to decrease training and education deficits. In this way action and production oriented transformation of technical education is possible. And by that approach a systematic instruction of key qualifications could be realized.

Simulation models, which can be used to reproduce CIM-Systems, can be subdivided into two categories [5]:

+Mathematical simulation models = computer simulation programs

These are programs which mainly represent parts respectively special machines of a CIM-factory and which run off interactively with the user of the program. It is possible to simulate different operating runs by changing the parameters.

Up to now computer simulations belong to the conventional concepts of a technological information and communication training, which can be designated as an action oriented instruction. Therefore computer simulations make the instruction of technical facts feasible, but demand an abstract intellectual power and do because of their model character not provide a production oriented training. This is the reason why they cannot go beyond the level of the symbolic representation. Accordingly, giving the feeling of a real production as a product and production oriented activity, which also stimulates the practical knowledge, is not possible.

+Physical simulation models = model factories

They are characterized by an extensive objective correspondence. In order to limit the modelling effort, simplifications during the development of the model are a prerequisite. Like computer simulations, this kind of model is often used for planning and checking systems if the direct examination of the real System is too expensive or too dangerous for training purposes. Recently more and more miniature or conventional industrial machines and robots, which are integrated by information and communication technologies, are used for these CIM-teaching purposes.

Model factories can be divided into two categories:

Miniature (toy) factories

Miniature or toy factories are CIM-factories on a small scale. These factories are made of a construction set from Festo, Lego or similar firms. On the basis of the use of miniature machines the limited space consumption is one of the fundamental characteristics. This limited space consumption does also result in an excellent clearness over the system and represents for that reason the essential difference to the real world systems. Another characteristic of these factories is that they focus on the integration of as many CIM-components as possible. On the other hand employees often find it difficult to accept these miniature factories because they view them as a toy.

Real world approach

Unlike miniature factories the spare demand for real world factories is much higher. Conventional industrial NC, CNC, DNC machines are used to build such factories. Real world factories can be divided into two categories:

- Real process chains adapted for teaching purposes
- Real full scale factory adapted for teaching purposes

Real process chains adapted for teaching purposes

Not the integrated order processing from order reception to dispatch is in the centre of interest, but the realization of single CAD/CAM process chains. Flexibility is probably the most important advantage of these solutions. With such a model factory it is possible to solve different problems and to remove or assemble process chains without influencing other parts of the model factory.

Real full scale factory adapted for teaching purposes

Real full scale factories focus their attention on the entire integration of conventional industrial systems and machines. On the one hand this kind of model factory has the advantage of a realistic demonstration object by the use of real machines and therefore a high acceptance of employees. But on the other hand the costs for the implementation, operation and maintenance of the factory are extremely high and as a consequence these factories can hardly be financed.

6. Conclusion

Different countries have tried to eliminate the problems of employee-, engineer- and student-qualification in the CIM area by setting up model factories. It depends on the intention of the training centre, which kind of model factory is taken. If the idea of a complete integration should be in the centre of interest, the miniature and the real full scale factory are most qualified. If in contrast to this special attention should be given to the flexibility of the system.
But in principle it can be said that the realized model factories are almost exclusively used as demonstration objects and that until now significant pedagogical frame concepts are missing. From our point of view an establishment of such model factories is only practical, if not only the implementation of the system is planned carefully, but also the later use for training purposes.

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Powerful Recognition Technologies for Automated Input, a Successful Global Company

Ákos Reszler

During history two revolutions have radically changed human society: the agricultural revolution and the industrial revolution. These days, a third important revolution is taking place: the information technology revolution in which LAN and WAN contacts between inexpensive PCs are an everyday practice. CompuServe and Internet have already become an ordinary working tool for more and more users not only in the developed industrialized countries but also in the Eastern part of Europe. PCs connected to each other enable the management of various processing tasks in a "Workflow" which mainly means the processing of different documents. At present, the majority of documents are not yet in electronic form. This fact provides solid ground for the ever-growing popularity of imaging applications. Imaging applications used for processing printed textual information are based on the OCR (Optical Character Recognition) technology. Recognita Corp., with its proprietary product, the result of its own development, has acquired a strong international reputation in this field. With an installed base of 400-500 thousand Recognita products, Recognita Corp. is the only Hungarian firm that has succeeded in selling its software product in mass volumes all over the world.

The Technology

Optical character recognition always starts from a digitalized image. For the digitalization of printed information (image, drawing, text) an ever more popular device, the scanner, is used. Scanners can also be found in such everyday machines as the copier or the fax. Being a special image processing tool and using digitalized image files as its basis, the OCR technology is closely connected to scanners. The evolution and growing popularity of scanners create market opportunities for OCR technology on the one hand and on the other, the effectiveness of high- standard OCR products also boosts demand for scanners.

Recognita's character recognition technology is based on a so-called contour-analysis method. The company's algorithm developers, who have been working on this technology for nine years, have achieved that the OCR technology used by Recognita products provides an accuracy of approaching 100% in recognizing texts typed or printed in more than 80 languages of the world. Considering the diversity of European nations and the variety of languages spoken in this region, this multi-lingual approach is of highest importance. In the new era of information technology, such a tool is a must for the efficient processing and preservation of the cultural heritage of all nations. The OCR, being an essential tool for automated input, is integrated in complex systems in many areas. Such systems are: automated document input, archiving and retrieval systems, various fax and other telecommunication applications, etc.

The program, using contour-analysis technology, looks for black shapes in the given territory, if found, it moves around their edge, compiling important information and recording features arithmetically. The characters recognized with 100% are stored as samples. The Recognition process uses data obtained from the analysis of not only one but several characters making these statistical data more and more exact and reliable. In a second recognition phase the samples collected during the first recognition process are compared to the less certainly recognized forms in order to further increase accuracy. In cases of uncertainty, the technology analyses the context of the characters. Since the information used for recognition is independent from the size and more or less from the type of fonts, this technology is called omnifont. Of course, the reliability of recognition depends considerably on the quality of the images to be processed.

The Company

OCR research began 9 years ago at SzKI (Computer Research and Innovation Centre), one of the biggest Hungarian information technology institutes of that time. SzKI gained an international reputation with its results in developing the MProlog programming language and artificial intelligence research. Image processing had primary importance in military and space research projects. In 1989, when substantial changes took place in Central Europe, favourable economic opportunities evolved first of all for companies with foreign participation. The Hungarian laws provided for long-term tax allowances - mainly in the areas of strategic importance such as software development - so encouraging the establishment of joint-venture companies. SzKI, among several other Hungarian companies, decided that while maintaining their majority ownership, they would establish a few joint-venture companies. Recognita Corp. was one of them, established as a British-Hungarian joint -venture share company. That period was characterized by:

- a favourable political and economic environment,
- a marketable OCR technology,
- an emerging OCR world market,
- few competitors and modest competition.

Strategic decisions on product development, marketing approach, market building and structural changes had to be made for the long-term to allow the company to become "Global". The specific objectives were:

- to achieve at least a 10% share from the OCR world market,
- to build a world-wide distribution network,
- to establish subsidiaries in key markets, i.e. in Germany and the US,
- to achieve a proportion of export sales exceeding 70% of total sales.

Considering the six-year operation of the Company we can say that all the above objectives have been attained. The Company's share is 8-10% of the world market and 30-40% of the European one. By achieving such shares in the world market, the Company has become globally visible which provides a solid basis for its long-term operation. Its share of the European market ensures dynamic progress. Recognita products are sold in 31 countries through 36 distributors. A subsidiary was established in Germany in 1990 and in the USA in 1991. 90% of the consolidated turnover of the group of Recognita Companies originates outside of Hungary.

In the meantime the ownership structure of the Company has been changed. The shares of the founding British company were obtained by a venture capital fund, the Hungarian-American Entreprise Fund (HAEF) and later also the shares of SzKI were acquired by them. At present, HAEF holds 75% of the shares and 25% is held by Hungarian private persons, namely the management and employees of the Company.

The Products

Recognita Plus 3.0 offers fast, accurate, font-independent OCR, using Self Assertion Technology (SAT) and dictionaries. A Proof-And-Train module permits training after recognition. Proofing is made easy by verification from image. Up to 80 languages are recognized, also fax, barcodes, checkmarks, hand-written numerals and dot-matrix text.

Object linking and direct connections speed data transfer to target applications, greyscale scanning, auto-brightness and auto-deskew give image optimization. 140 scanners (+TWAIN) are supported. Page decomposition can be auto or manual.

Recognita Select 2.0 meets moderate, less complex OCR needs of users at the high level of an MS Windows platform. This software also recognizes 80 languages. Processing daily business correspondence is the key application field of this software. It supports a good range of scanners, most of them through the standard TWAIN interface.

Recognita Form 2.0 reads data from forms by OCR, ICR, OMR and barcode technology. Forms are read into databases with up to 255 datafields. A Windows screen interface and toolbar controls shorten training time for operators. Description is separated from processing, which therefore does not need specialist operators.

Automatic processing and manual intervention are available. Recognition can be multi-lingual, from typewritten or dot-matrix text, barcode, checkmark and hand printing. Data transfer and linking are enabled through OLE 2.0. Output to MS Access, text formats or commonly used databases through ODBC is available.

Recognita Card is a time-saving business card reader program which uses OCR technology. It scans at 400 dpi in eight greyscales from most card scanners or any TWAIN flatbed or handheld scanner. Vertical cards can also be read; brightness and threshold controls are automatic or manual.

Information is entered into an internal database, where records can be scrolled, searched, sorted, compiled into lists, filtered, printed or exported to ASCII formats and Contact Managers. Cards can be scanned on the move, and then processed later.

Recognita DTK includes the core of Recognita Plus 3.0 which is available for integration into a wide variety of application programs. This Recognition Engine uses a Self Assertion Technology to deliver extremely accurate recognition together with sophisticated page layout decomposition.

The basic application layout making use of Recognita's OCR services is a client-server type. This means the OCR library contains a communicating interface program that exchanges messages with the OCR processes running in the background. Routines in the C /C++ language can be invoked in order to tap the functionality of Recognita Plus. In the Windows environment Visual BASIC and Turbo Pascal are also supported. The DTK contains more than 150 entry points (functions).

Biometria is a software product for use in the pharmaceutical industry. It is specially designed for assaying the activity of antibiotics which is an essential phase of drug production. The quality control function performed by this product uses the Agar-diffusion assaying technique.

The program automatically measures the diameters of the inhibition zones, makes statistical calculations based on the Latin square experimental planning applied on variance analysis and enters the results and related data into data bases.

The Markets

Recognita products are distributed all over the world. Recognita's recognition technology can read almost all Latin-based languages and also Greek. Such languages are spoken in many and different parts of the world providing market opportunities in India, Australia and Japan alike. We aim at further enlarging the language choice; the next step is to integrate Cyrillic recognition into our products. By also offering this language, a new and potentially large market opens up for our company. In addition, we are closely watching research results in the field of Arabic, Chinese and Japanese language recognition.

Distribution Methods

Our products are sold in the following ways:

Packaged Software Products

Recognita's "off-the-shelf" products are sold through an international distributor network, following the distributor-dealer-end-user channel world-wide.

Technology Transfer

Recognita Development Toolkit, a tool for technology transfer, allows us to license the recognition technologies themselves to system integrator companies engaged in developing complex solutions with an OCR and other recognition capabilities.

OEM (Original Equipment Manufacturer) Sales

Recognita's state-of-the-art packaged products with selected functions are sold in bulk to scanner manufacturers as OEMs who sell them together with their scanners. OEM sales are important from a marketing point of view, helping our product to reach customers who will have met an OCR program for the first time in their lives. Hence it is a Recognita product which makes them aware of the advantages of this technology. This clientele of end-users provides us a substantial market-base we can aim at when marketing Recognita's fully-fledged products.

Competitors

Recognita is among the best OCR companies in the world, only a few US companies with huge capital reserves are ahead of us. More than 50% of the world's OCR market is dominated by the Caere Corp. The other big competitor is Xerox. Due to the technology applied by the competitors, however, their products can recognize only 16 main ANSI-based Western European languages. None of the companies can compete with Recognita's polyglot approach.

Development Trends in OCR Technology

OCR technology seems to be nearing the limits of its possibilities. Virtually 100% accuracy can be reached with good quality input documents and use of training can augment this result. Telecommunication and information superhighway trends are gaining momentum and special emphasis is being turned toward recognition of degraded text and the same is true for processing documents from large archives. The quality of documents in archives are usually low. Recognition of such texts cannot be based solely on character recognition. New trends progress in the direction of using linguistic redundancy, recognition not of characters but groups of characters or words, N-grams, etc.

Another important field is the recognition of hand-written characters. Thanks to the diversity of human characteristics, customs, cultures and languages, researchers and software developers will have a lot of work to do for quite a long time in this field.

These elements constitute significant parts of Recognita's development strategy. We have succeeded in developing universal recognition of hand-written numerals based on samples from many countries. Close co-operation has been developed with Hungarian and foreign researchers and software developers leading to the development of powerful recognition of hand-printed characters.

Our everyday life is more and more standardized, the requirement for affordable yet powerful form recognition is moving from the level of banks and statistical offices to the level of small businesses. Recognita's brand new form layout analysis and processing technology meet this challenge. Our pioneering products in this field provide new market opportunities and perspectives for Recognita, earlier famous only for page recognition OCR products.

Developing a complex network management system at the University of Budapest (BME) and the University Association of Budapest (BESZ)

Endre Sára, Belá Várkonyi
Centre of Information Systems (TUB)

1. Objectives and purpose in network management

The computer networks at the educational and research institution have been developing for many years now. The need for network management was getting stronger as the networks were interconnected, and the international connections were established. Large improvements have been planned for the network of the BME and BESZ. The subnetworks and organizations has been connected to each other through a FDDI ring in the scope of FEFA 652 project. This unique, high-speed and complex MAN network has been built with the existing interuniversity network (FDDI) and with the internal FDDI ring of the BME serving more than 20.000 users all over the universities of Budapest. New structure of the Internet connection will be built, and one of the important parts of the boundary system has been placed at the BME. The speed of these networks is much higher than speed of the existing ones. [1]

The University Association of Budapest was established to improve coordination in problems like setting up a common internetwork. The BESZ consists of the following universities: Technical University of Budapest, Budapest University of Economic Sciences, University of Veterinary Science, University of Horticulture and Food Industry and the Government Administration College. The Technical University of Budapest and the Budapest University of Economic Sciences were already interconnected trough the interuniversity FDDI ring, but the other universities had no usable connection to other educational institutes and to the Internet. [See attached Schema 1.]

Some of the main elements of this development is the managing equipment and the maintenance rules of such a network. We pursued studies on the network management

possibilities for this network. In the scope of the FEFA 652 we want to work out the structure of the network management system and to find the needed equipment considering the complexity of networks and the planned functions.

In the FEFA 652 project we are concentrating at the weak points of our previous management. We have to develop our fault management system and enhance it with a good trouble ticket system. We had problems at the client contact point, so we establish a software aided helpdesk system to help operators' work. We are going to develop our change control system with preparing fault statistics and preliminary maintenance. We want to develop our security management system with and expert system examining user behavior schemes.

2. Aspects of the research

The fault management has great importance, because we have to ensure the greatest availability in this metropolitan area network. The software has to be able to monitor the connection of the subnetworks and the availability of the main resources. If it detects an error, it have to log the fault, search for the cause and the responsible person. It informs the person through the trouble ticket system, which has to be automated. Some of this examination is done by hand now, which gives more reliability, but our little network management team is not able to do this check as often as it is needed. So we have to automate all these fault management functions at a central management station, so the operator only has to check the availability of this management station. If it works the errors will be reported normally. We can prepare for possible errors, if we examine the fault statistics. We can improve availability with preliminary maintenance. We will use a case based reasoning system, which will help the operators' work. It can collect several events and the repairing activities, and provide the similar case studies if such an event happens. Operators can identify the problem easier and choose the most effective solution. We set up an alarm system, where all the operators and administrators have their responsibility, and they must be reachable in a certain way during their time. The trouble ticket system informs them through the email system if it's possible, and it will try to deliver the alarm message to the person's pager or with a fax in other cases.

We can collect information of a working network through the performance management functions. The software must be able to monitor the network traffic, and to process and save these data. The segmentation and the bandwidth of the network can be changed after the evaluation of these data. We can prepare quality information of the network with the fault and performance statistics. We will examine a modeling system, which can simulate network load based on the network topology information retrieved from the management station. These expert systems can simulate network faults and show the changes in network load at different points of the network.

The integration of the configuration management is an important point in the network management system. We are building up a platform based network management system, where the configuration applications are integrated into one graphical user interface. Several companies ship such a product, like HP, Sun, IBM and Novell. The configuration management works in synchrony with the asset management database. We will use a distributed asset management application, where the local network managers can manage their data, but it can be used centrally as a global network information.

We need a helpful helpdesk service with good technical background. The continuos operator service is reachable trough phone and email, they answer the question or they will route it to the responsible person with the trouble ticket system. MS DOS and MS Windows based console emulator software is useful for more exact description or even for the solution of the problem.

The network management system has to be prepared for accounting management, which provides data on the resource usage of different suborganizations and persons. There are special resources, which has to be accounted for the users and other resources to be accounted for suborganizations. For example, we need traffic statistics on the WAN lines. There are theoretical problems about accounting, as we have to decide whom to account in a duplex traffic. There are applications accounting for the originator or the destination. If the subnetworks connected trough the X.25 network it is easier to account because of its' built in functions. We examined the IP accounting and the IPX accounting functionality of the Cisco routers used network wide at our site. We have to sum up the accounting result of different resources for a specific person or suborganizaton. There is a

general cost and there is additional fee on specific resource usage. We will probably have to move to real accounting of resources that tends to stop the communication, and it is a paradox since the goal of accounting is to manage communication.

The task of security management is to monitor and log the illegal actions on the network. Alarms can be generated and delivered to the responsible person especially if the computer stores important information of the organization, such as exam results. [2]

We can distribute these functions through the network. We can monitor the network traffic in each subnetwork and collect and display data at a central management station. We can process the alarm messages at different management stations of each local system, but they can be collected and archived on a central computer for future examination. These can improve performance and reliability.

3. University environment, internal, inter-university and international networks

The university network is the most complex environment from many points of view. Different applications, such as file and print services, multimedia systems, database applications, and email systems are widely used. The network is also very complex from the view of the used network protocols and media. TCP/IP, IPX/SPX, DECNet (+LAD, LAT), Netbeui protocols are used over Ethernet, Token Ring, FDDI, Poin-to-point serial links, X.25 and test ATM networks. It is hard to find a network management application that can manage most of the systems, the network protocols and handle the different alarms. We found that it is only possible with the using different and specific applications and integrating them under the most user friendly interface (management console). We examined different network management applications in MS Windows, Unix and VMS environment and the integration possibilities.

The university network was connected trough bridges and we are moving toward a routed network, by placing Cisco router between the different subnetworks. The filtering of the illegal machines was not solved in the previous bridged system, and this problem still exist during the changes. We had a database of the computers at the universities, but it was not up to date, and not enough to generate filters based on it. Although there is no application that provides the filters for bridges or routers, not to allow illegal machines

communicate on the network. All this job must be done by hand. The common management of more router is also a problem from the view of supporting application. We have to set up the same things on many of our routers, and differences of configuration are also based on the same information. We search for an application that generates router configuration from common network information. It is impossible if we have network equipment from different companies, so that's why we only use Cisco routers.

The only protocol presently used in the inter-university and in the international network is TCP/IP. So we found that a strong Unix machine with a reliable management application will be useful to manage this network. These applications mostly provide the management of TCP/IP networks with some enhancements in certain cases. The software used at the management console must have an easy-to-use interface, because the less professional operators will be the first to meet the alarm messages.

In most of the cases the network management application does not fulfill all the above mentioned functions, that's why the API of the software has to be available for developing at different level of network management, like the SNMP interface or the user interface level.

4. Possible and examined alternatives [3]

We mostly examined network management applications based on Unix or other strong operating system like Windows NT, since we have to manage quite a big and complex network of different machines and applications. However we will have to choose MS Windows based applications in some cases, because of their simplicity or their functionality, even they are not as reliable and sometimes slower. For example a little site will not have the money for buying a Sun workstation as their management platform, they will choose and IBM PC with an MS Windows based application. Also the full management of Novell networks is usually not supported in the Unix based management application, or must be bought separately with the IPX/SPX protocol stack. The SNMP facilities of the Netware servers provide only limited monitoring and management functions.

The Cabletron Spectrum network management software is high level application, because its artificial intelligence facilities. It uses an object oriented database, which models the whole network including the connections between the elements. These features make possible that Spectrum can provide useful data or start an activity by itself. The application works in client/server model, providing multi-user access facilities. It has intelligent network topology and configuration discovery functions. It is especially useful in the physical topology representation. The alarms of the fault management system can be supplemented by sound or phone message. The most important sufficiency of the software is the low number of application developed for the Spectrum environment.

The HP Openview is a very popular application. This is the first management application using the Openview technology. The Openview user interface is easy to use and to develop. This is the first network management software that supports the OSF/DME standard. Of course the SNMP management is also supported under the HP Openview. It has wide application support from different companies, because the management API and the Openview API are both available. One of the most well known application in the Openview product family is the Network Node Manager. The HP Openview NNM process the alarms of the fault management system quite flexible, but it has no multi-user support, yet. The intelligent autodiscovery function builds a hierarchic database from the devices on the network. It can monitor the configuration and state of the network devices continuously. The monitoring of MIB variables on the routers, and bridges are useful in preparing fault, traffic and quality statistics. Events can be assigned to certain limits. The Event Management Services software is capable for monitoring faults of computer parts and for security alarm logging and management. These alarms can be filtered and priority can be assigned to each. The management API and user interface API is available. Unfortunately we do not have a HP server which strong enough to run HP Openview and the integrated management software, even if it would be a good central management station.

The IBM bought the Openview technology from the HP, and developed its' management application under the Openview interface. The IBM Netview inherited all the good features of the HP Openview and the IBM enhanced them with its' own software.

IBM networks can be managed from Netview, and Novell network management can be solved with an OS/2 based station. There is a possibility for managing DECNET networks, too. Because the IBM Netview is based on the same API than the HP Openview, it is easy to port the third party applications. In September 1993, Digital entered into an agreement with IBM to license Netview technology. Polycenter Netview is the first result of this agreement. The product is a port of Netview 6000 to Digital's Alpha AXP hardware. Polycenter Manager on Netview supports all IBM's APIs as well as the Netview/6000 GUI.. Optional DECNET Manager applications support management of Digital DECNET networks. Polycenter Manager provides the same depth of TCP/IP management functionality as Netview, including an Open Topology manager and advanced alarm filtering and event handling. Digital lost ground in management with its previous application, DECmcc, which was used in the university network. We are still in a need of DECNET management, since we are running lots of VAX/VMS and some Alpha stations. The Digital is trying to implement the whole functionality of DECmcc under the Netview environment, and it will be a good management tool in DECNET networks looking at the present applications. As further development went on, they came out with Windows NT based version of the Netview software, which can run on an Alpha workstation running Windows NT. IBM announces a good Trouble Ticket system with the Netview software family, this third party application is called Paradigm, which will be used for change control and fault tracking.

The SunNetManager is the first network management application that has wide third party application support. It is based on a protocol independent architecture, the Sun's Open Network Computing Remote Procedure Call is used in communication between the agent the management application. The SunNetManager has only the very basic functionality by itself. It can manage network devices supporting SNMP, but it has no alarm filtering support, and has only weak configuration and accounting functionality. Events can be assigned to logical expressions on the state of devices. The event can be logged, mailed or passed to other program. The discovery function must be started for each network, and the result of further manual discovery will be placed in the first network view. There is a third party application supporting hierarchic placement of the discovered

devices. Since our networks are connected trough Cisco routers, we choose this platform to use the Ciscoworks software, as the configuration management software and query tools. The BESZ network consists of many subnetworks trough the universities, and each has its local manager. They want manage their network databases, such as the topology map, but we searched for a synchronization tool for this distributed management. The Mapsync software can do this, even later we want to examine the possibilities of Soltris, which has integrated map synching functionality. We can get a global topology database from the different management stations with this software. The SunNetManeger API is available for the Manager Services, Agent Services and for the network database. We developed our network load monitoring application under the SNM API. We also developed a simple trouble ticket generator using the alarm system of the SunNetManager. These applications will be mentioned later in more detail.

We need a different software for managing the Novell network of the university. The most simple and most efficient solution is the Novell's Netware Management System. This separate management environment has been set up for managing the Novell networks, but it can be integrated with the SNMP management station through SNMP traps. At our site the operators get alarm on the SNM console from the NMS if serious error occurs, but they can also review the logfile about loading and unloading of different Netware modules on the monitored servers if they are interested. There are some management applications for the NMS system, but the most important function is to manage the Netware servers and workstations. The management software of our USRobotics modem pool is based on this platform. The software can monitor the load and faults of the Netware servers. It has no multi-user functionality, and it has only limited alarm possibilities. The configuration of alarm and the network database is not simple. It has been implemented as a distributed system, with agents installed on the Netware servers, and with a management console run on a PC under MS Windows. The NMS builds up a logical database of network devices from the data collected by the IP and IPX discovery agents. The traffic of each subnetwork can be monitored with Lanalyzer agents installed in each Netware servers. These data can be reviewed from the management console. The whole API is available from the Novell.

5. Network management system benchmark [4]

We did a benchmark of our network management system, which includes not only the equipment, but the human resources, too. It is usually not easy to evaluate the worth of the network management system, and to measure how efficient it is. This benchmark shows the gaps in the network management system and shows a comparison with the industry average. The purpose of this procedure is to improve the performance of the network management processes, the use of the network management instruments, and the allocation of human resources.

The first step in benchmarking is the data collection from the different sites trough personal interviews. A form was prepared to evaluate network management functions, such as client contact point, operation support, fault tracking, change control, planning and design, finance and billing, implementation and maintenance, security management, fault monitoring, performance monitoring and systems administration. We discovered what network management instruments are used, and can be managed, such as network management integrators, WAN element management systems, LAN element management systems, monitors and lanalyzers, security management systems, administration instruments, database tools, client contact point instruments. We collected information about the used network management protocols. We examined what network management job titles are established or planned. We examined the responsibility and skill matrix for the human resources supporting network management areas.

We found as result of the benchmarking process, that the present network management system has good features but is needs improvements in many places. We need more instruments in specific tasks, the network management functions are not declared exactly, and the responsibilities are not clear. You will see later, how we described the responsibilities of the operator, the system administrator in charge and the weekend operator at BME. The other main point of the benchmarking result was to find out the needed improvement in our instrumental background. In the next chapter we will summarize the use of the present equipment and the suggested future equipment.

6. Planned configuration

We planned a complex network management system for the above mentioned complex network. In the scope of FEFA 652 a Digital ALPHA hardware running a Windows NT server software was accepted as the management console. We are going to use the IBM's Netview on this platform. The IBM Netview supports SNMP, and our DECNet management will be based on Netview, too. Our Cisco routers, Xyplex terminal servers and some other equipment are SNMP manageable. All of the DEC terminal servers and bridges can be managed with MOP (a management protocol based on DECNet). We can solve the management of Novell and IBM networks with the Netview, but we have better tools for Novell, and no need for IBM management. The IBM announces a well-prepared trouble ticket system for the IBM Netview, which will be used as fault tracking tool. This software is called Paradigm.

We are also going to use the SunNetManager, and share the SNMP network management functions between the IBM Netview and the SunNetManager. The Ciscoworks runs in this environment, which we use for Cisco router configuration and queries. All of our internetwork routers are Cisco products. The SunNetManager is also a suitable environment for Xyplex terminal server management, which are used on the university network. The Xyplex gives the software called Controlpoint, which can be used to manage our terminal servers and other Xyplex products.

We will use a redundant network management system with two SunNetManager station, on of them was placed BME and the other at BKE, which will provide more reliability in case of power loss or other problems at one of the sites.

We planned to use the Mapsync software to synchronize the locally managed SunNetManager databases and generate a global topology database retrieving the information from the management station regularly.

We need redundant equipment for the main resources, as well. For example we set up a VAX cluster for the system, which runs the program providing the monthly payment counts. It is cheap to organize our systems redundant to provide higher reliability, but there is no software supporting the design process.

The software chosen for management of the Novell networks of the universities is the Netware Management System, since at most of the places they use Netware 3.1x or 4.1x servers. It is integrated into our SNMP management console through SNMP traps. The Netware specific traps are defined at the central management console and operators get the alarm on the SNM console together with the other TCP/IP network information. It is also possible to retrieve information at the SNMP management console about the users logged in and out of the Netware servers or about the modules that has been loaded or unloaded at the monitored Netware servers.

A completely new fire prevention system was installed in the central computer room at BME, which is integrated into the operation center's functions. The operators have to take care of these alarms together with the network alarms.

We are going to use a USRobotics modem pool, which will serve the remote logins of the researches working at home. The management of the modem pool will be integrated into the management system. It can provide information about the usage of the lines, security information, and remote configuration of the modem pool is based on the Netware Management System.

Novell ships a product called Lanalyzer Agent for Netware with the Netware Management System, and it is able to monitor and analyze the traffic of the segment connected to the Netware server. We can examine the collected data from a central management station. The other possibility is to use a hardware sniffer, which is capable to catch up at higher network load, but it has to be placed at the specific point of the network we want to examine. We have this kind of equipment and we use it usually if slow network reported or high error rate supposed. We will place RMON agents at different point of the network, which is specific hardware designed for the monitoring. It provides data trough a standard protocol.

We had really hard work with software distribution without automatic software distribution tool. The university administration uses the cc:Mail software for mailing, so this system was to installed at all administration computer. The work was done by more then ten people - even Unix administrators - but it took many weeks, as it was not easy to set up the software at these different machines, and to teach basics in to minutes. From

this experience we decided to examine automatic software distribution tools. We set up a Windows NT server with the Server Management System software, which is able to do the software distribution and to manage the software licenses, too. Novell's solution for this is the Network Navigator which we also tried at the university. Because there are more then 70 Netware servers and only 5-8 Windows NT servers at the university, we concentrate on Novell's solution as these are designed to use in a network like ours.

The fault management of the resource computers is needed for the best availability. We tried the Compaq Insight Manager, since we have Compaq servers for the administrative electronic mailing in the university, also providing other public data.

We want to start a complex helpdesk service, and the supporting application is to be integrated into the management system. We found the Intel Landesk Manager as a tool for this purpose. This is a part of the Managewise software, the newer version of the Novell's Netware Management System. We planned to use a knowledge base system providing similar case studies for operators to help their work.

The power supply is a key point in high availability. So all of the new UPS systems can be managed with SNMP, supplying the main central resources on the university network.

We use Powerchute on the Unix and Netware servers to manage the UPS systems where SNMP management is not available, yet.

The above mentioned applications work on logical network management level. We also studying the possibilities of the cable management, which is the physical representation of the management devices. The ISISCad application provides such a functionality.

This management environment is going to cover the management of the whole BESZ network, having distributed management stations in each local NM center.

It is not easy to use this complex management system. The education of the managing group is part the project. People from the different universities will be able to use the education classroom placed at BME. We are going to organize courses for the network managers, and there will be also a possibility to work out test environments and try out new software. We will also use this education center as a place for presenting sample

network management systems. Four IBM Risc workstations and four 486 PCs will be available for the students in the classroom. We will use a common security system for the IBM workstations, which means that the authentication system will run on a separate Unix machine. We have good relation with the Hungarian companies providing network solution, so we will ask them to use this site as a demo and a test environment for their software, as well.

As we see, the human part of the network management system is also very important. We worked out strict rules for problem receiving, and for the persons in charge during worktime and on the weekends. There are written rules as we will present them later, but there are also verbal rules which are important for the good work. We plan to write down more rules for the employees and clear the tasks and responsibilities.

Clients can report a problem related to the information system on many ways, like email, fax message, voice phone and letter. During worktime the operator receives the problem report, and forward it the system manager in charge, if he not available then to the chief network manager. He has to log the problem report in the operator's book and the actions that have been taken. The client must be informed if the problem has been solved. The two operators take turn on receiving problems on workdays from 7.30am to 08.00pm. The operator has to check the availability of the main network resources in each half and hour.

The six system managers take turn on doing the task of the system manager in charge from 08.00am to 05.00pm. They are the first persons when taking corrective actions. If they are not available the chief network manager is in charge. All the changes have to be logged in the system manager's book. When the system manager in charge starts work in the morning he has to check this book for open problems.

One of the persons working at the information center will be in charge out of worktime, he is available on mobile phone from 20.00pm to 07.30am on workdays and from 7.30am to 7.30pm on the weekends. He has to check the main resources at 22.00pm and 06.30am on workdays, and at 8.00pm, 10.00pm, 12.00pm, 14.00pm, 16.00pm, 18.00pm, 20.00 pm, 22.00pm and 6.30am. There is a logbook for the operators on the

weekend, where all the problem and actions must be logged. This system results an effective network management and quick problem solving.

The network management system can be reached trough a dedicated modem line if there is any serious problem in the internetwork. The system manager in charge has a mobile PC with a built-in modem, to access the network management station and check for possible errors. The operator can check the availability by hand but we are moving to the more automatic checking of the network resources. We want to ensure 1 hour availability with this management system.

7. Further development supplying the insufficiency of the management applications in our environment

Unfortunately there are many functions not implemented in the basic configuration of the network management software. We developed distributed applications to solve some of the problems. [See attached Schema 2.]

The SunNetManager has basic traffic monitoring facilities and user controlled graphic display, but it has no automatization in processing and storing. We developed a software for these purposes. The SunNetManager collects traffic information and writes it to a file, which is processed regularly from a cron process. A perl script archives the traffic data weekly, and converts it to a suitable format for the gnuplot graph-maker software. It provides postscript version of the weekly traffic report graph, sends it to a network printer and to the chief network administrator. [See the attached Figure 1.,2.,3.,4.]

Another problem to solve is the accounting management of the internetwork traffic. Our Cisco router is capable for collecting accounting data for specific interfaces, and this data can be retrieved by a SNMP based software available from ftp.cisco.com. The IP accounting can be switched on for each interface of the Cisco router. If you turn on the IP accounting on one interface the outgoing traffic will be logged. It means that we have to account for the destination address. We run this retrievement regularly, and the Cisco router provides the traffic data in machine-to-machine relation with the byte and packet counts. We developed an application, which count the traffic of specific suborganization in internal, inter-university and international relation. The software uses a /etc/networks

format file for deciding who to account and name of the suborganization. This software prepares a bill for each suborganization based on the above information. The output of the software is a raw text table, but it can be converted to real bill for each suborganizations by the secretary if needed.(Until now we don't have to pay for network usage.) [See the attached Table]

The SunNetManager can inform a responsible person about alarm by an electronic mail, but it is not in a standard trouble ticket format. We developed an application that uses the SNM event log, and converts each event to a trouble ticket if specified. The trouble ticket will be sent to the operator who can supply the missing information and take the needed actions or forward the ticket to the responsible person. If the responsible person is not reachable by electronic mail, it is possible to send a fax or use a pager to send the ticket. [See the attached Sample ticket]

The objective of this network is not only to ensure the connection between the suborganizations, but we are running software development projects for students, too. There are expert systems on the market for example to examine the Ethernet traffic, but they quite expensive, so we encouraged students to develop such an expert system. Other students develop security tools for Netware. A student worked out a rating method for security system, which is based on Netware servers now, but can be used generally with other systems, as well. [5] One of the most interesting projects is the action monitoring by rule-based and neural network based pattern recognition. This project examine typical user behavior by collecting and examining audit log files. It is not enough to find the someone who tried to break the security system, but we also have to find the one who succeeded. [6]

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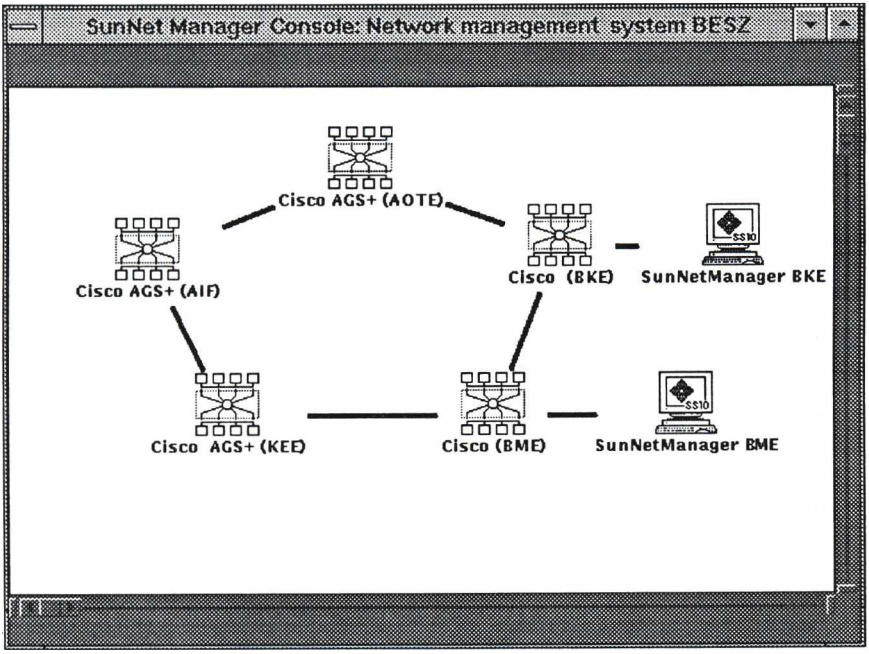
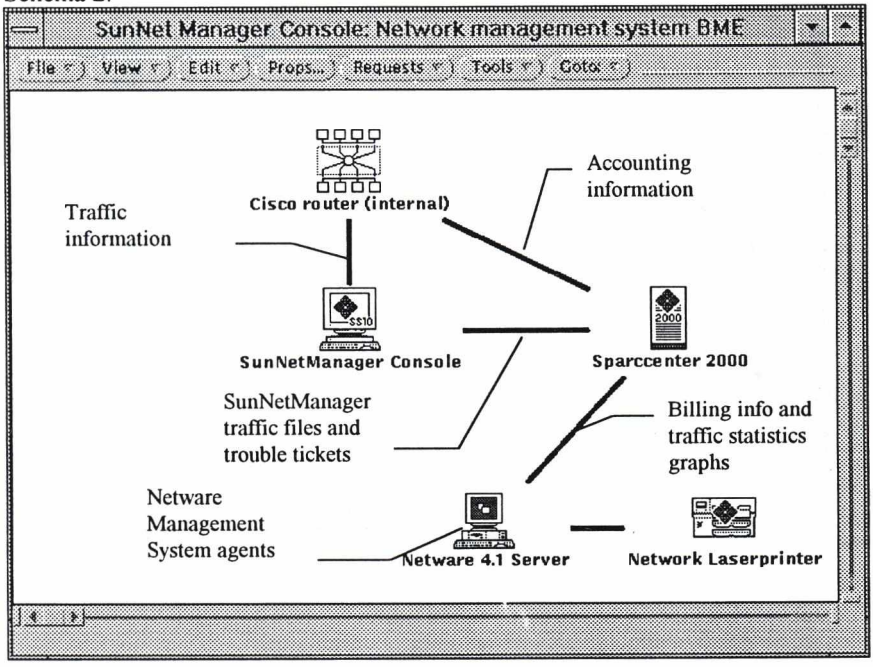
Keywords:

- Research on network management possibilities at University Association level.
- Functions in network management to be fulfilled.
- Evaluation of the most popular network management applications from our aspects.
- Presentation of some locally developed applications supplementing the insufficiency of the applications in the University Association environment.

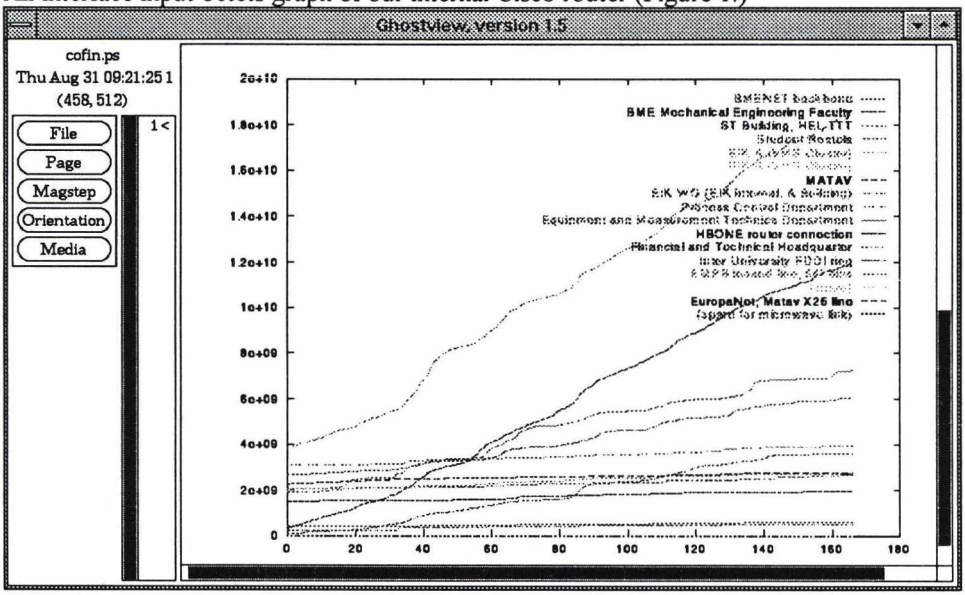
Schema 1.



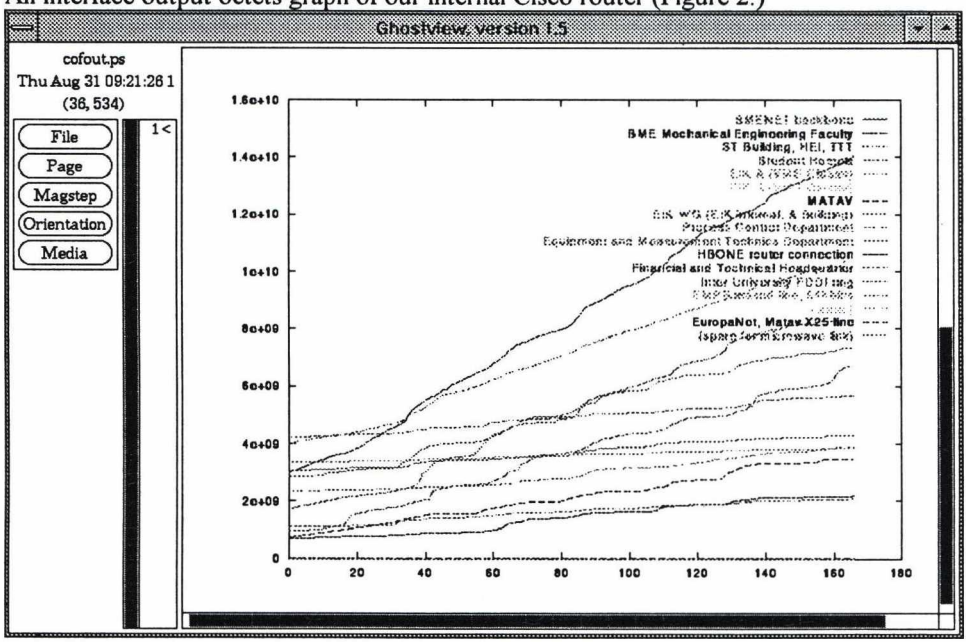
Schema 2.



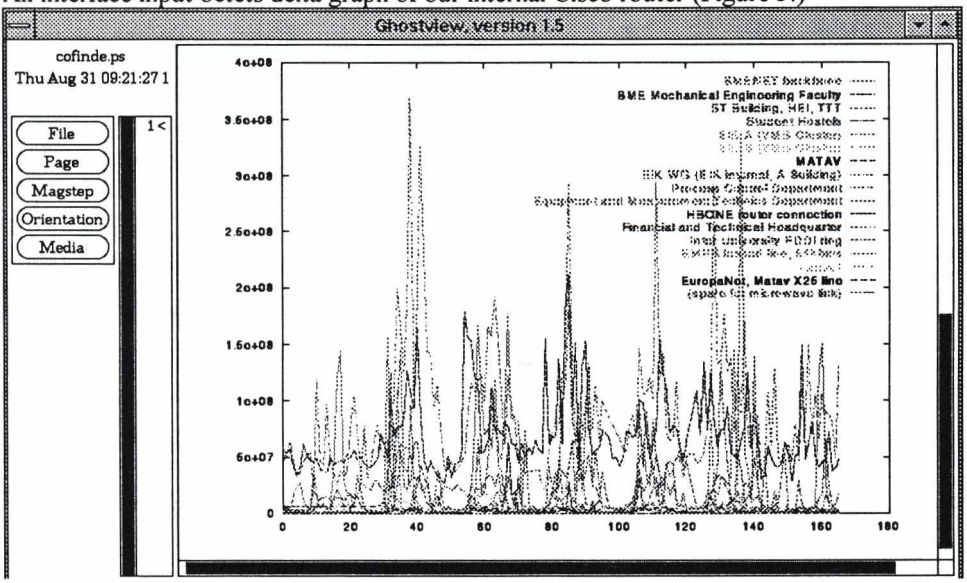
All interface input octets graph of our internal Cisco router (Figure 1.)



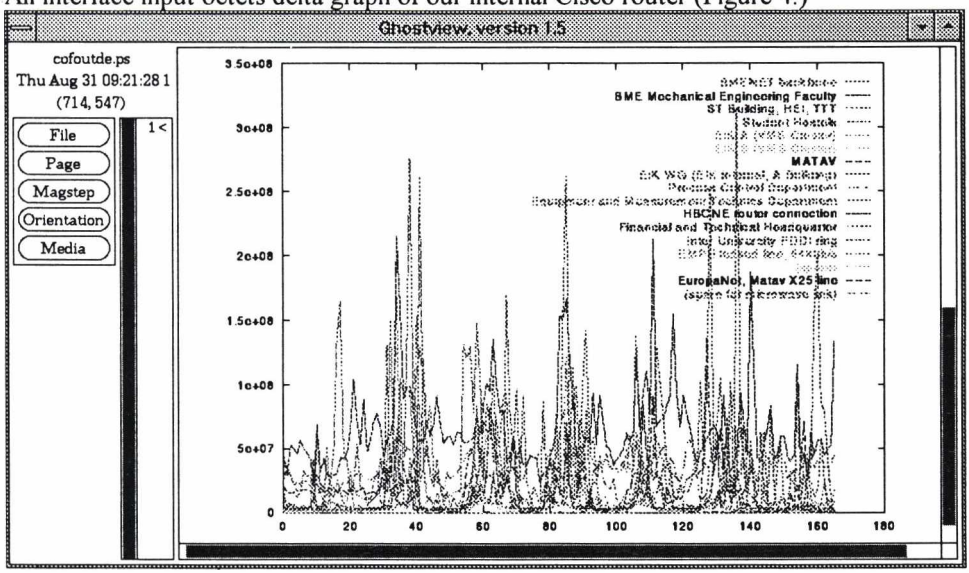
All interface output octets graph of our internal Cisco router (Figure 2.)



All interface input octets delta graph of our internal Cisco router (Figure 3.)



All interface input octets delta graph of our internal Cisco router (Figure 4.)



IP accounting statistics for the following networks: (1995.08.21.-1995.08.27) (Table 1.)

Suborg	Netnum	BME_bytes	KUN_bytes	OTHER_bytes	BME_pkts	KUN_pkts	OTHER_pkts
inflab	152.66.25	375725	0	0	5836	0	0
mkt	152.66.59	2484608	0	0	44368	0	0
vemt	152.66.67	2429896	0	0	43391	0	0
vdh	152.66.68	2484496	0	0	44366	0	0
aut	152.66.70	1805496	0	0	32241	0	0
stt	152.66.71	2484328	0	1314799	44363	0	7181
sot	152.66.72	5877417	0	0	35188	0	0
svt	152.66.73	2483600	0	1792099	44350	0	7115
vmt	152.66.74	2484776	0	0	44371	0	0
ntb	152.66.75	2485504	0	0	44384	0	0
fxr	152.66.76	381362	848574	3728054	6895	2137	24595
vxr	152.66.77	277555398	0	1488822	272405	0	7005
ttt	152.66.78	5301765	0	508967	50535	0	1303
mbt	152.66.80	2434451	0	0	43453	0	0
mmt	152.66.81	1737069	0	0	12337	0	0
vma	152.66.83	12952066	8868804	0	80792	105581	0
inf	152.66.84	4535456	0	51481463	27760	0	604711
vdk	152.66.85	2493400	0	0	44525	0	0
nsh	152.66.86	713513015	21242882	363784778	552532	301943	856903
phy	152.66.102	13221782	0	0	55344	0	0
nyi	152.66.108	27038	755288	0	153	1364	0
tdh	152.66.110	2484328	0	0	44363	0	0
mtl	152.66.111	18538365	0	49840	98585	0	890
reak	152.66.112	2484328	0	0	44363	0	0
eik	152.66.115	52245340	90731758	1985670051	747973	1522389	4540885

Sample SunNetManager event log

```
E "" 152.66.115.100 100115 152.66.115.100 809726704 680127 809726748 809726748 0 0 0
akela.sch.bme.hu reach "" hostname S akela.sch.bme.hu size I 56 reachable E 0 != 1 H
triptime G 1
```

Sampe Ticket

```
Ticket Number:   [bme]809726748                  Ticket Status:   OPEN
Ticket Type:     unscheduled                     Ticket Source:   HBONE
Ticket Scope:    reachability                    Site/Line:       NOC.EIK.BME.HU
Ticket Owner:    snmuser@noc.eik.bme.hu          Problem Fixer:   netgroup@eik.bme.hu
Ticket Opened:   809726748                       Problem Started: 809726748
Ticket Closed:                                   Problem Ended:

Problem Description:
 akela.sch.bme.hu is not reachable!

Affected: akela.sch.bme.hu and connected networks

Actions: Check connectivity!

Time to fix:

Fix:
```

TELETEACHING

Dr. Johann Günther

Institut für Publizistik und Kommunikationswissenschaften der Universität Wien

Im Rahmen der Vorlesung „Neue Telekommunikationstechnologien" am Institut für Publizistik und Kommunikationstechnologien der Universität Wien wurde eine Televorlesung mit Universitäten anderer Länder durchgeführt.

Dr. Bobrowsky führte mit dem Medium Internet eine Vorlesung mit der „University of Southern California" durch. Damit konnte für das Wiener Publizistik- Institut eine neue Dimension zur Nutzung des Internets hinaus über das bisherige reine Abrufen vorgespeicherter digitaler Informationen geschaffen und in Entwicklung begriffene Technologien und Softwareprogramme zum ersten Mal zu einer konkreten Anwendung gebracht werden.

Einige Wochen später wurde dann von mir eine „Rundreise" von der Universität in New York über London und Brüssel bis nach Moskau durchgeführt. Dazu benützten wir ISDN Leitungen zur Übertragung und erreichten eine für die Teilnehmer akzeptable Bildqualität

1. Generelles

Teleteaching wird das Szenarium der Ausbildung gänzlich verändern. „Vorlesungen" im traditionellen Sinn können entfallen. Ausgaben auf Videobändern oder interaktivem Zugriff können dem Hörer mehr Komfort bieten. Er kann sich die Vorlesung zu Hause anhören wann immer er Zeit hat und muß nicht zu einer bestimmten Zeit an einem bestimmten Ort (= Hörsaal) sein. Sein Wohnzimmer kann zum Hörsaal werden. Passagen, die er nicht sofort versteht, kann er wiederholen.

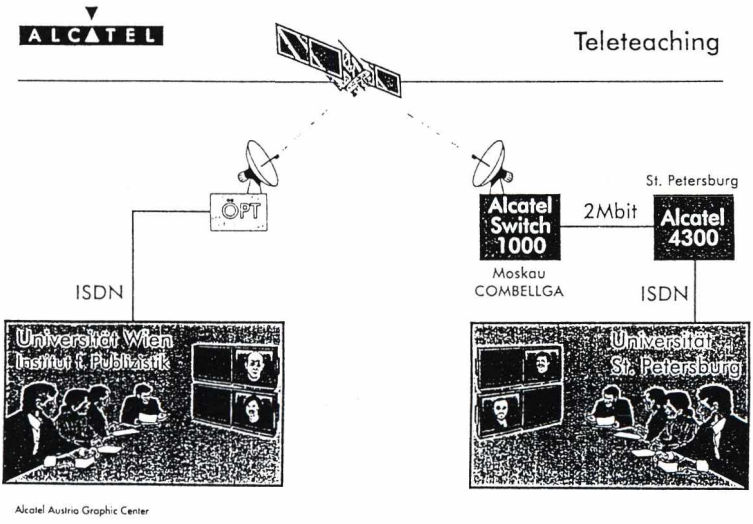
Das „Lehren" wird auch internationaler. Man kann sich zu einem bestimmten Thema international anerkannte Fachleute holen. So geschah es am Institut für Publizistik, daß Umberto Ecco eine Vorlesung im 18. Wiener Gemeindebezirk hielt, ohne dagewesen zu sein.
Daß sich durch diese Internationalisierung das Lehrniveau heben läßt, liegt auf der Hand.
Mit Hilfe interaktiver Kommunikation wie sie mit Videoconferencing betrieben wurde, kann auch Feed Back gegeben werden und zu bestimmten Themen und Fragen nachgefaßt werden. Auch der internationale Dialog bringt eine neue Dimension.
Internationale Fachleute, die über Teleteaching verfügbar sind, geben den Studierenden auch mehr „First Hand Informationen" als im konventionellen Lehrsystem. Das Sprichwort der Telekommunikation „Die Welt wird ein globales Dorf" kann für die Applikation „Fernlehre" realisiert werden. Der Standort des Lehrenden und Lernenden wird dadurch unwichtig.
Für ein kleines Land wie Österreich könnte Teleteaching einen höheren Stellenwert bekommen. Wir könnten an das internationale Szenarium anschließen, bzw. uns in bestimmten Fachgebieten international auch profilieren.

2. Das System

Jedes professionelle Videokonferenzsystem besteht grundsätzlich aus einem Monitor, einer Kamera, der Bedieneinheit mit eingebautem Mikrofon, und dem 'Herzstück' des Systems, dem sogenannten Codec.
Die Elektronikeinheit Codec komprimiert die über Kamera aufgenommene Bildinformation sowie die über das Mikrofon empfangene Audioinformation auf ein Signal mit einer Bandbreite von 128kbit/s und ermöglicht damit die Übertragung aller Informationen zum Partnersystem, bei welchem der dort vorhandene Codec die Dekomprimierung des Signals vornimmt.
Als Übertragungsmedium wird meist das öffentliche Telefonnetz unter Verwendung des Dienstes ISDN (Integrated Services Digital Network) verwendet. Damit ist es möglich, die notwendige Datenrate von 128 kbit/s über die vorhandenen Telefon - Kupferleitungen zu transportieren und hervorragende Bild- und Tonqualität zu erzielen.
Videokonferenzsysteme können jedoch nicht nur in Ländern eingesetzt werden, in denen ISDN im öffentlichen Netz bereits implementiert ist, es besteht auch die Möglichkeit, alle Informationen über

Satellit oder über private Netze zu übertragen. Diese Variante wird derzeit vor allem bei Systemen in osteuropäischen Ländern gewählt.

Selbstverständlich sind für Videokonferenzsysteme internationale Normen geschaffen worden, die gewährleisten, daß nicht nur Videokonferenzsysteme verschidener Hersteller miteinander kommunizieren können, sondern daß auch Benutzer von Multimedia PCs und Bildtelefonen an professionellen Videokonferenzen weltweit teilnehmen können.



3. Das Programm

Das Programm sah ursprünglich eine Kommunikation mit der Technischen Universität in St. Petersburg vor.

Bei der Programmerstellung wurde auf die Interaktivität des Mediums Rücksicht genommen. Man wollte die kulturellen Unterschiede nutzen um an ein Thema mit verschiedenen Blickwinkeln heranzugehen.

Programm siehe nächste Seite

PROGRAMM

BEGINN: **16.00 UHR**

KONFERENZSPRACHE: **RUSSISCH/DEUTSCH, SYNCHRONDOLMETSCH**

- **EINLEITUNG** DURCH LEHRVERANSTALTUNGSLEITER DR. J. GÜNTHER; OFFLINE ERKLÄRUNG DER TECHNISCHEN EINRICHTUNGEN UND TELETEACHING AN SICH

- **VORSTELLUNG DES INSTITUTS** DURCH PROF. DR. THOMAS BAUER ERKLÄRUNG ZUM INSTITUT, LAUFENDE FORSCHUNGSPROJEKTE

- **FRAGEN ZUM STUDIENLEBEN** UND DAS FORUM IM HÖRSAAL IN ST. PETERSBURG

- **MEDIENSITUATION IN ÖSTERREICH** PRÄSENTIERT DURCH TEILNEHMER DER LEHRVERANSTALTUNG

- **„MASSENKOMMUNIKATION UND POLITISCHE PROZESSE"** VORTRAG VON PROF. DR. GOTTSCHLICH

- **DISKUSSION** ÜBER BEIDE INSTITUTE HINWEG;

ÄHNLICHER ABLAUF AUF RUSSISCHER SEITE

Einerseits war die Vorstellung der beiden Institute geplant, um den Tages- background aufzuzeigen. Die Studenten beider Institute sollten dann die Möglichkeit bekommen, die Situation noch zu hinterfragen. Spezialthemen wie „Mediensituation" und „Massenkommunikation und politische Prozesse" sollten die Kulturunterschiede und verschiedene politischen Entwicklungen aufzeigen. Eine abschließende Diskussion sollte den Bogen abrunden.

Dolmetscher waren auf beiden Seiten postiert und die Leitungen geschalten. Praktisch kam es dann anders. Informationspiraterie bekam die Oberhand - ein anderes Institut in Russland, über dessen Gebäude die Leitungen liefen, knackte diese und wollte die Veranstalter erpressen das Ganze mit ihnen abzuwickeln. Ein Institut wollte dem anderen die Show stehlen. Wir in Wien entschieden uns dann kurzfristig dabei nicht mitzumachen, und cancellten die „Russlandvorstellung". Ohne viel Voraussetzung änderten wir das Programm und nahmen mit der State University in New York, einem Telekommunikationsunternehmen in Moskau, London und Belgien Kontakt auf. Sozusagen eine Reise in zwei Stunden um die Welt.

Beim Moskauer Partner handelte es sich um den privaten Telcombetreiber „Combellga", einem russisch, belgischen Joint Venture, das über Satelliten Moskauern belgische Telefonnummern anbietet. Man nennt dies „Overlay Networks" .Parallel zu den lokalen Telefonnetzen werden private Netze aufgebaut. Die schlechte lokale Infrastruktur Moskaus macht so Botschaften und internationale Firmen und Organisationen zu Kunden dieser Netzbetreiber. Dies zeigt auch die Löchrigkeit nationaler Monopolisten. Über Satelliten kann man internationale Telkomkunden aus einem Land „herausfischen". Auch wird keine Unterscheidung zwischen Voice, Data oder Image gemacht. In unserem Fall war es eine ISDN Wählleitung mit zwei Kanälen. Auf grund der fehlenden internationalen Kooperationsverträge der österreichischen Post mußten wir von Wien über London nach Brüssel wählen, von wo es über Satellit weiter nach Moskau ging.

Ebenfalls über ISDN wählten wir uns dann nach New York, wo für uns Österreicher die Hörer einer eben zu ende gegangenen Vorlesung sitzen blieben, um mit uns zu plaudern. Der zuständige Professor sprach uns zum Erstaunen im Wiener Dialekt an. Er ist in Wien geboren lebt jedoch seit

einigen Jahrzehnten in Amerika. Sein Meidlinger „I" hatte einen starken amerikanischen Akzent. Mit Rücksicht auf die amerikanischen Kollegen, erfolgte der Dialog in englisch.
Man führte uns vor, was in Amerika „State of the Art" ist. Über Ikonen am Bildschirm holte er weitere Kollegen aus anderen amerikanischen Bundesstaaten ins Gespräch.
In London sahen wir das Konferenzzimmer eines Videokonferenzanbieters. Unsere Gesprächspartnerin dürfte den ausgemachten Termin vergessen haben. Sie war nicht anwesend. Wir konnten aber zeigen, daß man auch „remote" die Kamera bedienen kann und suchten unter dem Tisch, schauten was auf dem Tisch lag und zoomten uns auch durch das Fenster auf Londons Straßen.
In Belgien erklärte uns dann der Bildungsbeauftragte einer privaten Firma, in wieweit Teleteaching bereits eingesetzt ist. Zwei bis drei Sitzungen täglich werden bereits abgewickelt.

4. Meinungsbefragung

Mit Unterstützung von Hrn. Prof. Dr. Karmasin wurde ein Fragebogen an die Hörer ausgegeben, um deren Reaktion und Akzeptanz zu erheben. Ergebnisse liegen im Augenblick noch nicht vor. Aus Gründen der Repräsentanz soll diese Erhebung bei weiteren Telekonferenzen wiederholt werden.

International betrachtet sind diese österreichischen Erfahrungen sehr primitiv, mehr aber gibt es noch nicht.

Global connectivity: The World Wide Web and beyond

Balint Domolki[1]

The term "global connectivity" is used here as a kind of synonym to "Internet" not only for reasons of referring to the title of this conference. Usually "Internet" means both the phenomenon of world-wide interconnection of computer networks and also an organically self-developed organization performing some kind of control over this most important part of the global information infrastructure. How long and in what extent such a loosely-coupled organization can survive in the context of growing commercial importance of the Internet services, this is one of the most actual questions of computer networking, which, however, will not be dealt with in this paper.

The World Wide Web (WWW) is a service on the Internet, having shown the most dramatical evolution in recent years. As many of the great inventions in computer science, it was not designed for the purpose it has been used later: originally it was developed as a communication tool allowing researchers working on a common project in remote sites to share their ideas. The "Internet community", however, recognized very soon the far reaching possibilities residing in (and behind) the idea of WWW and this resulted in a tremendous growth of WWW servers all over the world (at the end of 1993: 600, end of 1994: 6000, in August 1995 over 20000) and also in the fact that WWW is becoming the "universal" user interface for most of the Internet applications.

The reason of this fast growing popularity can be found in two basic features of WWW:

- the simplicity of the hypertext interface providing a powerful generalization of menus, directories etc. in a form easily understandable to any user;

- the possibility to use in the links general Internet addresses (Universal Resource Locators), which can hide from the user all the different requirements for accessing different computers in an international network.

[1] IQSOFT Intelligent Software Co.Ltd, Budapest, Hungary

There might be a danger, however, that this simple and powerful mechanism is not always used properly and this may hinder the efficient utilization of the WWW. A few topics arising in this context are listed below:

1. The WWW as it is used mostly nowadays consists mainly of a network of direct hypertext links, referring from one place of one document to another document possibly on a server in a different part of the world. These documents are created - and deleted - completely independently from each other by an increasing number (see the growth figures above) people. This may result in a large number of links which point to "nowhere", as well as in documents "hanging in the air", which cannot be accessed since the links leading to them have been destroyed.

Since the uncontrolled, organic, cooperative creation of the information is one of the most significant, inherent features of the WWW (and of the Internet in general), no "administrative" regulations might be possible to solve this problem. A combination of conventions and "housekeeping" tools might help the situation.

2. Another set of problems concerns the usability of the information received from the WWW.
The questions about the real value of such information fall clearly very much beyond the scope of this paper and cannot be addressed without very serious considerations about freedom of speech, media politics etc. What can be discussed here, however, are some formal aspects of the usability of information, making sure that the information might be properly understood by those people to whom it was intended.
The problem with WWW (and with Internet in general) that the provider of the information may have very few assumptions (much less - if any - than in the case of other, more conventional media) about the possible receivers and therefore the danger of providing unusable information becomes more imminent.

- A trivial example of a formal usability feature is a "time stamp" on each document. Without it, the reader will not be in the position to judge properly the content of the document (especially if it contains references like "now", "recently" etc.). In most WWW pages a "Last modified...." clause can be found, its existence (and correctness!), however, is left to "netiquette" and is not enforced by technical means (which probably would not be very difficult to do).

- A less trivial case with "time stamps" is if a list of documents is provided on a page (e.g. as result of a search) and the reader has no clue to decide which one represent an up-to-date information and which has historical significance only.

- An other usability problem is connected with the fact that in WWW the "pages" may live their independent life, the order in which the reader will see them might be different from the one the provider of the information has intended (e.g. we get into a page as result of a search and the page uses notions defined on previous pages we have not seen.) Cross-referencing may help and again "netiquette" requires to give a pointer to "our home page" but more powerful (and secure) mechanisms might be needed.

Such examples can be continued, going into more details how the information can be constructed to be understandable to a wide range of - unknown - readers. This, however, will lead to the more general problem of the quality of information on the Internet, which falls outside the scope of this paper.

3. The third topic is connected with the fact that WWW realizes the principle of the client-server architecture in its very extreme form: the servers should provide information without any kind of knowledge about the capabilities of the clients (the "browsers".) This means, that in most cases, the servers may utilize the simplest, most common properties of the browsers only

As WWW is mostly used, the "clients" are receiving and reproducing textual (or multimedia) information, to be processed by the eye (or ear) of a human being. Practically no (or very little, e.g. decompressing) post-processing takes place in the client.
The usual procedure is, that on the request received from the client, the server selects a piece of (multimedia hyper-)text and delivers it to the client, who makes it visible (audible,...) to the user. This procedure can be made more efficient in both ends:

- instead of a simple selection the server may undertake a more complex processing on the request received from the client, by running a program, using the client's request as data (the different kinds of queries are simple examples of such a feature), and

- the client may perform some transformation on the information received from the server, before "showing" it to the user, e.g. to "translate" it to a more understandable form (according to the

preferences of that particular user) or in a more general way, it can be used as an input to any kind of program being run on the client level.

It should be emphasized, that in all considerations outlined above we are talking about the problems in the mass-usage of the WWW as an increasingly popular tool for Internet access, rather than about the possibilities of its more sophisticated utilization.

It is clear, that potential solutions to these problems does exist in the present weaponry of the WWW (see e.g. the mechanism to "negotiate" data formats between the server and browser in the underlying HTTP protocol, the "programming language" Java, allowing interpretation of a code given on WWW pages by the browsers, the existence of different "robots" on the WWW, checking references, time-stamps etc.)

The task would be to introduce such features into the everyday use of the WWW, resulting in the utilization of the whole Internet (or global connectivity) on a much higher level.

To summarize the situation, it can be noted, that the status of the common usage of WWW at present is somewhat similar to "machine code" level access of the information available on the Internet. This resembles the age of the boom of programming languages in the sixties, when introduction of higher level features was accompanied by restricting the freedom of the programmers to do "everything" allowed by the hardware. In 1968, E.W. Dijkstra's famous paper "Goto statements considered harmful" initiated the introduction of more secure mechanisms into the world of programming in order to reduce confusion and to master complexity. May be a similar type of development can be envisaged in the rather complex world of Internet as well.

Disclaimer: The author of this paper is not an expert in the technicalities of the WWW, so the considerations outlined above are coming from a user's perspective only.

Acknowledgment: This paper has been prepared in connection with the ESATT and INDIS projects of the European Union, supporting the development of Internet activities in the countries of Central and Eastern Europe.

Hungarian telehouse movement

Gáspár Mátyás[1]

1. What is the telehouse[2]

Telehouse - one type of the community teleservice centres (CTSC) - is a multi-purpose centre aimed at providing computers and telecom facilities and support for local communities in remote, rural and in low-income urban settlements. Normally, they contain an office, a public area with access to computers and telecom services, a classroom providing both computer training and general training and education supported by computers and telecom, a meeting-room, work facilities for users (pupils, teleworkers, local farmers, businessmen etc.) and a small kitchen with a coffeemachine. Typically, a minimum staff is a full time director (the so-called „CTSC manager") and a part-time assistant who runs the centre, serves the users, arranges training courses etc.

2. Telehouses over the world

The first CTSCs were established in Härjedalen in Sweden and in Lemwig in Denmark in 1985. International Association of CTSC has a global telehouse survey of 1994, what is completed by the Hungarian data (some additional information see in part 4.):

Country	**No. of CTSCs**
Denmark	9
Sweden	23
Norway	5
Finland	49
The UK	57
Ireland	6
Germany	47 (established and planned)
Austria	9 (soon 25)
Brazil	4 (35-40 more planned for 1994)
Canada	7
Hungary	2 (Csákberény, Nagymágocs)
In total, November 1993	**200**
In total, 1994	**239**

[1] President The Hungarian Telehouse Association

[2] In 1. and 2. parts I used materials of the International Assotiation of CTSC, particularily „Community TeleService Centres: A means to social, cultural and economic development of rural communuties and low-income settlements.

3. Factors affecting on the Hungarian telehouse movement

We have in Hungary around 3000 small, fully self-governing villages, with 1400 average population. Most of this settlements don't have timely access to basic nation-wide legal, economical, technical and other types of very quickly changing information. Rural people are living, working in very variable environment forcing them to adjust to this new, unknown world. People need help to understand changes, possibilities, forces and technical assistance in they everyday life, when starting new businesses, activities. All old and new systems aimed at this support were and are planned, organised from the centre as it has been before. As usual, this services (e.g. job services, small entrepreneur's information offices) can't reach people living in small villages.

Having some year's experiment became clear, nobody wouldn't help people and small communities in their trouble caused by the transition if not themselves. More and more people understand, only newly organised, well managed communities can solve problems of the community and their members. Citizen's organisations are underdeveloped, not strong enough for partnership with local councils and upper levels of the public administration. Information, technical assistance become crucial in this kind of competition. Maybe network of telehouses could help.

Telecommunication is developing rapidly in Hungary. Market orientated telecom business is providing a wide range of traditional and developed interconnections for the smallest villages. More and more number of databases are available in different areas as law, public administration, companies, privatisation, agriculture, tourism etc. There is a real pressure from the IT market forcing potential clients to use this services.

4. First Hungarian telehouses

First Hungarian telehouse - as they say: „telecorner" - has been opened in May 1994 in the village library of Nagymágocs. There were librarians, who firstly realised the use of telehouses providing electronic database information as special library service. Main clients of the Nagymágocs „telecorner" are local farmers, entrepreneurs, industrialists, „white collar" people.

Csákberény is a small village in the Vértes mountains, close to Székesfehérvár, 70 km from Budapest to the West. As a result of the community and village development program local people invented

some kind of a place where they can get information, help, learn, meet each other, arrange different things etc. It seems we reinvented a wheel, as it frequently happens at this times in our countries (but it was our own wheel). So, looking around we found that this type of organisation - telecenters - exists. At 14 June 1994 was opened the Csákberény telehouse in a renewed hundred years old peasant's house. It's a typical telehouse - having 4 rooms on around 40 m^2, one for reception, second for meetings and computer work, education and play, and third for consultation, forth for refreshing, 2 terraces for open meetings around 8 m^2 each - with technical infrastructure and services as described in the next table comparing with the international situation:

Equipment	Telehouses in general (%)[3]	Csákberény telehouse (pieces)[4]
Access to ordinary telephone network	100	+
Personal computers	100	9
Printers	98.5	1
Scanners	96.9	-
Telefax	87.7	1
Photocopier	83.1	1
Access to databases	66.2	+
Electronic mail	61.5	possible, not installed
Access to data network	47.7	+
Access to satellite services	41.5	-
Access to ISDN	20	-
Videoconferencing facilities	9.2	-
CD-ROM	6.2	-
Others (teleconferencing, videotex)	3.1	-
Flip-Charts	n.a.	2
Overhead projector	n.a.	1
Advertisement board	n.a.	2
Kitchen (refrigerator, coffee-machine)	n.a.	+
Services		
Electronic information services	typical	under installation
Word processing	typical	+
Meetings	typical	+
Computer training	81.5	+
Photo copying	80.0	+
Public telefax service	76.9	+
Office facilities	76.9	+
Desk top publishing	75.4	possible
Hiring out/offices	58.5	possible, limited
Distance work	43.1	possible
Translation	35.4	+
Distance training	18.5	possible
Other communication service	12.3	-
Other business service (e.g. accounting)	12.3	possible
Videoconference	7.7	-
Other training (e.g. language courses)	n.a.	+
IT-consultancy	n.a.	+
Local paper redaction, edition	n.a.	+
Community programme's organisation	n.a.	+
Consultancy mediation	n.a.	+
„Looking for - offering" mediation	n.a.	+
Tourist information centre services	n.a.	+

[3] The table shows what part of 65 analysed telehouses is installed by the given kind of technics, early 1994.
[4] August, 1995.

Csákberény telehouse is a non-profit institution founded by the „Foundation for Csákberény" in contract with a local business group[5], which is also sponsoring the telehouse activities while it becomes self-financing.

Many settlements - around 50 - are showing interest at this time in the telehouse building. One of the concrete programs is organised in Lengyeltóti (County Somogy), where 4 villages decided to create a small area telehouse network around Lengyeltóti telehouse service centre. This development is very interesting, because in Hungary we have around 150 so called „small area village cooperations", most of them without any technical assistance. This aspiration needs and serves something like the telehouse system forming nation-wide network.

5. The Hungarian Telehouse Association

In January, 1995 is established The Hungarian Telehouse Association (HTA) by volunteers, who are working for Hungarian telehouse development. There are more and more villages interesting in telehouse building, asking for help, models, education, consultation.

As a fully volunteer's, non governmental movement, HTA members decided to work for research and further development telehouse practice, and it's distribution. They think to widen this process by

- research, analysis, accumulation and distribution of the Hungarian and foreign telehouse knowledge and practice by a publication (manual) and project manager's course, telehouse building guide publications,
- composition of the information catalogue for telehouses (data bases, other Hungarian and foreign information sources),
- a pilot project, creating some (3-4) other telehouses, giving help in this program (consultation, technical help),

  widening telehouse practice, promoting nation-wide program, analysing results, developing the supporting institutions and infrastructure, organising seminars for telehouse builders,
- representing common interest and organisation services for the existing telehouses.

6. Vision

[5] KÖZIGKONZULT is a company specialised in public administration management consulting., KÖZIGPRINT is a company specialised in public administration publishing and education, both located in Csákberény.

Following the mainstream of the world-wide IT development strategy formulation - e.g. Bangemann report, White Paper, national IT strategies as US, Singapore, Denmark and many other's - a group of experts formulated National Information Strategy as the part of the Hungarian modernisation programme (NIS). Many suggestions of this strategy lead to the different types of interconnected, universal teleports, electronic meeting points etc. where new services could find their local clients under their local control. Telehouse is a special, successful solution for small villages, potentially able to realise all novelties of the future infosociety aimed at people living in small settlements, local - rural our neighbourhood - communities. Some examples, mentioned in NIS, show this possibility: remote administration (one stop/non stop shop), public purpose information distribution, widening IT receptivness of the society, teleworking, distance learning, telemarketing, widening access to databases and multimedia information, intelligent city/village.

*

„Not houses finely roofed, nor the stone of walls well-built, nay, nor canals and dockyards, make the city, but men able to use their opportunity". Alaeus (Greek), Sixth Century B.C. - cited by Dr. Indu B. Singh, President James Martin Strategy Inc. U.S.A introducing his „Intelligent City" conception.

Remote Administration in Distributed Environments

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Administration and management of distributed systems are in cause of the mostly far distances not an easy job. Solutions are required, allowing centralized management of computers in a distributed client/server system. Synchronous remote control is a basic mechanism, supporting these needs. The consistent usage of this concept enables the administrator to perform management and maintenance tasks from his local computer. The architecture and implementation given here allows system administrators to work interactively and together with the users on their remote computers for doing maintenance and configuration jobs. Additionally the built-in conferencing board enables information and document exchange. The solution is not limited for system administration and is flexible enough to deal with existing standard applications running on the computers (e.g. word processing, programming environments). It is an informational and communicational infrastructure for system support, remote maintenance, hotline and remote administration in distributed computing systems. The architecture is built upon our object oriented framework for interactive audio, text and graphic communication and currently implemented for the Windows NT and Windows 95 operating system. Evaluation of this solution for maintaining computers in distributed corporate networks has been started.

1. Introduction

A special character of information systems of this decade is the integration of open standardized systems from different vendors. Decentralization of organizations and the growing of networks has created a new challenge for network administrators. Client/server communication is based upon transactions generated by the clients and processed by servers. Typically client and server are running on separate computers in distributed environments. Within distributed systems we have to

decide network management and system management[3]. Network management is dealing with communication facilities and is responsible for providing the communication infrastructure. System management means coordination of interconnected computers.

Remote control enables interactive access to remote workstations for system management and user support. The distributed solution given here provides a communication system supporting remote control services, which are suitable for system administration tasks. The main point of view lies in an appropriate method for information exchange and access (devices, configuration, desktop, etc.) to their remote systems. System administrators use the *management application* for connection with the *remote agents* which are running on the remote workstations. Both components are based upon our class framework for audio and video access and interactive communication. The management application is built with special capabilities for viewing and interacting remote systems. On the remote computers the agent is started as a background process which is usually inactive and invisible.

2. Administration and Management of Distributed Systems

According to the distinct requirements in system administration of distributed environments, different mechanisms must be established for maintaining the connected computers. Optimized integration with simple operation mechanisms is an essential need[1],[9]. The following list gives an overview of the basic demands for centralized administration and management of distributed systems:

- Collection and interpretation of connected computer systems and their configuration (cpu, memory, harddisk, etc.)
- Search for data and information in many distributed sources
- Software installation and configuration on distributed computers
- Software distribution and use of shared copies
- Individual configuration of computers within networks
- User and server management
- Monitoring system security

Remote control - one computer controls another distant computer - is the key to most of the above listed requirements. Existing network or dialup connections between computers will be used for interactive work on remote computers. Capturing a selected screen area (text, graphic) of computers desktop allows to view into a remote system. Synchronous control of mouse and keyboard of the user's workstation enable interactive work on this computer.

For helpdesk environments and user support there is an additional need of communication support between the requesting user and the support specialist [4]. A conferencing board should allow bidirectional conversation and exchange of messages, documents and files as well.

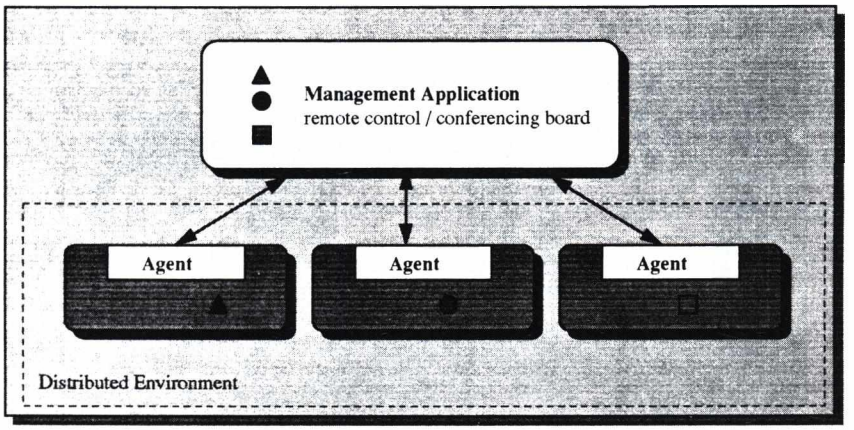

Fig.1: Centralized administration of distributed environments based on remote control

Administrators and users are often separated geographically. The communication link is built by computer networks within buildings or small bandwidth connections (i.e. modem, ISDN, ..) between distant locations. A framework architecture hiding this communication issues was used to implement the remote control solution given in Fig. 1.

3. Remote Administration based on Remote Control

Looking at some already existing remote control environments more closely we found some unsolved items, like the missing integration or the lack of functionality for maintenance tasks (bidirectional communication, inventory management, device configuration).

For handling these issues in our remote control environment we designed two components. One part is optimized for the system administrator (*management application*) and the other as a

background process for the users on their workstations (*remote agent*). Both components (*management application* and *agent*) are built upon the same basic communication modules [6]. These basic modules support screen input/output and audio input/output as well as network transmission mechanisms with remote procedure calls. Capturing of desktop information for remote control is implemented by hooking desktop calls and therefore does not compete with any standard applications running on the remote computers.

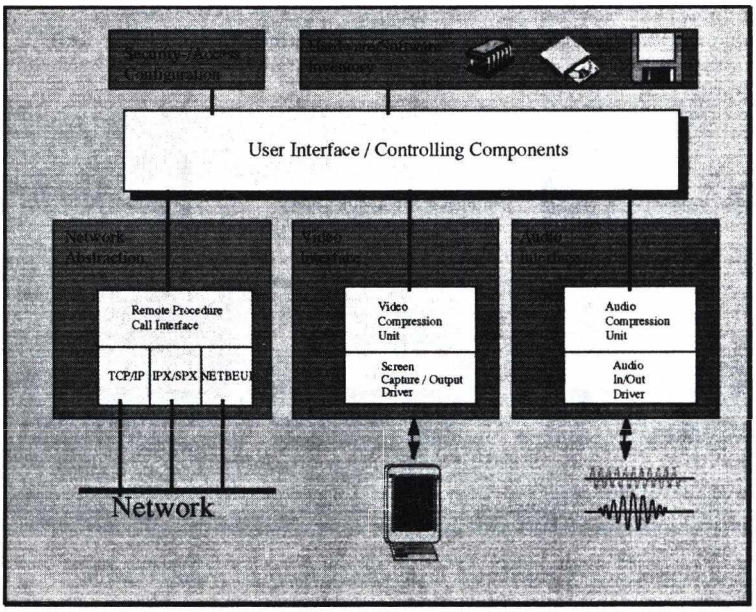

Fig.2: The main components of communication support for remote control and administration in distributed environments.

3.1 Network Abstraction (protocols, services)

Communication and connectivity in heterogeneous environments are essentially in this distributed architecture, thereby networking plays an important role. Remote Procedure Calls (RPCs) provide data transmission in our solution. For optimizing interaction the networking unit contains different remote procedures for transmitting the various sources and different amounts of information (audio, configuration, graphic,..). RPCs help to hide network communication and parameter marshalling - this is done automatically by the RPC-stubs and network components of the operating system[7], [8].

For increasing flexibility, the *management application* and the *agent* are able to link at various communication protocols (i.e. TCP/IP, NETBEUI, IPX/SPX). Different types of hardware connections are supported (network, dialup link, ISDN..). Through existing standard network transport mechanisms no additional wiring is required. Interactivity depends on the available bandwidth of the communication link.

3.2 Video Interface (display driver, capturing driver, video compression)

An important role plays the video interface unit. Special drivers for capturing as well as for the output to the screen areas must be implemented. These drivers contain mechanisms for intelligent capturing of picture information. Only information for altered display areas must be transmitted. Because of different display resolutions in heterogeneous environments the information must be converted into device independent data and compressed for the transfer over networks. Distinct mechanisms (RLE, JPEG, MPEG, Hardware support) for video compression can be selected for reduction of data. Due to digital compression transmitting of desktop information requires lower bandwidth. Only information that has been changed must be transferred, very often screens are static with minor changes.

3.3 Audio Interface (audio driver, compression unit)

All tasks dealing with audio communication are taken over by the audio module consisting of two parts. For accessing the audio hardware and sampling control a special audio driver is implemented. The audio compression unit is realized as a module for simply selecting different data compression algorithms. For optimal quality in audio transmission and decreasing delays on conversation the information must be divided into many small packets before transferring.

3.4 User Interface/Controlling Components (management application and agent)

There are two components of the application according to the distributed architecture. The management application for administrators with graphical user interface for maintenance tasks (chapter 4.1) and an usually invisible agent for remote computers (chapter 4.2). Optimized routing of messages and data streams between network and audio/ video units is it's main task. This unit is responsible for handling the user interface including dialogs and is therefore the visible part for the

operators. Additionally a special macro component allows to do repetitive installation tasks on different remote computers.

3.5 Software/Hardware Inventory

Our architecture allows to collect and maintain software and hardware inventory of the computers equipment in networks (memory, cpu, harddisk, ...). The administrator can look at the inventory and information about installed software versions of any computer within the network. For configuration change or software setup on remote computers he directly interacts with the remote control tools.

3.6 Security-/Access Configuration

Because of the possibilities and services given by this application (i.e. monitoring and controlling remote computers) a consistent mechanism promising security and controlled access is necessary. We chose Access Control Lists [7] for individual configuration of user access to remote computers, which are defined at the agents individually.

4. Implementation of *Management Application* and *Agent*

Our prototype implementation of management application and agent is fully 32-Bit multithreaded for the Microsoft Windows NT and Windows 95 operating system. They are objectoriented applications based on Foundation Classes [5] and our communication framework [2] and support interactive remote control in networks according to the demands given in chapter 2. Multiple threads reduce application response times and support multiprocessor computers.

The computer running the management application (administrators application) displays the desktops of one or more connected stations (users workstations) simultaneously with multiple document interface (MDI) and zooming. On the remote computer a small control panel containing the conferencing board is started automatically when the connection is established. An integrated security editor allows the configuration of access control by use of Access Control Lists [7]. Both components include context sensitive online help. The language of the user interface is simply portable by translating the message module into the language of your choice.

4.1 The Management Component

A remote computer is represented on the administrators console by a window containing the inventory, the remote computers desktop and the communication board. The inventory of remote computers including devices and their configuration is given by the hierarchical viewer. For remote interaction the management application controls mouse and keyboard inputs for the remote computers. Thereby it enables interactive work on distant units. Communication boards for exchanging messages and documents with drag and drop are integrated to reach all members of the network. Special attention was taken on optimizing the communication dialog between connected users. Digital audio communication across the network allows direct conversation of administrator and user.

The application includes controls for selection of dialog forms and also a toolbar for fast access of often used functions (e.g. capture a user's screen, get information about the connected computer). If the same administrative tasks should be done at more computers, (i.e. installation of a new software package) this can be performed by usage of predefined procedures. Inside the application window the administrator can display several user's desktops by positioning, cascading or tiling the connection windows. Active connections can also be iconized for minimizing space on the administrator's desktop.

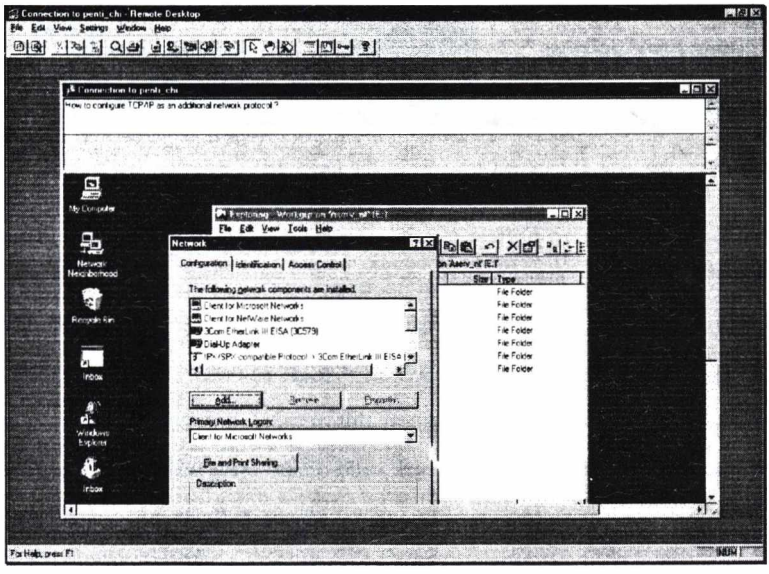

Fig.3: The administrator is connected to the network and controls a remote computer.

4.2 The Remote Agent

The user interface for remote users is also implemented as an object oriented application. For realizing a background application it is wrapped by a service process. It consists of a small control window, which is opened when the connection from an administrator is established. This control window contains the communication board for individual dialog with the connected administrator. Additionally she or he can hear transmitted audio information and can put questions over the microphone. Administrators are able to control the users' computers remotely. For defining the access rights of different users and user groups a security editor is realized as a special dialog.

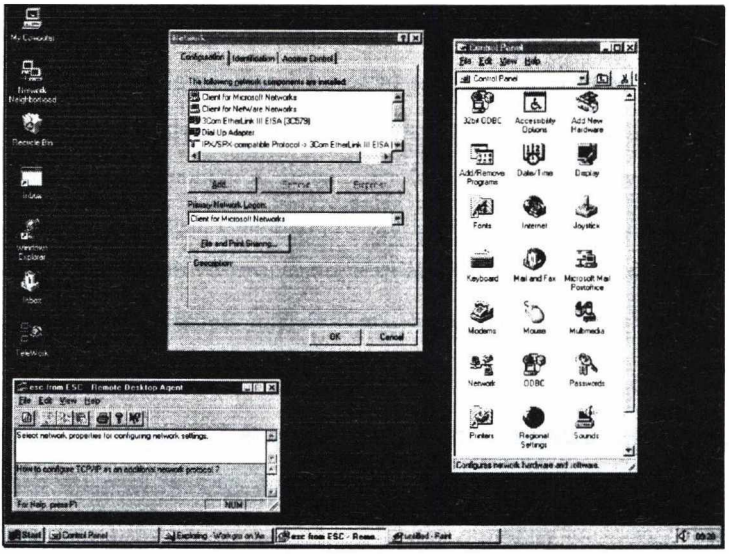

Fig. 4: The agent pops up the communication window in the lower left corner on establishing the connection from the management application.

5. Conclusion

This article presents the architectural overview of our solution for remote administration of computers in a distributed environment. Services like remote control, maintenance and synchronous information exchange are built upon this remote procedure call architecture. The design integrates standard communication networks and dialup links without any additional wiring. Access validation to remote computers is provided by object security on contacting the remote agent.

The main fields of application for this communication architecture and the implemented prototype are in network administration and maintenance areas. Further in fields where several forms of synchronous communication over distances are needed (management of distributed systems, user support, distance education). The solution improves assistance in distributed environments, where the administrator is able to contact the users and their computers on the network. Management of distributed systems is simplified essentially and the system administrator assists and communicates directly with the users without leaving his office.

6. Acknowledgements

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Use of cooperation technology to empower children with cognitive impairments

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Introduction

Many human achievements could not be made without *cooperation*. CSCW (Computer Supported Work) emerged based on the recognition of human work as a cooperative activity.

In work situations, cooperation allows for achieving complex tasks. In education, cooperation between a student and a teacher is necessary to enable a child to reach a higher level of knowledge or cognitive skills. Children would not develop properly and finally reach the desired level of independence if *mentors* would not cooperate with them in learning and behaving.

Children with mental impairments have severe problems to get independent at all. Little is known so far of the cognitive potentials they have and how basic cognitive capabilities (including reading, writing or doing simple calculations) can be taught. Expectations about what can be achieved by and with mentally handicapped children are low. Unexpected and surprising results are rare but, if achieved, based on big efforts in terms of time and resources spent by mentors (parents, teachers) cooperating with the child in almost all learning situations. Many of the mentally impaired children have problems with reading and writing. Some results can be achieved by dedicating more mentoring time but some are impossible to reach with standard methods. Many of the children have severe neurological problems making talking or hand-writing impossible for their whole life.

The paper reports an approach to explore the cognitive potentials of an individual child who is mentally handicapped and develop methods for acquiring basic cognitive skills through cooperative mentoring and the use of cooperation technology (like shared editing). This approach is quite different from current approaches of how computers can benefit the disabled in which the role of the computer is mainly the one of a prothesis. Such approaches are appropriate e.g. to help blind or deaf people to perceive better. Mentally impaired persons, however, are lacking basic cognitive skills and such can not be simply *added* to a person in the sense of a prothesis. Simply spoken, the computer can not read or write for a person who can not read and write.

For mentally impaired people, the approach must be different. Here, it must be explored how the use of computer technology can empower people so they can achieve their full cognitive potentials. This does not exclude using the computer as a prothesis too.

The first part of the paper is written in a story like style. The story introduces S., the person for whom the system reported in the paper was developed. It continues with reports on a sequence of steps taken to teach S. reading and writing. Later steps included the use of single user editors and finally multi-user editors allowing shared editing between a mentor and the

child. The shared editors were developed iteratively using rapid prototyping. Quick changes were made based on intensive user observations.

The second part of the paper presents the design principles on which the most current version of *BiEdit* (the editor for sharing documents between S. and his mentor) is based on.

The third part, finally, gives a short overview to the implementation of *BiEdit*.

The case S.

BiEdit is designed and under development for a single user. S. is a currently 13 years old child and it is said that he is mentally handicapped. S. is suffering from the fragile X syndrome.

"Fragile X syndrome is the leading known hereditary cause of developmental disabilities, having an estimated incidence of 1 in 1000 individuals. Both males and females may be affected with a variety of developmental problems, including learning disabilities, mild to severe mental retardation, behavior management challenges, attention deficit hyperactivity disorder, sensory and perceptional problems, autism and autistic behaviors." (from *National Fragile X Advocate*)

Fragile X syndrome is thought to be the most common familial cause of mental impairment. Currently, many people with mental impairments are diagnosed as such with unknown origin. Knowledge of the fragile X syndrome is rather new and it is very likely that many of the cases with unknown origin are suffering from the fragile X syndrome.

In addition to mental impairment, fragile X syndrome is characterized by a group of symptoms, which include physical and behavioral characteristics and speech and language delay.

The fragile X related problems of S. have been severe since his birth. When S. was 6 years old he could *not*

- walk properly,
- use his hands properly,
- talk at all, and
- understand spoken language.

His motor coordination was very poor. He had vision problems and bad eye convergence. At this time, there was a clear diagnosis: S. would be never able to *talk, read or write*. He also would have a long life problem with expressing ideas, wishes, needs, or emotions. Definitely, he would never be able to attend a school.

Approach

Breaking down barriers: notion of written language

None or little research is done on the cognitive potentials of mentally handicapped, mentally impaired, or cognitively impaired people. The majority of the mentally impaired has severe speech problems so they can not communicate properly. They simply can not tell what they are thinking, feeling, or wanting. Quite often, their speech problem has a physical cause (spasms, muscle paralysis, ...) which prevents them from talking. Nevertheless, they are

called cognitively impaired although nobody knows what their internal cognitive representations and processes (concepts, internal imagery, reasoning, ...) are. They are simply unable to communicate them. On the other side, communication is an important process for developing a mature cognition.

If mentally impaired people would even be able to communicate (assuming that they have got a notion of written language), there are again quite often physical problems preventing them from hand-writing (e.g. poor eye-hand coordination, spasms, ...)

There are a lot of signs that people with cognitive impairments are able to compensate their deficiencies by developing some capabilities extremely well. People who can not speak might have problems to develop language based concepts (propositional memory). They quite often compensate this with an amazingly huge and perfect working visual memory. Again, however, they can not communicate their visual concepts.

Assuming that due to the brain deficiency a mentally impaired person will never be able to talk, the question is now whether he/she would be able to learn to read and to write although there is the common belief in educational sciences that only children who are already talking will be able to learn to read. On the other side, many elementary schools are teaching reading through a wholistic method by presenting word after word. This is a method stimulating visual cognitive processes and visual memory.

It is outside the scope of this paper to explain the details but it must be noted that S. learned to read at an elementary level. Supervised by a rehabilitation clinic in Philadelphia, words and later also very simple phrases (written on big cards in very big letters, to overcome eye deficiencies) were exposed to him for a few seconds and several times a day and the word was spoken out by the person who did the presentation. In this *sensory stimulation* program, S. has seen over 10000 words and 5000 phrases over more than 3 years. He also has seen over 2000 hand written books which have been produced by his parents, especially for him.

When S. was 8 years old, he has got a clear notion of written language although he still could not speak any real word. A few meaningful sounds were the only spoken language he had developed so far. However, his capability to memorize and recall visual items and scenes as well as spatial structure was extremely developed.

First steps in writing: using letter cards

In school, reading and writing are taught in parallel. Due to his poor motor skills, S. was unable to reach a level of writing similar to his reading capabilities. In fact, he still was not able to write his name properly but at the same time he could read, for example, the words for more than 20 parts of the human body by seeing the word and pointing to the part of the body denoted. He also had learned the letters of the alphabet and numbers from 1 to 100.

Several experiments were made to find out ways to get S. *writing*. The use of a letter case was the first successful one. A letter case is a box containing cards on which a single letter is printed. For each letter of the alphabet, there is a small set of cards. Words and phrases can be build by putting letter cards into a sequence. Letter cases are providing a type of *workbench* on which letter cards can stick. Usually, they provide space for 10 to 15 words over 3 lines.

The use of letter cards enabled S. to develop his first writing capabilities. It was the first time in his life that he could use a medium to express himself, his thoughts, and his emotions. Composing words of letter cards allowed him to write his name or his favorite words.

The use of letter cards, however, is rather limited. They require a lot of perceptual and motor skills to draw them out of the box and to arrange them into the right sequence on the workbench. Corrections are hard to make since they mean quite often rearranging a lot of cards and/or removing some.

With the help of his parents, S. was able to write very short stories e.g. about his daily life or simple facts of knowledge. Here, the major disadvantage of letter cards was that all what was edited with letter cards could not be saved and was therefore not permanent.

Because of all this limitations, letter cards although very successful at the beginning could not be considered as an appropriate medium for developing writing skills.

Stepwise advancing in writing: using a computer

When S. was 9 years old, first attempts were made to use a text editor for developing writing skills. Since then, editors were (and are still) used almost daily with increasing frequency and duration. They offer many opportunities for developing S.'s reading and writing capabilities.

All editing sessions happen in close cooperation between a mentor (parents, teacher) and the child. This means, that S. and his mentor are writing cooperatively with changing roles.

Editors are used for a variety of tasks ranging from learning how to write a word or a simple phrase to writing complete *stories* on factual knowledge or S.'s daily life.

There are a variety of principles an editing session can be based on, e.g.:

- the mentor is the driving force and writing up a story; the mentor prompts S. to write some words in the story usually words S. is already mastering or getting familiar with;
- there are standard stories on S.'s daily life experience or S.'s favorite objects or events; for them, S. is the *driving* writer; the mentor helps when needed; sometimes the mentor misspells words on intent to challenge S. to correct them;
- stories are evolving either by permanent *spoken negotiation* between S. and his mentor or in a more or less quiet atmosphere in which both partners are communicating by writing only;
- stories are pre-written (on paper or on the screen) and S.'s tasks is to copy them word by word;
- stories are written from dictation;
- S. may write what he likes and what comes in his mind regardless whether the result is readable or not; at the end, S. and the mentor are going to work over and improve what S. has written.

When first experiments started to see how S. would accept an editor it was immediately evident that S. had a clear notion of what an editor is for, how it works and how it must be used. From the very beginning, the use of editors had many advantages over the use of letter cards:

- documents can be developed incrementally from simple to complex and sophisticated ones
- the text can be *infinitely* large

- the medium is *patient*
- results (even intermediate) are aesthetic
- results are permanent and reusable
- an editor provides a lot of flexibility in editing and undoing.

Of course, there have been obstacles S. had to fight against. The use of the keyboard, for example, was a long lasting problem. Due to the poor motor skills, wrong keys were hit quite often. A major problem was to succeed in pressing together the SHIFT key and any other key although the meaning of the SHIFT key (as a mean to get a caps letter) was quickly picked up.

The CAPS key (co-located to the SHIFT key) was a permanent source for frustration. It is, by the way, the only key for which S. has never developed any clear notion of its function.

Many other keys, however, were understood either immediately (alphanumeric keys, of course) or soon. Backspace key and cursor keys, for example, were learned by observing what the mentor did and by intensively *playing* with them (especially with the cursor keys).

At the beginning, editors especially written for people with vision problems were used. They had several features facilitating the introduction of a computer based tool like

- small functionality (to avoid distraction due to too many options),
- offering big fonts (necessary because of S.'s vision problems), or
- providing colored fonts (allowing for words in red color on a white background a configuration with the best fit to S.'s visual perception).

All the single user editors which were used later were prototyped with *Tcl/Tk* and improved iteratively by observing how S. was using them. All these editors were shared between S. and his mentor during an editing session. The screen and the keyboard were shared as well as the whole functionality of the editor was.

Both was problematic, because

1. S. wanted all the time to get more independent and so he wanted soon to own the keyboard. On the other side, the mentor was needed all the time to teach S. writing and to intervene (e.g. undoing actions S. could not undo) if necessary.
2. for the main task, namely writing, only a very small part of a standard editor's functionality was needed, and perceived and understood by S. Sophisticated features like *CUT/PASTE* using an invisible clipboard or kill buffer, and also all file related operations like save or load were either not well understood or distracting. In addition, all editors used at the beginning were based on an *EMACS* like interaction style, namely *CTRL+key* or *META+key*. S. quite often hit the wrong keys due to bad motor skills. There have been often hit key combinations causing unexpected results like leaving the editor or deleting a region of text Since S. was not aware what key has hit he could not build any model of causality.

These and many other observations lead to the design of *BiEdit*, a two-user editor for cooperative writing. *BiEdit* is now successfully in use for more than 1 1/2 year. S. has advanced in

his writing capabilities in a way which could not be expected a few years ago. *BiEdit* enables him to develop toward an independent writer but support can always be provided if and where needed.

Basic design principles for *BiEdit*

Since the emergence of CSCW, several real-time multi-user editors were developed. They certainly have influenced the design and architecture of *BiEdit*. Most influential for *BiEdit* was *ShrEdit* (McGuffin and Olson).

BiEdit is designed for cooperative writing sessions usually taking place in the same room. Both, mentor and child have their own working environment consisting of screen, keyboard, and mouse. They are sharing the same text document (controlled by a server process). Mentor and child have access to the document via their own *BiEdit* client software providing editing functionality and user interface.

Like *ShrEdit*, *BIEdit* was designed as a *relaxed* WYSIWIS (What You See Is What I See) editor. Usually, mentor and child see the same portion of the text in the same basic layout (line content is preserved, font style and size can differ). The mentor, however, can decouple the editors which means that he can browse through the text without effecting the child's view and change text without notifying the child.

The default version of *BiEdit* consists of 2 windows on both the child's and the mentor's side. One window, the text window, represents the editor for the shared text. The other, the *dictation window*, is writable for the mentor but read-only for the child. Its purpose is to present text to the child which he can or should copy into the text. Dictation window and text window can be strongly coupled which means that the child can only write the content of the dictation window into the text window. Otherwise the two windows are de-coupled and the child is free to write in the text window.

The mentor's (client) editor provides full functionality (including file management, cut / copy / paste, mouse selection for insertion point and regions, ...). The child's editor in its minimal version allows only writing, deleting characters with backspace, and text cursor movements. The default mode is the insert mode. Since using a standard mouse is a major problem for people with bad motor skills, mouse functionality is not part of the minimal child editor.

Based on the experiences that using an editor can enhance the cognitive capabilities of impaired persons and the sophistication of use is growing, the child's editor can be extended in its functionality incrementally up to a version equal to the mentor's editor's functionality. S.'s editors, for example, is currently extended to simple mouse functionality namely controlling the insertion point by mouse clicks.

The mentor can configure the child's editor and change settings at any time (even during sessions). Adding more functionality to the minimal editor is one configuration option. Other options are font size, foreground and background color, and word wrapping. As mentioned above several keys can cause problems (like the CAPS key) or should not be used. Hence, single keys can be locked.

Since the child's editor in the minimal version is *mouse-less* windowing operations like move, open, iconify, close, focus and resize are supported from the mentor's client program (tele-manipulation of windows).

The child's editor can also be locked from the mentor's client program. This allows the mentor

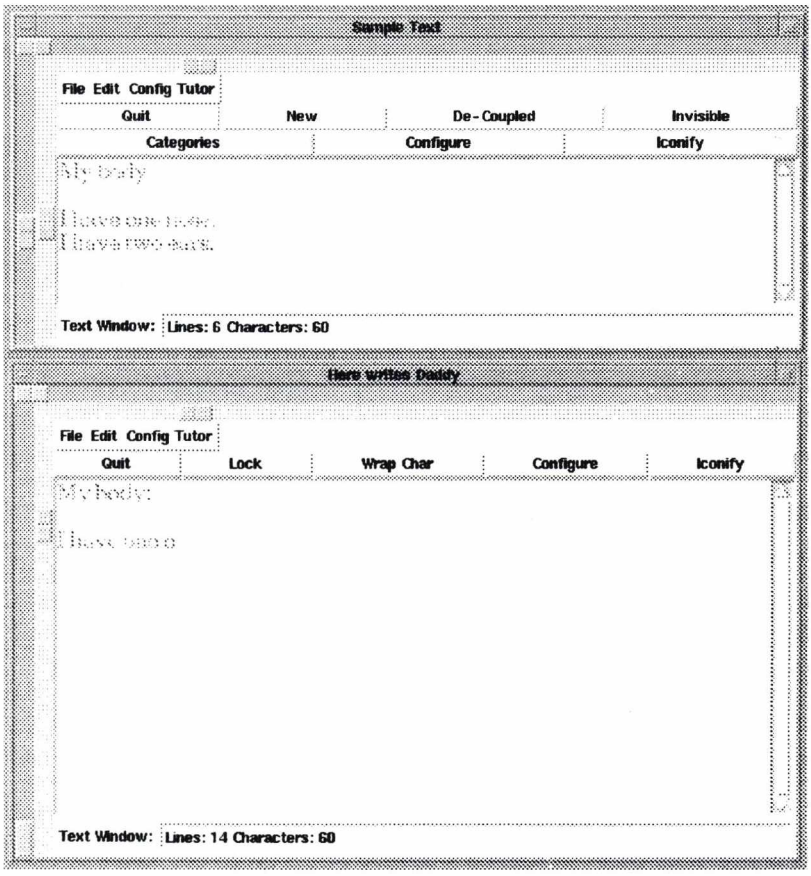

Figure 1: Mentor's screen

to stop destructive operations on the child's side but also to make the child watching what the mentor is currently writing. This feature allows sessions where the child is reading only.

Figure 1 shows the two standard windows of the mentor's editor. The top window is the dictation window, the bottom window the text window. The dictation window was edited by the mentor and the current mode is *strongly coupled* so the child must write in the text window what is written in the dictation window. The text window shows what was written so far. Figure 2 shows the two windows at the child's screen.

The vertical and horizontal scroll bars attached to both windows in figure 1 allow to resize and move the child's respective window on his screen. Several pull down menus give access to the functionality described above.

Figure 3 shows some more windows at the mentor's side: e.g. a tool bar with access to other shared tools like a board for exercising simple calculations or a calendar. A first prototype of the calculation board is opened in the bottom window. If the client version is running without a mouse, the active window must be set from the mentor's side. This can be accomplished in the top window of figure 3.

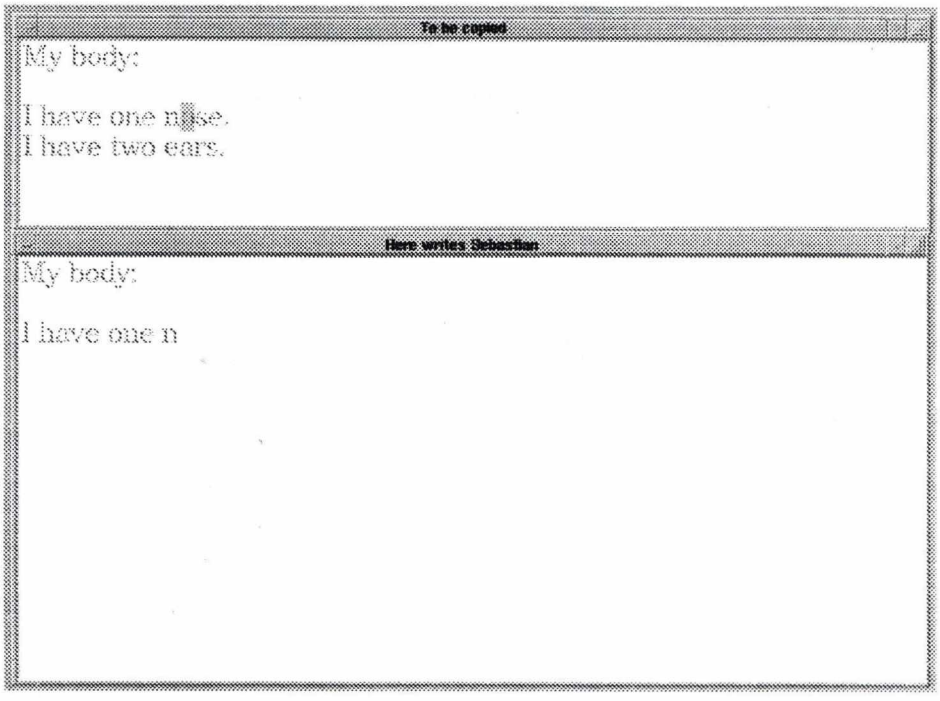

Figure 2: Child's screen

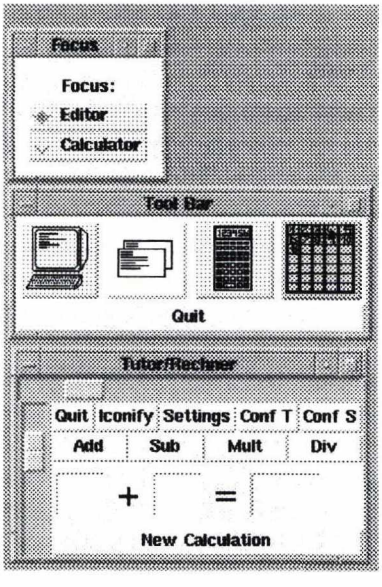

Figure 3: Other windows

Implementation

BiEdit is part of *SunRise*, a user environment, especially developed for S. *BiEdit* is implemented for a *TCP/IP* based network and runs under *X11*.

Since the development of *BiEdit* is highly iterative and extensions should be possible and easy, a platform allowing rapid prototyping of functionality, user interface, and *TCP/IP* networking was chosen.

BiEdit, as all the other parts of *SunRise*, is implemented in *Tcl/Tk* (Ousterhout, Welch) as far as functionality and user interface is concerned. *Tcl* (*Tool Command Language*) is increasingly becoming popular for prototyping and is both a script language and an interpreter for that language. The *Tcl* functionality is implemented by a *C* library and can be easily extended with *C* functions. The most important extension of *Tcl* is *Tk*, a toolkit for *X Windows*. *Tk* provides commands for the creation and manipulation of user interface widgets under *X11*. *Tk* offers almost all basic widget classes (e.g. **button**, **menu**, ...) and also a few high level widgets like **canvas** and **text**.

Working with *Tcl/Tk* has several advantages. Among them are:

- the development of user interface components is fast; changes can be made easily and *on the fly*;
- *Tk* is providing high level widgets (e.g. **text**) which most of the UI toolkits do not offer;
- new high level widgets can be added rather easily by implementing their functionality in *C* (or *C++*) and building a new interpreter containing the new widget class.

BiEdit, as a collection of shared text editors, is based on the *Tk* **text** widget. In *Tk*, a **text** widget realizes a general purpose editable text. Attributes like Fonts, Size or Colors can be controlled for regions of a text represented by a text widget. The content of a text widget is accessible through positional marks which allow for an easy implementation of all generic editing operations.

TCP/IP networking, necessary for implementing the shared editor and the tele-manipulations as described above, is realized under *Tcl-Dp* an extension of *Tcl/Tk* allowing *TCP/IP* programming under *Tcl/Tk*. *Tcl-Dp* supports *TCP/IP* socket access, and development of message exchange between *TCP/IP* clients and servers is fast and simple.

Outlook

The development of *SunRise* is far from being finished. Current work is on providing 3D visual representations for filing and retrieving objects of interest like text documents or pictures. This work is based on the general design principles for the Information Visualizer (Robertson et al.). Since talking and reading loudly what one has written is an important feedback for the development of reading and writing skills also a speech synthesizer which can speak out what S. is writing is under development. This type of prothesis used together with the editing tools will enable S. who can not speak to *speak* with increasing sophistication and to *hear himself*.

So far *BiEdit* has proven as an appropriate environment to enhance cognitive capabilities of mentally impaired children. According to the nature of problems mentally impaired people have

achievements like the reported ones can only be reached in cooperation with a mentor. *BiEdit* was designed and developed for a single person only. However, discussions with experts in special education confirmed that many of the design principles for *BiEdit* could be of importance for a broad range of mentally impaired people.

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Teleteaching in the Számalk

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SZÁMALK, Systemhouse Ltd.,
Director of Training and Consulting Center

I would like to demonstrate the practical and financial implementation of a nationwide network in the case of Dennis Gabor Technical College for Informatics.

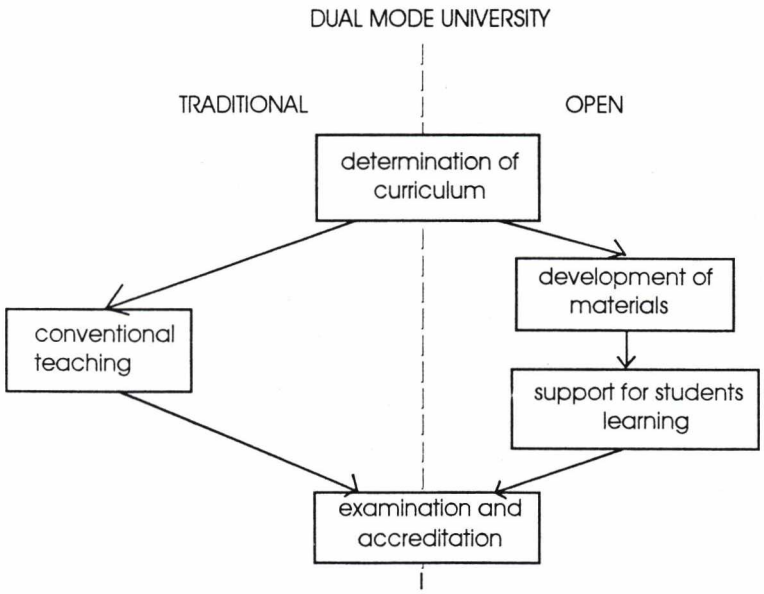
The College

Dennis Gabor Technical College for Informatics, founded in 1992, is a private college maintained by a foundation that provides college level instruction in computer science, systems engineering and information technology via distance teaching combined with traditional lecturing and tuition. Following a government decree (No. 127/1992 (V.12.) it was founded by SZÁMALK and LSI, two leading companies long active in computer related third level education. The College is committed to the introduction and use of modern and efficient teaching methods, including those of distance teaching and learning as pursued in the developed countries across Europe.

The number of students enrolled for autumn 1995 was nearly 7000. The College has an extensive network of regional learning centers where nearly 50 % of the students applied including Békéscsaba, Debrecen, Győr, Gyula, Isaszeg, Kaposvár, Keszthely, Mátészalka, Miskolc, Nyiregyháza, Pécs, Salgótarján, Szeged, Szekszárd, Székesfehérvár, Szolnok, Szombathely, Tatabánya, Vác, Veszprém, Zalaegerszeg, and four places in Transylvania.

The Methods and Form of Instruction

The College is operated in an open university setting using the methods of distance teaching.



Students are provided with special distance learning packages and home study materials. They also have access to individual tuition, consulting services and activities on the premises of the regional center of the College.

Learning progress is assessed by applying a number of tests and exams in each subject. Test exams dates are scheduled flexibly by the College. Exams in similar subjects taken elsewhere by students on transfer will be recognized.

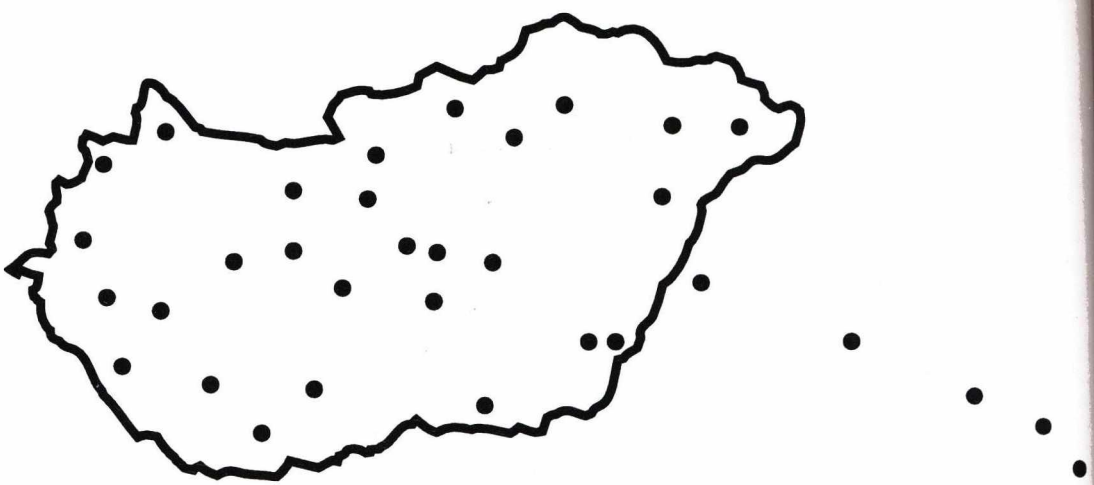
The study program follows a rolling delivery policy with no breaks for the summer or winter vacation or end of the term examination times. Lectures and consulting services organized into modules that follow one after the other in tight turns. Lectures and consulting hours are scheduled for Fridays and Saturdays, other activities are flexible arranged.

The Experiences

In order to create an 30 elements network we had to elaborate "the train the trainers" system, the standardisation methodology and the delivery system. There are four requirements to create a network:

- organisational,
- technical,
- contractual,
- financial.

THE NETWORK REGIONAL LEARNING CENTERS



The regional centers mainly placed at unive rsities, colleges, secondary schools, public community centers, or at bigger computer companies.
Very important figures of the evaluation are the speed of expansion and the drop-out rates.

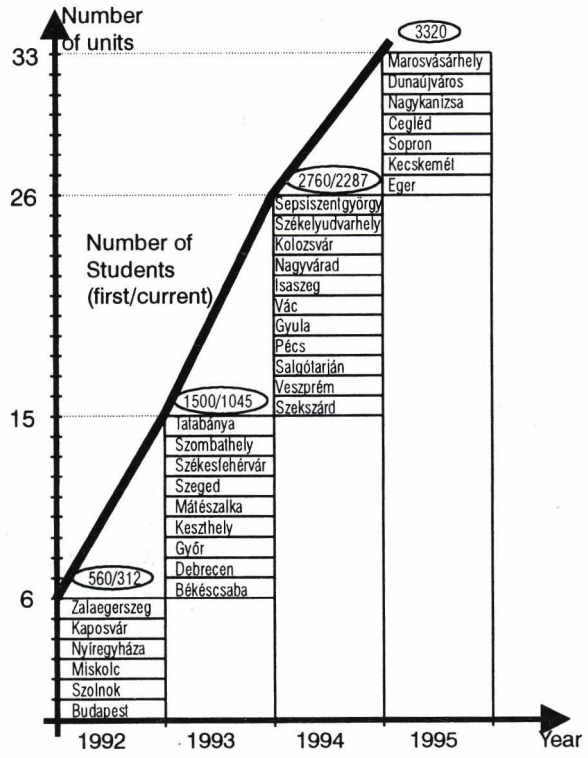
The expansions of the student number:

Year	1992-93	1993-94	1994-95
Percent of growing	167	84	20

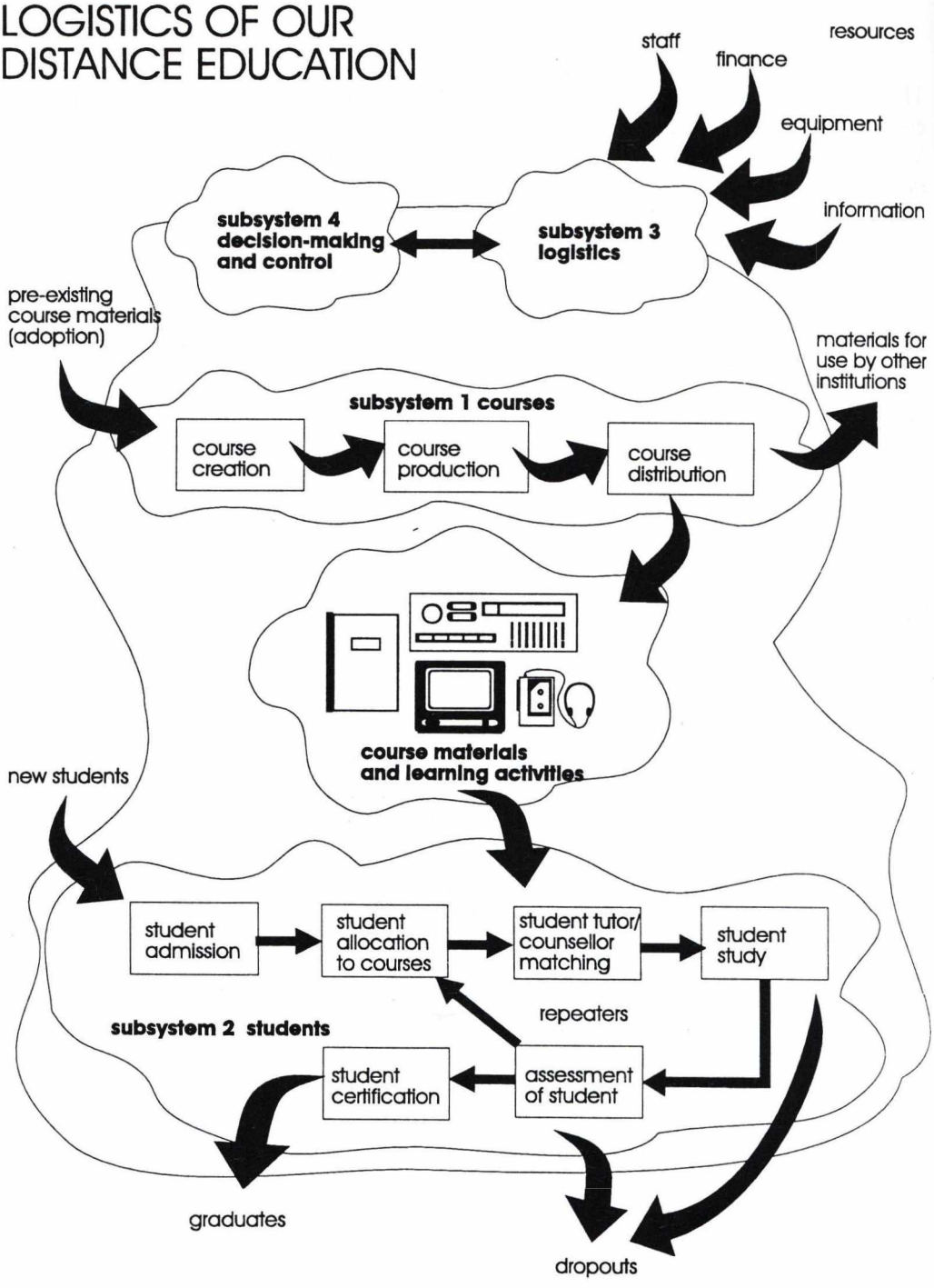
The drop-out rates by the first year:

Year	IV/I	III/I	II/I
Percent	45	31	18

THE NAMES AND FIGURES OF THE REGIONAL NETWORK



LOGISTICS OF OUR DISTANCE EDUCATION



Heterogeneous Databases and Data Flows: A Case Study in an Industrial Environment

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Typical medium sized companies use heterogeneous databases. This results in redundancy and manually controlled data flows. By introducing an additional database for handling the data flow we are able to automatically control the consistency of product data. By that the quality of the data is improved considerably.

1. Introduction

The KEBA company in Linz, Austria, a project partner of the our Institute develops and produces printed circuit boards and products based on these boards. With the project "Integrated development and production ambience" KEBA made the first steps towards a global integration of data and communication services focusing on the manufacturing process.

The following objectives built the frame of the project:

1) Reduction of processing time
2) Increase of delivery quality

Despite the high level regarding the information integration that KEBA has reached with its first CIM project, the present information structure still included following weak points:

1) The aim to file the company data
   * redundancy-free
   * in a general data format

   has not been satisfyingly achieved.

2) The integration of information flows (information logistics) and the optimisation of material flows (logistics) [2] do not work together and have therefore not yet been adapted to each other. That is why a large potential for reducing processing time and increasing the flexibility is still wasted.

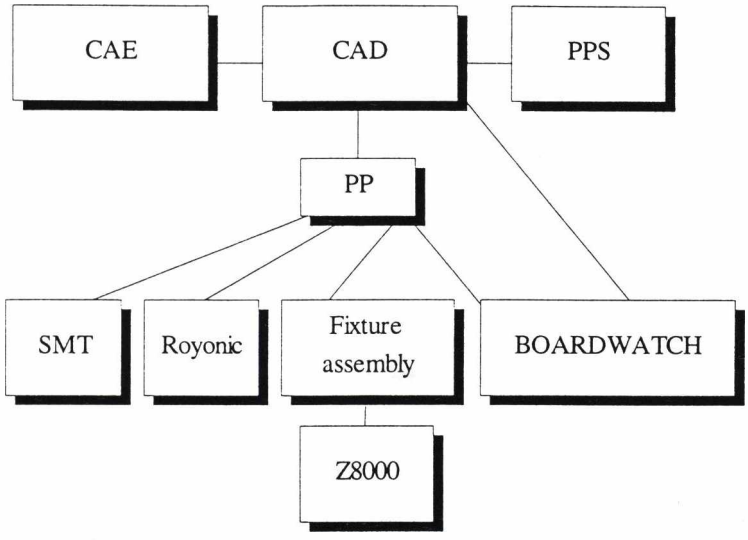
A second step of the extensive and modular CIM concept of KEBA was the implementation of the product information system (ProdIS). Product modifications and development releases should be managed by this database in order to implement important basic data for product handling with regard to product liability regulations (QA standards ISO9000 to 9004). In particular, the ProdIS data base supports the possibility that different company sections (e.g. PPS, CAE, CAD) can specifically manage their data. However, the base data is only managed once in the system so that the user can always access current data. If a redundant data management cannot be excluded, there exist control algorithms which independently (triggered by the system status) update the data stock.

Due to vertical as well as to horizontal integration of information and data flows inside the company the following requirements had to been fulfilled in order to meet the customer demands quickly:

1) The completion of product and order data by production-specific data (CAM) as well as by data which is required especially for the in-house test of the products (CAQ, CAT);

2) The development of universal interfaces in order to create a modular company database (e.g. SMT integration) giving the basis for further investments.

The following Diagram gives a general overview about the partially heterogeneous and distributed databases and their connections before the usage of ProdIS:



Legend:

CAE	Current flow diagram - draft, simulation
CAD	Layout of printed circuit boards
PPS	Production planning system
PP	Post-processing universal interface
SMT	Robotic controlled SMT assembly
Royonic	Semiautomatic conventional assembly
Fixture assembly	Draft test head adapter for in-circuit tester
BOARDWATCH	Quality control documentation system
Z8000	In-circuit tester
Rep	Repair handling printed circuit boards

Figure 1: Distributed databases

All these databases have their fixed place in the company and perform their task quite well. Unfortunately, none of them did manage informations about

* the history of versions, revised versions and modification states of any product
* technical information to each modification state such as the construction bill of material
* software releases in the programmable components in association with the modification state of the printed circuit board
* technical information to each component

The information flow between these databases still performed without time coordination and consistency checks.

2. The Architecture of ProdIs

Derived from the previous listed requirements, we got the following architecture for ProdIs:

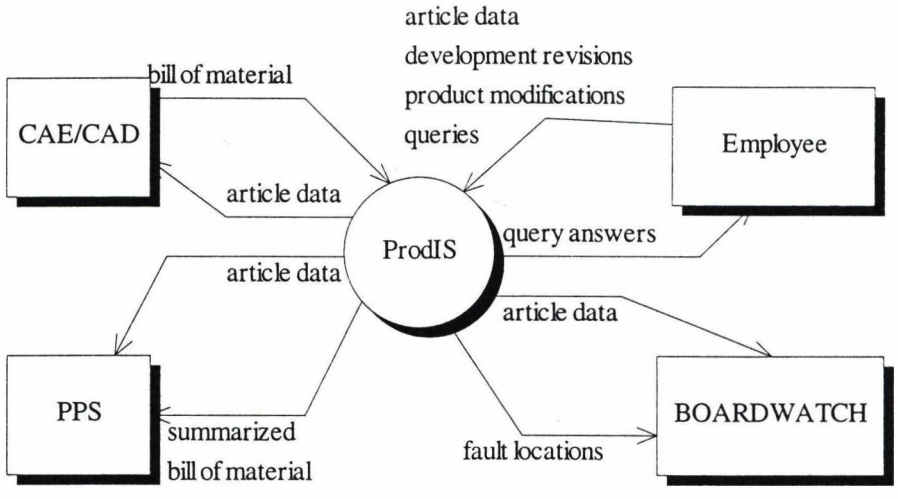


Figure 2: Global architecture of ProdIs

2.1. The database as a data turntable

The databases till the introduction of ProdIs used by the company (see figure 1) do not hold disjunct information. New data resulting from a new object of the real world (e.g. a new article) is not entered at the same time into all databases. There was an information flow - by paper or often by telephone-call between the employees - from one database to the next. This information flow should be take off by the new system. With this background the key-word "data turntable" is defined as follows: A data turntable is a system which is situated between several databases and controls the information flow between the databases in the way that it receives, completes and sends data. In the actual situation the data-turntable-aspect of ProdIs looks as follows:

ProdIs has own to manually entered article data which immediately and automatically is sent to the neighbouring systems. Construction bills of material are received from the CAE/CAD-system. This data is completed with information of mechanical parts and software by the constructors of the product. After a point decontrol this data is also sent automatically to the production planing and test systems

Modifications of a product are also managed in ProdIS and passed to succeeding systems. So the whole company works with consistent data and the history of all products is recorded in ProdIS.

2.2. Information logistics

The proper information has to be at the right place at the right moment

To achieve this goal a set of product states (e.g.: in construction, prototyping, production) is defined. For each possible change of such a product state the consequences (e.g.: copy bill of material to the PPS-System) have been determined [3] and manipulations of that states are logged in a product history.

Supporting company wide consistency

ProdIs has the information about the localisation of each object which is stored in another database too. If a part of this data is changed the interface will be started and the update will be sent immediately into the input buffer of the target systems where another process performs the update in the local database. If the connection is interrupted the messages will be buffered in ProdIs. A direct entering and updating of that data in the target systems is prohibited. The only data ProdIs receives is the bill of material from the construction department. This process is triggered by the constructor of the product.

3) Challenges for the implementation of this concept

The realisation of these comparatively easy data flows caused a lot of difficulties due to the following reasons:

1) Different data structures for the same object

* article data:
  The object type "article" in ProdIS maps to two object types in the test database dependent on the article type (that means there is a generalisation) and on attribute level transfer rules only can be defined to an article type.
* the bill of material:
  In addition to the data structure the content varies from system to system. Whereas the CAE/CAD database and ProdIs holds the whole construction bill of material, the PPS-Database only manages a subset in the shape of a summarised bill and the quality control database has a set of fault locations. All of them describe the same object of the real world from their specific point of view.

2) not all objects are managed by all databases

Naturally a local database which supports special tasks records only data needed by local applications. A good interface between such heterogeneous databases needs knowledge about where what data is stored and especially which data has to have the same content to support corporate wide integrity

3) the proper information has to be at the right place at the right moment

When the constructor works with a product, the corresponding articles and bills of material are not needed by the production department until the product is developed completely. Exeptions are parts with high delivery time. In that case a pre-item list is built and sent to the producing preparation.

4) the semantics of a bill of material is in a PPS-system different to that of a CAD-System.

With the integration of the CAD- and PPS-databases different bill of material trees cause special problems. The type of a bill of material which is created within the CAD-system is characterised by functional subassemblies, whereas the production planning requires a bill of material which structures the parts and subassemblies from a production-oriented point of view. This is also expressed by the different semantics of an edge within the graphical representations of the two types of bill of material. Within the construction bill of material the edges denote: "is part of", and within the production planning bill of material they denote the sequence in which the parts have to be ready for assembling.

4) Conclusion

In this paper we have described the situation of information systems within a typical industrial company. Further more we identified the challenges for consistent company wide data handling. This challenges have been faced by the development advanced interfaces between ProdIs and the other databases. Until now rule driven interfaces are in use.[4] In our research institute a prototype of a „bill of material processor" has been developed which supports the different types of bills of material within the company and the automatic, rule based transformation between them in a more general way.[1]

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Some ideas about the European Computer History

Gyõzõ Kovács[1]

I have participated in many international conferences and computer specialists meetings, and what stuck me was that the American presentations usually speak about the Computer History, as if all of the essential computer development had been done in the USA. When it comes to Europe, the general idea about it is that Europe had only copied the Americans what is true in the sense that THE original development was not realized in Europe.

But even more peculiar is the relationship of western computer-historians to the once socialist countries early computer development, because we can not even get a trace of it in the technical literature! There are good reasons for that of course: first is that the Americans have been busy with their own history of technology, the second is that while they have a well established monthly periodical, called ANNALS, offering principally a chronicle of computer technology of America, the ex-socialist countries had hardly ever worked on the regular elaboration or publication of their own computer history.

There are the well known European specialists and computer pioneers like Zuse Konrad and above all Zemanek Heinz, who write and argument, or even eventually campaign for the preservation of the deserved space of European computer technology in the history of computers of the world. We are fewer in East-and Central Europe who works on that, and therefore our voice can hardly be heard in America.

The European Museums of technology - of course - present their own national history, like the British Museum of Science of England, the Deutsche Museum of Science and

[1] Vice President John von Neumann Computer Society

Technology of Germany, or the Tekniska Museet and Telemuseum presents the creations of the Swedish computer technology, and so on. The Technishe Museum of Vienna, where the very representative exhibition was organized based on the projects of Zemanek Heinz, had unfortunately been closed, because the very ambitious former director of the museum had dismantled the exhibitions to build a modern one, but he was lacking persistency and maybe the knowledge to carry out his project. Fortunately enough, the University of Linz had saved the exhibition along with the other of Mailförfterl, but these treasures may eventually never more return to the reopening Technishe Museum of Vienna.

In East and Central Europe there are only a few and poorly supplied museums, having only one deposit in Hungary which belongs to the National Museum of Technology, but there new acquisitions are not accepted anymore. For this reason, the John von Neumann Computer Society - where I was the secretary general at that time - had started to save the machines, and for today we could parade of a very rich collection of computers - if we could only exhibit them somewhere. We have a private exhibition at the SzSz Company's corridors and stairways, composed of some orphan objects in the showcase and posters on boards along the walls.

We had once an idea with Professor Zemanek Heinz to create a Computer History Commission in the protectorate of IFIP and we could imagine that the European members would take care of the European computer history, and would like to demonstrate the development of the early stages of computing and their interrelations in Europe. The plan was never carried out, because of the disinterest of the directorate or members of the Commission.

Right after the Second World War, there was a short period, where the two great world systems could have a weak cooperation. Prof. Goldstine Hermann writes in his book (Computers from Pascal to von Neumann) that after the war, visitors went to see the famous ENIAC in a long queue and the Institute of Advanced Studies (IAS) to get acquainted with the new electronic miracle. We had discussed many times, that since 1946, when came to light that they have an ENIAC, the interested Europeans started

their peregrination to America, mainly to the University of Princeton. where von Neumann, Mauchly and Eckert, Burks and of course Goldstine received the inquirers, who openly confessed that they came to study and copy.

Prof. Von Neumann was of the stern opinion that computers are a common treasure of humanity, and all discoveries should be shared, so they have shown and explained all to the Europeans.

Some of the Americans don't like you to speak about who had really discovered computers. My version is that John Atanasoff was the first to use a vacuum tube for operations with binary numbers, and a drum memory based on capacitive principles for storing, even if his ABC machine was a target-computer, and so a relative to the Differential Engine of Babbage. One of the co-inventors of the ENIAC, John Mauchly had copied his principals, the other inventor, Prosper Eckert than had carried it out. Atanasoff, the originator of the idea was quickly forgotten, and they have patented the main principles and the circuits. About forty years later, in a court-case for priority initiated by Honeywell the judge have decided for Atanasoff , and the main inventions were credited to Atanasoff.

The same could have happened to the principle of the stored program, if von Neumann was only not alert. The principle was introduced by Neumann, at least as the truthful witness, still alive Hermann Goldstine confers. As this is a very simple idea, both Mauchly and Eckert had appropriated it and monopolized it. Until our days, many of the American colleagues believes that the Neumann principle is nothing else than the Mauchly and Eckert principle, but they were put out. They were so serious about their believe, that they have offered very generously to get the patent under the name of the four of them. Von Neumann refused the proposal and so did Goldstine. Than Mauchly and Eckert filed a request for registry under their names and von Neumann could cut it off only by making the First Draft public, which contained the principle, therefore the new request had lost its priority. That is why Mauchly and Eckert and von Neumann and Goldstine had split.

Mauchly and Eckert proceeded with the development of the sequential operating stored programmed EDVAC, elaborated under Neumann directions, while von Neumann and Goldstine had designed and built an absolutely newly designed computer, the IAS (from: Institute of Advanced Studies). We could go into discussions again about from which of the two lines the modern computers had come from. I do believe that from the IAS, because that was a parallel machine thus very quick, instead of the EDVAC, which was an in-line machine, and got to a dead end, even if it has given origin to the Univac Company.

As I mentioned before, from 1946 on, the Europeans lined up to visit the Neumann, and among all the most famous and disrespectful was Maurice Vincent Wilkes. As soon as he got full understanding of the EDVAC's designe and base circuits, returned to Cambridge, England, and lightening fast constructed the EDSAC, which thus became the first functioning stored programmed computer, the first of Neumann principles.

The machine started to operate just one day before Neumann would arrive to England. For the greatest of Neumann surprise, Wilkes had presented him with his own idea put into practice (later on called Neumann principals machine).

The next question is than: what was the EDSAC, in fact - a copy or an independent creation, based upon a well utilized principle? I vote for the second option. But the story was very similar also in Sweden, where from Stig Ekelof paid a visit to America. Based on the Experiences and with the guidance of Conny Palm, a work team was formed, and for 1950 they have realized the BARK - a relayed computer and right after, under the instructions of Erik Stemme the BESC Computer, which was also influenced by the EDSAC. The next in the queue was Richard Peterson in Denmark, who had formed the Regnencentrale Co. (it was sold at the time to the Japanese, but closed up for our days), where the DASK, the Dutch variation of the Swedish BESK was manufactured. The Norwegian got their knowledge also from America, through Ernest A. Selmer, who had studied the construction of the EDVAC and all research

and development operations of the IAS. That gave life to the APE(X)C, and later on to NUSSE.

The situation was different though in Germany and in Austria. Walter Hundoft and Konrad Zuse in Germany had been busy for a long time with binary computers as well as with electronically calculating circuits. Because of the World War II, these researches had been unknown to the professional world, but they were not known neither in Germany because, partly on the recommendation of Helmuth Schreyer the naci's had considered it absolutely unrealistic and without value, and refused it. After the war. Zuse continued the chosen road while other colleagues were related to the American development, like Billig and Biermann (G1, G2, G3) and Hans Piloty, inventor of the PERM.

It is known in Austria that Heinz Zemanek went on his way and after the URR-1, and LRR-1 relayed receiver machines they have constructed the Mailüfterl, which is the first 100% transistorized computer in Europe.

The Soviet Union should be the next to be mentioned: not only the Hungarian but all socialist countries development had a strong connection to it. Although the administrations policy had qualified cybernetics and the early computer technology to be an imperialistic pseudo-science, and they were backed up by a socialist countries choir (among them the well known scientists), the soviets have developed an electronic computer already during the war. As Goldstine says: The Russians have been very concerned about electronic computers from the late 40's on. I had a number of occasions received request from Russian trading company for the reports by von Neumann and myself on electronic computing instruments.

It is widely accepted today, that these were the basis for the early soviet grand-machine, the BESM, realized under the orientation of the academician Sergei A. Lebedjev, and than the further M Series came from new developers. Hungary and Chine received the projects of the M3, the smallest unit of the series, and later we came to know, that the same was given to the Latvian Academy of Sciences. The first

Made in Hungary - electronic, binary computer, the M3 was born in 1959, out of the mentioned projects.

The M3 is still eliciting discussions between the Hungarian specialists and the non-specialists. Some say that a computer made based on the soviet-origin projects can not be considered Hungarian. This comes from people who do not understand the circumstances and the background of the development in the 50's. They are not aware of, that at that time the developers could only consider the documentation as an imposition from the administration, and only these could be used as such, and not more than a stepping stone for the foundation of computers to be built during further research and development.

To give you an example, I will tell you my activities from the late 50'. I was appointed to be responsible for the magnetic-drum of the M3, after the termination of the successful project engineering and construction of the cc. 10 KW performance ~~capacity~~ supply unit. The magnetic-drum needed only about 100 changes, and was built more or less like the original plans. Than we started to work with it, and find out that the 1 KWord capacity was not sufficient, the circuits were unstable and the command was insecure. For that time I already new how the magnetic drum works, where are the week-points and I could start a restructuring of the whole project. I designed than new circuits and we had constructed it with my colleague Kalman Kardos, using the most updated, long life tubes of the Tungsram. I have restructured the logics for reading and writing, so that we could use 4 magnetic drums together with the control unit. We have increased the density of signals on the magnetic surface and for that we redesigned the reading heads, and started to understand more about the magnetic processes and measured the extension of the magnetization on the surface. We have finished up with 4 magnetic drums and a control panel, which were nothing like the original. You may question again, whether this new system of magnetic drums is an independent creation or not - I do consider it to be new.

In my opinion - with some exception - part of the above mentioned European development had served from the American (or Soviet) results, but using them had

created new and brilliant computer systems, which can be considered independent creations.

The Americans consider the early development to be theirs not because they are too selfish, or too egoistic but in fact, they don't know much about what was happening here in Europe, and even less what could be happening in East and Central Europe. Therefore we have to make public what our achievements were, even would be worth to launch a periodical such as a European ANNALS, where we could publish regularly the results of the European computing.

The Americans had lately suggested IFIP that the year of 1996 shall be declared as The Year of the Computer, to celebrate the turn-key of the ENIAC in 1946, 50 years ago. Unfortunately, the history of ENIAC was stained by the Atanasoff court case and the discussions about the principles of Neumann. While the ENIAC was originally not a stored program machine, it was rather an electronic calculator than a computer. On my opinion, this would be a hit on some inventor'/s pride, with special regard to Konrad Zuse, to bind the Year of Computer to the turn key of ENIAC, to a genuine machine but computer. I have suggested the board of IFIP that it is fine to celebrate the ENIAC in 1996, but let us call it the year of ENIAC, instead of the year of the computer. Than later on, in 1998 or 2008, would come the year of Mailüfterl and 2002 shall be the year of IAS, and of course, 2009 shall be called The Year of the Hungarian M3).

The early computers are not unrelated to each other: EDVAC and the IAS had influenced BESK, the EDSAC influenced DASC, and all previous ones had effected NUSSE. A similar lineage was felt in Hungary too, being influenced by EDVAC and IAS, BESM was constructed, and out of the many experiences the M-Series, than the Hungarian M3, which had become a very special member of the Family of European Computer

NETWORKS: BEYOND TECHNICAL ASPECTS

Jörg R. Mühlbacher [1)]

The impact of the Internet is changing our society dramatically. The dominating forces are based on commercial considerations and expectations of return of investment. We must be aware of potential danger. Censorship would not help and access limitations are not welcomed. Universities and related associations should contribute significantly by helping the net to grow in a direction which is welcomed by the society.

1. A retrospect and what we can deduce from it

Let us look back to the early eighties when in Austria (Germany, Switzerland as well) the Videotext system (Bildschirmtext) was introduced. As we know this system was not as successful as its proponents expected and some people still wonder why.

Videotext (VTX) is built upon a stable and reliable national network, the telephone network of the PTT. It provides a few distributed servers and the endusers are connected via modem to these servers. At the beginning the system was limited to Austria, later on it was connected to the German and Swiss system by dedicated gateways. Due to security reasons and a strict authentification procedure full access to these networks however was too cumbersome to most of the endusers.

In principle there is not too much difference between the old Videotext system and the Internet, the big wheel of today.

VTX already provided most of the services which are appreciated so much today and which are regarded as the current dominant killerapplications of the Internet: e-mail, download of software, various interesting databases and also discussion groups. There have been hypertext homepages as well. All together, this should have been enough services for a success of the Videotext system, which could be expanded gradually according to growing demands.

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A closer look on determining factors for the success and acceptance of a technology or its failure reveals however various limitations and thresholds of VTX. Probably a combination or coincidence of several of these limitations may be regarded as reason for its failure.

Let us have a closer look on some of them:
- technical factors
- commercial aspects
- psychological arguments

1.1 Technical factors

Since the days of creation of VTX the power of workstations, their storage capacity and their mass storage capacity have improved by factors 30 to 50. The dominating limitation factor of videotext was the bandwidth of the provided connections. VTX started with 1200 bits/sec (the faster channel from the server to the user). This was outdated already even at the very beginning, because ordinary modem connections provided up to 9600 bits/sec.

This is worth mentioning because today the majority of users outside of universities or similar institutions is still connected by modems and is not hooked to the Internet by a broadband access. They have to rely on say 19.200 bits/sec or 38.400 including some compression techniques. On the other hand there is ISDN available with 2 channels of 64 KBits/sec each. It is still rarely used, but even this bandwidth is small compared to what is available: ATM switching technology provides us with 300 MBits/sec and more and still the capacity of fibre optic connections is not exhausted.

In other words: the minimal bandwidth provided to and accepted by the average user has crossed a critical lower limit, but it is still far below of what is offered already and what is possible technically. This means, that many possible or planned applications within the network scenery are not used in general and that we are only at the beginning of a development. From the user´s point of view it is essential that sufficient bandwidth is available for the services he or she is interested in. The obtainable speed of transactions seems to depend rather on what price the user is willing to pay for.

We have learned that "software behaves like a gas which always expands and tends to fill its container". In other words: how much RAM you provide ever, there will always be software which takes advantage out of it.

If we adopt and adapt this saying to networking we can formulate: how much bandwidth you provide ever, there will always be networking applications which utilize it.

1.2 Some commercial aspects

There are evident reasons why world wide networking has been accepted by the academic community so quickly. On the one hand side the services provided are comfortable and extremely useful, e.g. e-mail and ftp, but it is more important that access to the Internet and the use of its services is free of charge for members of universities and related institutions. This is true at least from the individual point of view. Even more, using the Net helps saving money from the ordinary budget as it reduces costs for telephon calls, faxes, stamps and alike.

This land of milk and honey does not exist for private persons or companies. They have to pay for both, the access and for transactions. However in the US there are already more private and commercial users of the Internet than academic ones and the growth rate in Austria points to the same direction. This is a surprise to some extent unless there are good reasons that private users find it worth paying for the offered services and that information providers have a realistic chance to achieve a return of investment on the long term.

Is this hope realistic? It is as long as we can ensure, that the forces spinning this wheel do not end. Let us try to factor out some of these moving forces.

The first factor behind the success of the Internet is simply the fact, that it could rely on a critical mass of users already before it started to go commercially. As I have pointed out already, the use of Internet is virtually free of charge for academic staff. If we had to pay for every transaction, we could not afford it because of budgeting reasons. But that is not the end of the story: against any commercial common sense collecting information from the net still is free of charge. I doubt that this will keep staying so. If an individual collects a newspaper, he or she has to pay for it. But at the same time, if you download it from the net you don´t pay for the information provider´s service, but you spend your money to the PTT for using its underlying physical network. This situation reminds to a time where bank accounts have been offered to customers free of charge. Later on, when everybody had to have such an account and had to rely on the services of his or her bank, the policy has been changed, as you know: running a bank account is not free of charge any more.

The second factor might be a bit irrational but is important, too. VTX has been invented too early and had a bad review and no support by print media from the very beginning. It was run by a national organization, the PTT, which is excellent in many other areas but has no experience in fields like marketing and competition. In particular the PTT was unable to cooperate with relevant mass media and could not encourage them to report friendly about the new system.

Internet however is growing in a period of time, where "communication" is fashionable and stories about it attract the reader. Therefore Internet can rely on an established commercial force without having to pay for its publicity. This is remarkable insofar, as within the next decade this new media will be a severe competitor to current newspapers, magazines and even broadcasting stations. Cynically spoken they lay a snare for themselves and even pay for it, unless they follow the same strategy as banks do and take a lesson. The number of people spending more time on the Net than watching TV or reading newspapers is growing continuously. And time is a limited resource.

Therefore I believe that the current enthusiastic support of traditional media can be regarded as an initial incentive only and will try to drive the wheel in a different direction later on.

The most important factor however, which attracts commercial providers currently is: Internet spans the globe, it is accessible world wide. And exactly this is important for advertising or activities as creating a good image or for broadcasting related attitudes. The potential target group addressed by any announcement is not restricted to a specific area, to a country or a nation. Therefore the chances for a return of investment are much better than traditional approaches, in particular if one is interested in global markets as the EC or even the world market in general. World wide advertisement now is affordable for small companies and even for one person shows.

Think of the booming shareware concept and the strategy to put evaluation copies of software on to ftp-servers. Announcing it in a discussion group and describing it neatly in a WWW home page guarantees success, if your software is really relevant to many people. But really important is, that the distribution channels - the costs for download - are paid by those who have been attracted by the announcements. Possibly other people set a link (URL) to the home page and the wheel starts turning even faster.

The big deal however will be based on the strategy "software on demand". The following is based on the assumption that cryptographic standards and acknowledged authentification procedures will be available on the Net. We also assume that enough bandwidth can be guaranteed and is affordable to the customer.

I think there are two cashcows in the same stable. One refers to the problem of software piracy, the other refers to the fact, that one is not willing to license software he or she needs only casually.

Let us start to discuss the second case, where software should be available to the customer now and then, without cumbersome handling of a ftp client. From the vendor´s point of view there is the logistic problem of how to supply software in time, when the customer is prepared to pay for it.

Currently the cheepest distribution channel is given by CD-ROMs on the shelf at the stationer´s around the corner. The capacity of a CD-ROM currently is about 1 GB and a new standard for 10 GB disks is announced already. Evidently a few CD-ROM disks, bought for peanuts, give you the chance to have every software available which you likely will need. But the point is, that all the executables on these disks will be incomplete in the future, there will always be one missing - but essential - component (e.g. DLL) which you will have to download. This will be done via the Net on the fly. But at the same time you will have to pay for it, cashing will be done via the Net as well (assuming a previous authentification of the user, of course).

Let us illustrate this by a little but very realistic example. Assume you wish to build a new house and you have engaged an architect. She sends you an e-mail saying "the first draft of your house is ready, download it from my ftp server". There are also extensive comments written by a text editor WP. You however are using a text editor MW and have no viewer licenced for displaying the plan of your new house on screen. Of course, the architect could "lend" this software to you by putting it on the ftp-server, too, but this would violate licencing laws. The escape of and solution to this problem is evident: you execute what you need from your spinning CD-ROM, download the missing parts from the Net and just pay once for that temporary use of the software.

This leads us immediately into fighting against software piracy. If one takes into account how much software is copied illegally worldwide, if one considers the unbelievable fact that there are still many countries where the percentage of legally licenced software is below 50 %, then it is obvious, how burning this problem is.

The basic strategy against software piracy follows the principles of delivering software on demand.

Unfortunately the necessary preconditions are affordable and manageable to big and internationally dominating software vendors only. The problem that faces us here is that small "software huts" likely will be driven out of the market: they hardly can afford running a dense web of servers, which would be necessary in order to guarantee the supply of software on demand immediately.

From this point of view we can understand why in the US a legal war started against the aim of bundling network facilities with a preloaded operating system.

The sunny side of that vision is that there will be demand on new organizations and companies which run and maintain networks locally on the physical layer. I also have the vision of a new type of service providers: they can offer value added services on behalf of small vendors, in particular the delivery of software on demand.

Taking all these visions, which I have sketched, we can conclude: the big deal with software in the future will be done by new ways for distribution. Having the power of controlling networks will likely lead into monopolies. The chances of smaller companies however will depend on the availability of vendor independent servers. Thus the society is well advised to build the tracks for a fair infrastructure. This, I think, must be created now if we are interested in a balanced competition within the future software market.

1.3 Psychological and social aspects

We all live in a period of time where central power is loosing its attraction and is getting less appreciated. People - in particular the youth - like to be independent. The Internet grows from the edges, there is no fat spider in the centre, at least people believe that. Even the running costs of the various subnets and the gateways are covered by distributed organizations or by the users themselves individually. There are no common guidelines or commandments one has to sign up or to agree with before having the right to "log in". I guess the broad acceptance of the Net is based on such factors, too. Of course this overwhelming welcome of the Net will make it eventually pervasive and will lead into a dramatic impact on society.

I appreciate that to some extent, but I also have to admit that sometimes I wish there were at least a couple of acknowledged guidelines.

I am reluctant to comment this development in either direction. From the senders point of view the possiblility of spreading out information or what is believed to be information might give the feeling of ultimate freedom. From the receivers viewpoint however this might be seen differently, because information covered by and hidden behind garbage is not quite helpful. Information should be found quickly, reading garbage steals one´s time and time is a limited and therefore worthy resource.

2. Is there a need for restrictions or censorship?

Should we impose restrictions on the Net, should we install specific controlling mechanismus as there are censorship or limited access, in order to avoid unpleasent developments or in order to minimize harm?

I doubt it would be helpful from a long term point of view. But even if we did so, there always would be found bypasses. The decentralization of the Net makes such attempts more or less technically impossible. The approach I suggest is different. Remember the complaints I have made concerning the fact that too many useless messages could hide useful information. The strategy we

can adopt takes advantage of this argument, but the other way round: let us contribute to fill up the Net with worthwhile information which in turn covers the garbage. Contributions in that direction are a noble task for our society and its acknowledged institutions and associations.

As soon as digital signatures become a proofen standard of the Net, we can assure that approoved pages, articles and alike remain unchanged. Trusted associations (e.g. OCG) should establish helpful indices or abstracts with corresponding URLs to help the user finding his or her way through the ocean. Of course, diving into shallow water remains possible but is done on personal risk. In other words the underlying idea of this proposal is: help growing the Net into areas which we really need and ignore what we think is useless or wastes our time.

3. The Net will change job profiles and creates new ones

Because of the impact of the Net on society in general it will both, create new jobs and alter the profile of existing ones. A trivial example for a new profession is the design of homepages and running (providing) of websites in general. This task covers much more than to collect relevant information, to structure it conveniently for easy access and to publish it on the Net finally. Evidently one needs some technical background and a solid knowledge of tools for the design. But additionally, if you want to attract a browser to click a specific button more likely instead of another one, you must have experience in designing user interfaces: psychology is an essential skill there.

There are rarely lectures given on subjects like these, in particular if we want to look on that task from a horizontal point of view instead of stretching vertical details.

Another example is the profile of an editor working for a newspaper. Traditionally an editor collects news and related information from various sources, puts them together and writes a selfcontained article. In other words the editor creates a door enabling messages from the outside world to pass through and to reach the reader. Some of the tapped sources are public anyway, some of them however are kept secretely because of various reasons. One of them simply is competition with other editors of other newspapers.

The editor´s job profile will change when an electronic version of a story has to be written. The article has to be composed as a hyperdocument containing links (URLs) to various other documents. The door will be opened into the other direction and the reader gets the chance to read other people´s comments on the same subject as well and there will be other links found again and so on.

This in turn changes the shape of a newspaper radically as soon as it is provided electronically.

Therefore I don´t see an advantage, if several publishers make their products available on the Net just as issues which are available as hardcopies as well. That approach can regarded as a marketing gag but does not yield additional value. Electronic versions of newspapers have to be and will be different to ordinary ones.

A specific change in job profiles and involved institutions will happen for teaching. This is important specifically because changing the way of teaching and learning will alter the society recursively. The gap between traditional learning sites based on classroom teaching, as there are universities, high schools etc. on the one hand side and distributed units for distance learning at the other side will diminish. But distance learning is much more than piping in somebody else´s lectures in order to enrich what is available locally. This only would modify and improve the access to additional didactic instructions. A significant use of all the possibilities of the Net however must enable students to make their own findings available to other people outside of the classroom and the Net is an excellent vehicle to do so.

In that sense distance learning has to be reconceived. At the same time the teacher´s role and position within such a learning process has to be reconsidered, too.

4. The Net is changing the landscape globally

The most dramatic change will occur by teleworking (also called "telecommuting"). Very often the teleworking concept is just seen as convenient way to do some or most of the work from home without having the need to move physically into the office. Current discussions focus on the expected and partially obvious advantages. Also social consequences and possible disadvantages are on the discussion lists, as there are the importance of personal contacts and the need that employees can meet each other and can exchange information. Other aspects deal with costs, traffic jams, various rights of employees, working space needed at home, privacy and security. Also working times are an issue.

I think that the major conseqences of teleworking will be in a change of the landscape itself:

- The bindings between a company and people who work for it will become looser and could end up in some temporary relationship.

- The number of people being selfemployed will increase substantially and there will be no strict separation between employers and employees as it is seen traditionally. This is a shift in the distribution of capital and could initiate a shift of power.

- Companies and also selfemployed persons can form temporary work groups. These new structures are discussed and described as (global) virtual corporations. They are characterized by the vision of making alliances and partnerships work for either a specific period of time or without defining explicitely for how long such an virtual corporation should last.

- We will have to reconsider applications where time and distances together are essential factors.

Computers impress me in particular because they can scale time in both directions: computers are time machines. If one models e.g. a chemical process he or she can execute that simulation program fast or stepwise slowly. Because the nodes of the Net consist of computers, this ability is also there. But additionally, distances are filtered out. Think of sending a fax or an e-mail as fast methods for distributing copies. The point however is, that we will be able to distribute 3-dimensional copies in the near future, at least as specific applications are concerned. In other words we can produce certain products not only in time, but we can provide them also exactly where they are needed. The Net is a *time* and a *space machine*!

5. We must not close our eyes

The Net is here and will expand. It shifts the distribution of capital to those who have not had it before and at the same time it develops monopolies. The Net gives many people the chance of having access to an ocean of information, but it also strengthens those who have controlled information sources before already.

We must not exclude anyone from the Net. This would broaden the gap between those who have access to information and to those who are still underprivileged. What we have to do is helping in navigation.

Previously I have mentioned a few areas where changes provoked by the Net will be radical, e.g. the shift to selfemployment and the formation of virtual corporations. At the same time we suffer from a lack of a legal framework, which deals with these new forms of work (Note: I don´t refer to laws regulating the Net!): which kind of protection can a selfemployee expect? How can one address such new forms of temporal collaboration in liability cases?

There are no laws dealing with such matters. But the open questions are much more complicated: any effort which is bound by political borders (regions, states, nations,...), will only have limited success. The Net is global, its consequences and impact ignore borders and alike. Therefore legal frames must be global, too.

The Net still is growing exponentially which in turn means that both the sunny side and the garbage are expanding concurrently. However, complexity theory teaches us that clipping off dirty branches by linear efforts would not help. We have to assist the development of those branches which are worthwile to be grown. That is the real challenge for our society. We can´t modify the growth rate of the Net and it is pointless to discuss whether we should attempt locally restricted efforts. But let us design a framework for the Net so that it will grow in a direction which is useful for all of us.

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Panel Session

Creativity in Engineering Processes - where is it needed, where is it a nuisance?

Position Papers

The CASE for CREATIVITY
What belongs where?

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Abstract

A major aim of CASE-tools is improving the quality of delivered software products and increasing the productivity of the involved software engineers. This implies the introduction of certain rules and formalism. One fear associated with the introduction of such CASE-tools is the suppression of creativity. In this paper we discuss the need or nuisance of creativity in various aspects of software development.

1.0 Creativity and Engineering

An encyclopedia might state that *to be creative* means *having or showing the power to produce original work* [19]. Looking at *software engineering* we detect the Latin word *'ingenium'* in it, meaning a *natural ability and inventiveness*. And this seems to be a major motive of software engineers: similar to seafarers of the 16th and 17th century a true software engineer ventures into unknown lands of operating systems, computer interfaces and the like.

Current definitions of software engineering do not seem to reflect this aspect, e.g.
"The establishment and use of sound engineering principles (methods) in order to obtain economically software that is reliable and works on real machines" [1].
Thus when introducing CASE-tools or software engineering environments, the fear of suppressing creativity is a major discussion point.

2.0 Why do we need creativity?

Creative minds always have to be known to survive any kind of bad training.
Anna Freud 1968

Automation has largely provided the economic basis for our current material well being - at least in the developed countries. Computers and software are today the foundation of automation, having considerably replaced other enabling technologies (e.g. mechanical engineering).

More and more areas are being subjected to automation. And considerable creativeness is needed there. It is not always the invention of *new* methods, very often it is the creativity to simplify and

abstract complex situations, leading us from a primitive system via a complicated system to a complex system, which is understood [2]. We need creativity for innovation. And lately the issue of differing between entrepreneurship (causing innovation) and management (administering resources) has received more attention [15]. Thus many software engineer envision themselves embarking on a trip into the unknown land of operating systems, frameworks, LANs etc., like Columbus some 500 years ago.

On the other hand we also can observe that the creative engineer very often appears to be the bottleneck and show stopper in many technical undertakings. Creative persons very often are not able/willing to subject themselves to 'trivial' administrative procedures, to adhere to given standards, to deliver the 'not perfectly finished' product etc. All problems well know to managers of software projects.

3.0 Creativity - the right and the wrong place

Part of the problems seems to be that we should carefully distinguish areas in an engineering process, where creativity is welcome, and where it is counter-productive.

3.1 Disecting the Engineering Process

We will restrict ourselves to commercial software development (Research and very advanced technology engineering might obey different laws). Basically we see a process which, given certain inputs ('requirements'), will produce a viable product.

In this discussion we have to distinguish at least 4 different levels:

Product and Process: A well known distinction exists between the engineered product and the engineering process. This separation into the 'WHAT' and the 'HOW' is largely the basis for automation: only the repeated use of the defined process justifies the expenditure to isolate, abstract, define and improve it. The description of such a process, usually called *process model* is rather a process class, because many instances of actual development processes will be derived from it. It is an abstraction of already performed (or imagined) processes and at the same time a prescription for future processes. Such a process model can be defined and analyzed independently of any specific product to be produced [6] [20].

Processes accompanying the core engineering process: To the dismay of many dyed-in-the-wool engineers and computer scientist, business realities show that the engineering contents and creativeness of a product are only a small portion (neither the biggest nor the most important one!) of the total product/marketing process bundle (Figure 1), and very often not the key to success or failure.

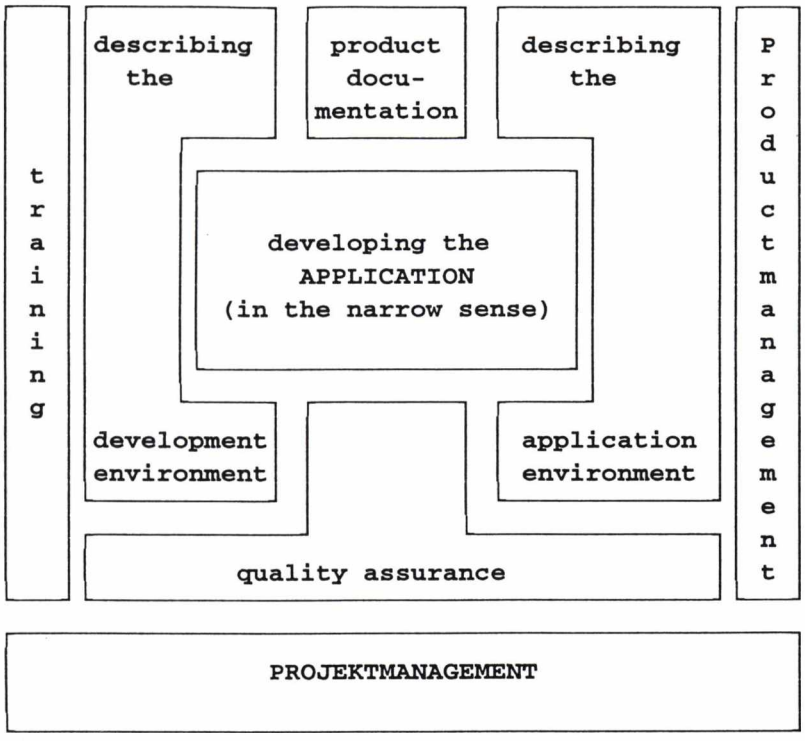

Figure 1. Processes supplementing software development

Development levels: Complex products cannot be built in one step. Due to the semantic gap between the often vague user requirements and the necessities of a commercial product on a specific hardware platform there must be a sequence of steps, transforming the initial requirements into a final product. In most cases these steps follow the so-called *development levels* (Figure 2), cf. [5] [12].

These development levels are more than just a degree of refinement, on each of them a different perspectives in the center of attention: gradually turning from the user requirements to the needs of the underlying computing system.

Levels of detail: Within each level we also find a hierarchy of issues from basic architectural issues to detailed details or procedural questions.

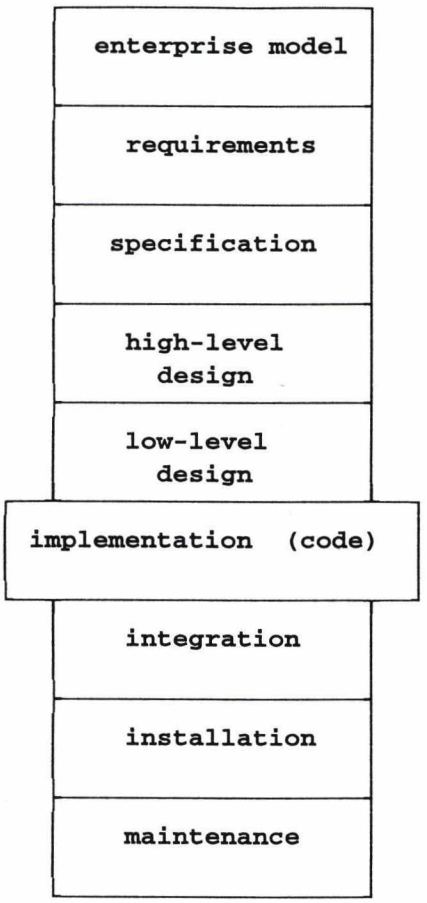

Figure 2. Development levels

3.2 Where do we want/need creativity and where not?

The ambivalence with which creativity is discussed can be taken as an indicator that in certain areas of the space spanned by above four dimensions the use of creativity is either highly needed or rather dysfunctional. A few comments will be made to each of above dimensions.

Process and Product: In their most basic form the activities of a development process can be described by the Cascade Model [5], as in Figure 3.

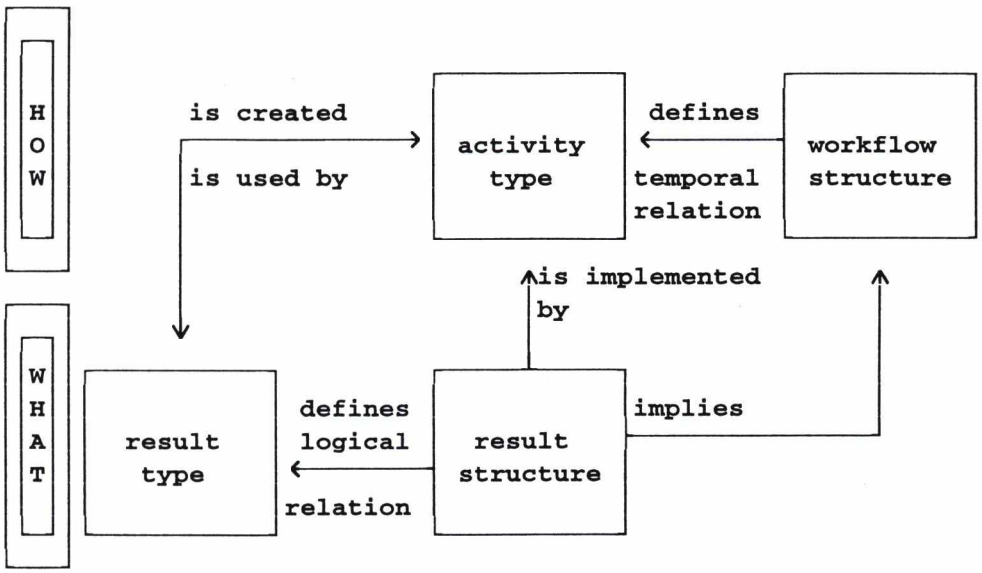

Figure 3. Cascade Model of Software Development

The lower level focuses on the product (the 'results types' and the associated 'result structure'): with respect to the product we usually *want creativity*. With respect to the result structure, certain restrictions are in place - what are the effects on other products, can the new structure be understood later by the maintenance staff? The upper level is concerned with the process. In general creativity *is not desirable* here. The development process should be transparent and standardized, due to its interleaving with other processes. Software engineering environments [4] [11] [16] [13] and the current emphasis on software process certification (ESPITI [7], ISO 9000 [17], Bootstrap [9] etc.) are a proof of this.
On the other hand, dramatic changes in the process itself are also called for as exemplified by the cry for business reengineering [10] and for new development paradigms [3] [18]. Such changes would affect the activity types and the result structure.

Processes accompanying the core engineering process: Figure 1 indicates processes accompanying the actual development processes. In order to function successfully we want their interfaces to be stable and reliable. On the other hand, there should sufficient creativity be spent *within* them (e.g. in the marketing plan for a product) in order to promote the actual resulting software product, but the basic structure of the individual processes should be kept.

Development levels: As each level considers a different perspective (Figure 2), the creativity to be expanded should also be of different focus. In [14] quite correctly it is observed that most engineering disciplines limit the choices/combinations basically to already existing design elements (reuse!). Typically, in the car industry, despite the fact that many different models are announced each year, they are built on top of a very conservative number of alternative engines, gear boxes, body parts etc. Only when the combination of such pre-existing partial products proves to be inadequate, creativity is called in to explore the complete space of

further possibilities.

In the design process later development levels are also bound by their predecessor levels, limiting the number of options there. At the same time certain expenditure of creativity might be counter-productive for two reasons:

1. Creative solutions at a subsequent development level must be compatible with the decisions made in previous design levels.
2. Commercial products are only partially sold on their inner engineering value [8], much more on their externally visible functional value. Thus improving some feature which is invisible or irrelevant from a buyer's view is a wasted effort, if it does not bring advantages for the development/production process.

Levels of detail: We may also question the level of detail on which we still want creativity. A typical example is spelling. Early at school we have been *denied* most of our creativity with respect to spelling - we were forced to spell in a standardized way according to some grammar.

Only some areas, typically advertisers and poets, are somewhat exempt from it. In the USA a yellow square standing on one of its corners carrying the letters 'PED XING' does not indicate a very rich Chinese but simply a 'pedestrian crossing'.

This syntactic restrictiveness is of advantage since it allows a convenient, largely unambiguous information exchange, thus enabling the *exchange and dissemination* of creative ideas on the higher semantic levels. Very often low level improvements turn out to be only a suboptimization anyway, disturbing some global optimization. Typically re-use of variable names for different purposes just confuses a compiler's optimization algorithm for variable allocation.

4.0 Creativity and the Software Engineer

We can observe that creativity seems to be a very desirable and highly valued human property. Some definitions indicate that it is one of the very few properties which distinguish us from computers. And it seems that a major point of satisfaction for engineers is their ability to create (even this word reminds us of creativity) products which prove the impact of their creative ideas.

In the light of the discussion before, however, it will be necessary to teach engineers the difference between well-spent and ill-spent creativity. And to accept the fact that in certain of their activities creativity simply is a nuisance, if not worse.

Once the need for creativity is established, and we need creativity - even if only in certain areas - we can ask the questions how to solicit creative ideas and how in general to foster creativity. It is generally accepted that creativity has something to do with playfulness, freedom of stress and thus available time. One promise of software engineering environments (including software process models) is that they free engineers from standard clerical work and thus free them for their more creative work.

5.0 A Tripartite wish

So let me formulate above conclusion as a tripartite wish for software engineers:

1. ***Let me posses enough creativity for those activities where creativity and innovation are key.***

2. ***Let me uncreatively and patiently bear and perform those activities, where creativity is a hindrance - or hand them over to the computer.***

3. ***Let me recognize the difference between these two types of activities.***

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CREATIVITY, ANARCHY and ENGINEERING

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Abstract

Software Engineering as a discipline has the aim to remove Anarchy from the highly creative process of Programming. Did it at the same time remove the room for Creativity?

This paper will briefly discuss the issue of creativity in engineering processes in general and in the process of software development in particular. Doing so, it builds on the basis that we better distinguish between a creative act and an anarchic act when building technical artefacts.

1. An Analogy

What are the distinctive factors between a prefabricated private home and the castle built by a group of preschoolers on the seashore?

The castle is built by sand. Hence the building blocks are very fine grained and pose almost no limits on how to combine them. The young "engineers" are full of ideas and imaginations, neither perturbed by limitations of historical correctness of the fortification they are building nor by any specific funtionality of the monumental structure gradualy emerging. Hence, what we can observe is certainly a highly creative act of construction. - Even after the building is complete it lends itself to further improvement. Another plateau is added, some doors are built into the outer wall, some streets around and inside, even a tunnel; yet another door. - The process continues till gravity and lack of cohesion of the drying sand fights back and part of the wall collapses. But that's no problem. They build another, a stronger wall or even change this portion of their castle in such a way that no door is needed any longer at this very place. -- Next morning, the tidal waves have cleared everything away. The shore

is as level and untouched as the day before. Hence, happily, the construction of a new castle might be commenced to fight the boredom of the day.

How different to the home, the parents are in the process of having built for them in the meantime. They opted for a prefabricated home to save money. Hence, they clarified their specific needs and choose - considering these needs - some general design from a catalog. This lead to a proposed floor map. A few things, notably in the wet-area, were fixed, others were adjustable. They moved one wall, to get more space for the children's playing room and they also decided to have a splendid arch linking living and dining room instead of a wall. With some details, such as carpeting, make and colour of tiles etc. they where fully free in their choice. Further, they proposed after careful evaluation an extra shell of insulation. Seeing shell and skelleton of the house completed led them to redesign their bedroom. This implied some changes in the plan for electric wiring, changes that came just in time to be accomodated without extra cost. Fortunately, since the family budget was already stressed for years and the family was hoping to live in their new house without any need for further changes, investments, or other than operating cost for the years to come. - With all the decisions they had to take, they were finally glad that so many things where already proposed or fixed from the outset. It gave them security and they could concentrate on those issues that really mattered for them.

So much for the apparent differences between making these two buildings. Probably, there are even more, and some of them - such as "... live (!) ... for years (!) ..." - have been just mentioned without emotion and without being sufficiently underlined. Some people might for all subtle and apparent differences even reject any analogy between these two construction processes. Comparing a useless toy project to kill time with the project to build something of lasting value, isn't this outrageous?

I claim it is not, notably when talking about software production. As long as people (and even experts who should know better) refer within the same phrase to a programming example such as finding the largest among three integers, and a complex factory automation system as "software", I feel privileged to claim that the sand-castle and the private home are likewise related creative technical artefacts.

2. The Software Product

I consider software as a technical artefact like a car or a house and calling it "software product" I am apparently referring to something of the genre of at least a private home and not a sand-castle.

Hence, for software engineers it might be as natural to observe the same discipline in building their product as architects, builders, or mechanical engineers would when building theirs. Creativity in these products has little to do with anarchy or with fantasy. Its room is well defined by the constraints of

- the customers requirements,
- the products characteristics (physical characteristics with houses, cars, or micro-processors; structural and "software physics" characteristics for software),
- the characteristics of the material (with software: programming language) and of the tools and machinery used for construction, as well
- the environment, in which the product is to be operated, and finally
- the time- and cost-budget allocated for building, operating, and maintaining the product.

This room, usually referred to as the design space, is quite often heavily constrained. Hence, finding a good (the best?) solution within it is certainly a highly creative act.

Claiming though that it does not leave enough room for creativity and justifying therefore transgressing its boundary is to me, if done verbally, a sign of not having fully understood the problem of software production. Actually transgressing it (without having this beforehand negotiated with the customer and sought appropriate permission) should be considered as a kind of cheating and as an act of anarchy. I would label it specifically as anarchic and even as unethical, if such transgression takes place in areas, where the immediate cost of the violation is not evident and where it needs the expert's knowledge and experience to understand its implications.

3. The Software (Development) Process

The process for developing software is certainly not such that one can follow some given rules or prescriptions in a dull way. In due consideration of the development scenario, we have to choose from a number of process models (certainly a creative step). Further, within each step, phase, cycle, or whatever the appropriate unit of the model is referred to, we have again a wealth of choices, so that I do not see any argument for lack of creativity even after a particular process has been enacted.

The enacted process, if perceived properly, is rather like the handrail of a staircase than the chain for a prisoner. It guides us through the project, notably if things "get dark". Thus, instead of having an

amorphous space in which we can exercise our creativity without any limit and without any protection, risking that our own creativity will finally turn against us, the process model prestructures this space in such a way that we, our supervisors (technical and managerial), and our customers will know at least from time to time where they (we) can find and track us.

4. Interactions

The process comes with the product! Hopefully not the other way round. But the process influences the product. It defines when which decisions are to be taken and when (or till when) which kind of decisions can be revoked. But it helps us also, to determine when which issues are to be completed. This will matter specifically in the portions of the project pertaining to requirements analysis (irrespective of how they are called in the particular process followed).

Here, in the interaction with the customer (or the technical environment defining the problem) creativity plays a double role. Not only that creativity is called for when pinning down what is needed, creativity is also called for on the metalevel to determine how to find out what is needed. Hence, the term requirements analysis might indeed be too weak and the term requirements engineering, as it is sometimes used, seems more appropriate.

The interactions between creativity for the product and creativity for the process are not confined to requirements issues. Let's think about quality assurance, let's think about design for change, ... Requirements are but those issues, where such interactions are most clearly visible and most thoroughly discussed in the literature of our field.

5. Summary

Software products are no sand-castles. They are invisible, but tangible technical artefacts, built to yield value of longlasting nature. Hence, constructing them should not be compared with activities of creative playing but with a disciplined act, where builders have to exercise their creativity within a framework that is ethically and commercially justifyable.

Creativity Amplification in Engineering
Is it at all feasible?

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To be creative is certainly in engineering tasks a desired property. In any engineering process there are steps which need creative actions (finding of a specific operation by inspiration) and thinking.

To begin with, let us look at the work of some authors dealing with the concept of creativity as related to science and engineering. Arthur Koestler, who was in his lifetime also very much interested in general systems theory states in his book "Janus, A Summing Up" of 1978 that "The conscious and unconscious processes underlying creativity are essential combinatorial activities - the bringing together of previously separate areas of knowledge and experience. The scientists purpose is to achieve *synthesis*, ..." and Koestler writes further "Creativity in science could be described as the art of putting *two and two together to make five*. In other words, it consists in combining previously unrelated mental structures in such a way that you get more out of the emergent whole than you have put in. This apparent bit of magic derives from the fact the whole is not merely the sum of the parts, but an expression of the relations between its parts; and that each new synthesis leads to cognitive *holons* on higher levels of the mental hierarchy."

Such description of "creativity" is naturally central in the art of problem solving in systems science and specifically also in systems theory: To take suitable premanufactured components and to define a coupling structure (a relation) between them to achieve a system which has new wanted properties, which cannot be foreseen by the known properties of the individual parts.

We are close here also to Buckminster Fuller's definition of "Synergetics" (R. Buckminster Fuller: Synergetics, Explorations in the Geometry of Thinking, 1975) which reads as follows: "Synergy means behavior of whole systems unpredicted by the behavior of their parts taken separately." And "Synergy means behavior of integral, aggregate, whole systems unpredicted by behaviors of any of their components or subassemblies of their components taken separately from the whole."

Therefor by Buckminster Fuller, creativity is needed to establish synergy; creativity is needed to built desirable systems out of components.
Koestler, as many original thinkers in the field of creativity such as Descartes, Leibniz, Poincare and others, assumes from a creative action the bringing together of previously separate areas of knowledge and experience. Creativity in Engineering, therefor, has to be based on scientific knowledge and on engineering experience together with inspirational talent. Joseph Weizenbaum in his famous book "Computer Power and Human Reasoning. 1976" states clearly that IQ testing is incomplete to determine the "intelligence" of a human being. He says, that it takes not into account that human creativity depends not only on intellect but also crucially on an interplay between intellect and other modalities of thought, such as intuition and wisdom".
The engineering design process is usually divided into several phases starting with the "problem formulation" and finishing with the "realization phase" (determination of the final structure to be realized by implementation). Between we have design phases which deal with "systems and their architecture" and with search and decision making procedures as means to find those. Here the creative abilities of the designer is addressed. He (she) is in the situation to find by the knowledge of feasible components the proper coupling structure (to find an "architecture") such that requirements and constraints, which are part of the problem formulation are satisfied.
Systems Theory has the goal to provide engineers with scientific knowledge on formal models of engineering components and on formal models for coupling relations (composition and decomposition methods). This, to supply the necessary abstract background for creative actions. The recently established initiative in Computer Aided Systems Theory (CAST) has the goal to provide tools to enhance CAD- or CAE-tools used in engineering design by the methods of Systems Theory and to help to amplify creative processes in engineering.

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Panel Session

Perspectives in Connectivity

Position Papers

PERSPECTIVES OF CONNECTIVITY

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A special characteristic of mankind - in contrast to other species - is, that human beings are able to develop complex skills, like the building of tools and the construction of social systems. These tools and social systems changed over time according to predominant environmental factors. Right now we are in a new transition phase towards new tools and new social structures.

There are some facts in the area of information technology, especially in communication, which support this evidence. We are faced with an integration of information channels which were used separately in the past. This tendency is based on an increasing speed of communication, with photonic networks at the horizon, and will lead to a global interoperability of broadband networks. Existing networks, like the Internet, experience a tremendous growth in utilizations. The number of Internet users is predicted to increase from about 30 millions to about 200 millions in 1999. In Europe the monthly increase is about 10 %. This trend and its implications will push the world market for communication services to an unexpected volume: from 850 billions DEM in 1995 to 1500 billons in the year 2000. In the future we will be faced with an increasing integration of computer/communication technology and consumer electronics ("edutainment"), enabling non-experts to become users of global networks, turning them from passive consumers of classical media, like radio and TV, to active players in the information game. Additionally, the trend in communication technology goes definitely in the direction of wireless/mobile communication with a large impact in various fields. We have to take into consideration the empirical evidence, that the inherent development in high technology experiences different trends and speeds in different areas, even within Euope as well as within different market sections.

What are the consequences following from these observations? All parts of our public and private life will be influenced dramatically by this revolution, moving from information islands to global connectivity. By the new structured connectivity infrastructure companies and organizations will be

confronted with new forms for their internal organization, resulting in less hierarchical structures due to high availability of relevant information, which provides the consumer with the right, valuable information on the right place at the right time. The significance of time and location has to be seen in a different way in the future. By the unification of individual and mass communication we will see a convergence between the (general) public and privacy with some important implications. The whole public domain will be much more serviceoriented, transparent and communicative. Even the relation between cities on the one hand side and rural regions on the other hand side will change, balancing their respective significance. This will lead to a new kind of politics influenced by the interaction between technology and politics. Obviously the relation between work and leisure will change too. This is part of one of the major impacts of future connectivity, changed social structures, which might lead to completely different forms of social behavior. You might think of virtual communities, where the communication between members is extended by new social and political relations as well as with respect to its content. This new environment will create totally new industries for e.g. multimedia or the production of useful, valuable information requiring new types of jobs (infonauts, IT-navigators, etc.), revolutonizing non neglectable parts of our economies. The visible "democratisation" of knowledge and information will change the character of power over individuals, as well as social and organizational units. Of course, the future will be confronted with individual fears, articulated in pessimistic behavior patterns of various kinds. Especially the fear of a two class society of privileged and unprivileged members, concerning access to information and knowledge, is evident. To prevent this trend new concepts and contents in education are required as well as new access mechanisms to information and knowledge must be provided.

There is a lot of open questions to be discussed and to be answered in the context of the consequences outlined above. Some of them are dealing with social aspects, others with regulations and even fundamental philosophical questions are raised:

- How will the social structures and the society as a whole be influenced?
- How will the democracy change?
- What is the role and the form of future politics?
- Which regulations in a legal sense and in standardization are necessary?
- Are we approaching a wild west of technology?
- Which kind of support, like free basic services, is necessary to prevent a two class society?
- What types of education systems are most adequate in the future?
- Can we expect to avoid or to compensate potential isolation of users through new forms of cooperative work?
- What is the significance of face-to-face communication in the future?

- How can we cope with information input overload?
- How do we define ourselves in the future?
- What does freedom mean in the context of global connectivity?
- What is our view of life in the future?
- How will our mobility behavior change and what is the role of different existing and new transportation media?
- Is our current code of ethics sufficient to cope with the new situation, or does it need extensions, modifications or new interpretations?

Summarizing, we are entering right now an exciting new epoch with new challenges as well as deep pitfalls. It will be a new period, where connectivity stand as a metaphor for new communications, which force us to think global and act local for the best of the mankind.

PERSPECTIVES OF CONNECTIVITY

V. Risak[1]

There are many „perspectives of connectivity" which depend on:

- Personal viewpoint
- Task and
- Partners.

Only if all three components fit well effective and enjoying mutual understanding and communication are possible. These requirements are quite old; they stem from the Information-Theory at the sixties. (There it is necessary to find a common basis of symbols used and of their meaning.)

In a global marketplace, a global *„Agora"*[2] spanning our whole globe these requirements are not so easy fulfilled. Too different people and cultures meet here and misunderstandings are quite possible.

As in every marketplace a balance between regulation and freedom is essential. If over-regulation takes place[3] then free exchange of information can be choked off. Otherwise there is a tendency to chaos, which maybe self-regulating or not.

But as in every marketplace the participants bear their own responsibility as emancipated citizens. They will behave different corresponding to their personality and their task. For example the same person can behave quite different when doing business or when chatting in a cafeteria in the evening. Otherwise different people follow quite restricted structures in business communication.

We can find this mix of communication-styles in many marketplaces beginning with the ancient Greek „Agora" up to now in eastern „bazaars". Typically there is a mixture of communication-styles, for example to chat, drink coffee, negotiate, buy or sell, ... and in all to enjoy communication.

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[1] Veith Risak PhD, president OCG

[2] „Agora" was the ancient Greek marketplace, where all free citizens met and communicated.

[3] There are tendencies in this direction in the USA to strongly survey the WWW, because there criminal and even terrorist information-exchange can take place.

In many cultures this mixture of communication-styles are felt necessary. A merchant will feel (and often is) annoyed, if someone buys his goods without this surrounding communication acts.

Our western style shows a quite strict separation of „business“[4] and „entertainment“. I personally prefer integrating all aspects of culture in communication, be they „useless“ or „money-driven“. Both are important aspects of human culture which should not be taken apart.

Even more in a global marketplace you can *not only sell goods and services*; you have to give opportunities for *humane communication without explicit purpose* too.

This has consequences for the use of global networks. Today there are two tendencies:

- Totally free and perhaps chaotic communication (like in the WWW today) or
- Restricted and secure business-networks.

I plead for a communication-structure which can serve both aspects. Like in a market conscious participants can use *verbal, written or testified form of communication*. In the global „Agora“ people should be able to decide for themselves, to use for example open communication, or more formalized procedures, perhaps in encrypted form. But the common medium should *allow both of them*.

Because of the different cultural and living styles these communication-styles can not be prescribed by any instance; they have to develop over some time in an inter-cultural setting. Much experimenting and much patience in learning will be necessary. This is not so much a technical problem, but a problem to listen to others and find out where openness and where rigid procedures makes sense.

But the chances of these global and at the same time personal communications are so big and unprecedented in history that it is worth the effort ...

[4] Perhaps accompanied by some „smalltalk“ at the beginning. But many people think this to be lost time.

THE INTELLECTUAL PROPERTY RIGHTS OF THE CYBERSPHERE

Peter Paul Sint

The growing number of humans on this planet makes it more and more necessary to have an eye upon the limits of material growth. Accordingly we can argue that it will need increasingly less human effort and manpower to produce those material goods. Even if we shorten working hours and shift a part of the remaining labour to social services (e.g. caring for the old and sick contemporaries) we will need to employ a growing fraction of the work force in other productions of non material goods. We may also infer that this needs a growing consumption of information related products by the consumer. The distribution of information will - this is the present wisdom - occur to an important part via digital information products and via communication networks.

The production and distribution of information has been regulated by a set of traditional means: intellectual property rights in the form of patents, of copyright - droit d'auteur - Urheberrecht, of trade marks, by the protection of trade secrets and the laws governing the unfair competition. Above all it is the copyright, which is challenged by the new communication technologies. Already the distribution of information on physical media, like tapes, diskettes, CD-ROMS made copying easy. The information technology allows also easy, fast and cheap modification of existing "works". Telecommunication bring an even more fundamental change in making information available world-wide at the call of the fingertips.

The existing framework of protection, the Revised Bern Treaty for copyright (concerning authors and producers of innovative works) and related rights (performers and other personnel involved in the production) has a basic feature which runs contrary to the new developments: it is based on the national treatment of all works. Owner of foreign copyrights are treated in the same way as citizens of the country are treated. This worked as long as distribution channels were slow and markets were essentially segregated nationally. The Bern Treaty, administered by the World Intellectual Property Organisation (WIPO) and the related international regulations provide a minimum set of common rules. Insofar there is no fundamental shift in the approach necessary. But the national treatments provide still enough differences to be of concern for some of the players: the terms of protection are different for different countries. The protection period e.g. may vary from 50 to 70 years after the death of the last surviving author. The types of works are separated rather strictly, with different rules governing them (text, picture, film, written and performed music /what is a MIDI file?). Multimedia works are often combinations of such works and the rules of how to handle this situation are not well defined and are handled differently by national authorities. The obvious way out is international

harmonisation: actually a first step has been inaugurated by the European Union which finished a Green Paper on the Copyrights and Related Rights in the Information society 19th of July this year (1995). It is still open for discussion and should result in a White paper which will outline possible directives in the area in considerable detail. Actually the paper is as much an catalogue of questions to be settled as it hints solutions of some of them: Digital broadcast defined in terms of transmission and not of reception. Rights of author are exhausted only in case of the sale of a physical representative (e.g. a CD-ROM). A still open question is the differing practice concerning "private use" (private copying). Library use of information has to be dealt with. Directive 93/98/EEC moves the protection period upward to the longest protection period existing in a member country: this is in the interest of the rights holders, but may be questioned by the consumers of the products: would not 50 years after the death of the last author be enough incentive to encourage the production of multimedia products? But whatever will be the outcome an agreement within the EU which comprises civil and common law countries will serve as a blueprint also for further world-wide agreements. Another international move is the TRIPs Agreement on Trade Related Aspects of Intellectual Property. Additionally to including major parts of the Bern Treaty it protects performers, broadcasters and phonogram producers, and defines computer programs as literary works.

The software products are protected - according to a directive of the EU (91/250/EEC), but also in international usage - as a work of type "text", as a literary work. As the Manifesto Concerning the Legal Protection of Computer Software (94 Columbia Law Rev. 2318, 1994), by Pamela Samuelson, Mich Kapor and others points out, this protects only the software as it is, but it does not prevent the copying of the "behaviour" of the program. The Austrian Law on Utility Models (Gebrauchsmuster) allows the protection of the "program logic". The protection is rather weak: only in Austria, with a protection period of 10 years, but the demands for the inventiveness are also low. This could serve as an international model. But the behaviour could also be protected by other means. Patent may apply in some cases. But the behaviour is often not up to the high standards demanded for a patent and still deserves protection.

Finally Charles Clark of the International Publishers Copyright Council may at least be partially right that "the answer to the machine is in the machine". Users who can download much material from networks will be interested in easy mechanisms to use this material also in a commercial setting.
A solution would be the automatic monitoring of access and use. Users could information access freely. But remuneration would be according to their privileges (subscriber, university department or student, charitable organisation, commercial enterprise...). Systems like the proposed DigiBox of the Californian company Electronic Publishing Resources, or the solutions worked on by the European CITED project will provide flexible computer supported management of intellectual property rights. The existing collecting societies for licences will be part of any such system. They will administer the different identification labels (of authors, publishers, performers, works etc.) which will be

incorporated (partially encrypted and not deletable) in the electronic versions of the works. Such "watermarking" may also prevent unauthorised tampering with texts or documentary photographs. This is important also in the light of the still ongoing discussion on the "moral rights" of the authors protecting their works from mutilation. National treatment varies widely in this respect (see Green Book). For authors working with existing works and for the final users "one stop shopping" solutions should be provided to enhance the ability to create multimedia products and to reduce the hassle for consumers.

Such technologies may create even supervisability of up to now unenforceable usages: In the USA libraries will register copying for their customers and report them online to the rights holders represented by the CCC - Copyright Clearance Center.

All commerce via the networks needs some form of protection of the user (buyer) of the information. That means that we will probably need some form of arbitration committees on the nets. Partially this role may be played by the net access providers (Compuserve, America/Europe Online). But the Internet and similar networks will need independent bodies involving consumer organisations and the information distributing industry.

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