Information Systems in Management

Scientific editors

Andrzej Jakubiec
Waldemar Karwowski
Arkadiusz Orlowski

Wydawnictwo SGGW, Warszawa 2008
PREFACE

Information systems in management became an indispensable tool supporting decision making, strategy planning, short and long time forecasting, operational research, and marketing analysis, just to mention a few of the most striking applications.

In the present monograph we collect a set of interesting examples, coming both from academia and business practice, showing mutual relationship of theoretical foundations, technological advances, and real life business activities.

This volume consist of 18 papers written by 22 authors coming from 10 different institutions, having various backgrounds and professional experiences. The total number of pages equals to 209. Although it provides no proof, it does give a strong indication that the collected material can serve the still growing community of researchers, experts, and practitioners. The chapters are ordered alphabetically, according to the surnames of the first-named authors.

A review of security issues in Wi-Fi networks is presented and an extensive discussion of important risk factors is performed (P. Jałowiecki, E. Jałowiecka, A. Orłowski). Various popular attacks on typical Wi-Fi protecting protocols are presented, including key reconstruction, authentication, and detection of data packets (P. Jałowiecki, A. Orłowski, E. Jałowiecka). Concept of Stochastic Simulations Generator is introduced, implemented within SAS Systems environment, and analyzed in the context of financial modeling, especially calculating levels of reserves in insurance companies (M. Karwański, W. Szczesny). Possible methods and technologies of creating and developing web pages of a reasonable quality and functionality are presented and compared, with emphasis on applications to web sites devoted to scientific conferences (W. Karwowski, A. Jakubiec). Problems related to server and network resources management are discussed, including both software (Intel Server Manager) and hardware (Intel vPro technology) based solutions; also various security issues of remote management are presented and a case study of MAXDATA servers is performed (W. Karwowski, A. Orłowski, J. Grabień). A Case Based Reasoning method approach to offers’ choice strategies in e-commerce
applications is developed using basic knowledge from psychology of choice and decision supporting systems (A. Kluza, St. Jablonowski). Problems related to practical applications of UML and MDA methodologies to software development are discussed and a case study of Altkom Akademia UML training is presented (M. Materny, W. Karwowski). Methodology of initiating modules of an integrated EPR system is described and illustrated by an example of initiating sale and distribution modules of SAP R/3 system in a trade company (R. Nafkha). Various criteria for choosing an information system supplier are formulated and discussed (R. Nafkha, W. Szczesny). Problems of business intelligence and other IT tools supporting management processes in financial institutions are identified and presented (Z. Odrzygóźdź, M. Karwański, W. Szczesny). Data and information quality issues as well as classification of information quality improvement methods are described and analyzed (F. Pudło, T. Ząbkowski). Problems related to in-house design, development, and implementation of web-based transaction processing information systems are discussed and illustrated by a system supporting the work of Dean’s Office (S. Robak, G. Arkit). Technologies of XML data processing in relational databases (including XPath and XSLT) built up on Microsoft SQL Server 2005 are discussed (M. J. Śmietoński). Modeling business processes using integrated process management system ADONIS is described and analyzed (D. Strzęciwilk, R. Nafkha). Consequences of advanced ERP systems implementations are elaborated, especially in the context of global corporations (M. Szczesna). Importance of WAP tools in choosing advanced analytical CRM systems is investigated, with applications in a large retail bank (W. Szczesny, M. Karwański). Different forms of e-advertising are presented and problems associated with designing e-advertising management systems are outlined (G. Szymański, P. Józwiak). Eventually, impact of e-business technology on firms and their market performance is investigated (M. Woźniakowski).

Arkadiusz Orłowski
SPIS TREŚCI

**Jałowiecki P., Jałowiecka E., Orłowski A.** OVERVIEW OF SECURITY METHODS IN WIRELESS-FIDELITY NETWORKS................................. 7

**Jałowiecki P., Orłowski A., Jałowiecka E.** EFFECTIVENESS OF SELECTED SECURITY METHODS IN WIRELESS-FIDELITY NETWORKS....................... 17

**Karwański M. Szczesny W.** STATISTICAL GENERATOR OF FINANCIAL SCENARIOS SUPPORTING THE PROCESS OF CALCULATING THE RESERVES IN THE INSURANCE COMPANY .......................................................... 30

**Karwowski W., Jakubiec A.** WEB SITE FOR SCIENTIFIC CONFERENCE ...... 41

**Karwowski W., Orłowski A., Garbień J.** SERVER MANAGEMENT TOOLS... 53

**Kluza A., Jabłonowski S.** A PROJECT OF OFFERS’ CHOICE STRATEGY IN E-COMMERCE ENVIRONMENT APPLYING KNOWLEDGE FROM PSYCHOLOGY OF CHOICE ........................................................................................................... 64

**Materny M., Karwowski W.** UML – APPLICATIONS IN BUSINESS PRAGMATIC APPROACH ............................................................................................................. 76

**Nafkha R.** THE METHODOLOGY OF INITIATING THE SALE AND THE DISTRIBUTION MODULE OF THE SAP R/3 SYSTEM AT A TRADE COMPANY 88

**Nafkha R., Szczesny W.** CRITERIA AND CHOICE OF THE INFORMATION SYSTEM SUPPLIER ........................................................................................................ 101

**Odrzygóźdż Z., Karwański M., Szczesny W.** IT TOOLS SUPPORTING MANAGEMENT IN LARGE FINANCIAL INSTITUTION ................................. 113

**Pudło F., Ząbkowski T.** INFORMATION QUALITY IMPROVEMENT METHODS IN MANAGEMENT INFORMATION SYSTEMS .............................................. 124

**Robak S., Arkit G.** THE DEVELOPMENT OF A WEB-BASED INFORMATION SYSTEM SUPPORTING THE WORK OF A DEAN’S OFFICE .......................... 134

**Śmietański M. J.** XQUERY LANGUAGE AND OTHER TECHNOLOGIES OF QUERYING XML DATA IN RELATIONAL DATABASE BASED ON SQL SERVER ............................................................... 144
Strzęciwilk D., Nafkha R. PROCESS METHODOLOGIES BY APPLYING IT SYSTEMS OPTIMIZING BUSINESS PROCESSES ............................................. 155

Szczesna M. THE IMPLEMENTATION OF ADVANCED ERP SYSTEMS IN SUBSIDIARIES OF GLOBAL CORPORATIONS ............................................... 169

Szczesny W., Karwański M. THE ROLE OF THE WAP TOOLS IN CHOICE OF ADVANCED ANALYTICAL CRM SYSTEM AT LARGE RETAIL BANK .......... 177

Szymański G., Józwiak P. E-ADVERTISING MANAGEMENT SYSTEMS ...... 188

Woźniakowski M. E-BUSINESS TECHNOLOGY IMPACT ON FIRMS AND ECONOMY .................................................................................. 199
OVERVIEW OF SECURITY METHODS IN WIRELESS-FIDELITY NETWORKS

Piotr Jałowiecki, Ewa Jałowiecka, Arkadiusz Orłowski

Department of Informatics,
Warsaw University of Life Sciences (SGGW)

Summary: The objective of this paper is to introduce concepts of wireless networks and to present main security methods and systems used in this kind of networks. Presented protection methods are divided into main and additional methods. The main attention is concentrated on the most popular security methods. Risk factors are presented and its potential effects are discussed with reference to specificity of polish wireless networks. The most of them there are small, local, private networks with no or very weak protection. Additionally, administrators and users of these networks have usually no sufficient awareness of risk.

Keywords: information system, Wi-Fi network, security system, coding algorithm.

Information systems based on wireless networks

The most of modern information systems use communication technologies based on computer networks. Very important problem is necessity of implementation of privacy, access control and security mechanisms. This problem is especially urgent in systems based on Wireless Large Area Networks (WLAN). In classical networks using wires to send data packages, administrators may depend on network architecture and physical abilities to delimit unauthorized access. In wireless networks data are sent
through the radio waves. To intercept data only computer equipped with Wi-Fi card, which is located in WLAN range is needed. In the consequence unauthorized access may be realized by any person with mobile computer in a car or neighboring building.

802.11 standards family

WLANs are based on 802.11 standards family. The first standard named 802.11 is based on not normalized 2.4 GHz frequency band. It was published in 1997 and enabled a maximal 2 Mbps data transfer. This value of communication speed was to slow for most applications. In consequence the new 802.11a and 802.11b standards were published in 1999. 802.11b standard is based on the same frequency as the original 802.11. Not normalized frequencies are willingly used by the producers, due to less problems with interferences. The faults of using not normalized frequencies are: slow speed of communication, interferences from other devices using the same frequency range, for example microwave ovens or wireless phones. The second 802.11a standard based on normalized 5 GHz frequency band is more expensive, but definitely more effective. Its maximal speed of data transfer is 54 Mbps. The higher work frequency means the larger receptivity for interferences, especially between buildings constructed of some kinds of materials [IEEE 802.11, 1999].

In recent years, one of the most popular version has been 802.11g protocol, which has unified the best features of 802.11a and 802.11b standards. It enables 54 Mbps data transfer and works on 2.4GHz frequency band. 802.11g standard is fully compatible with earlier 802.11b standard and
enables to construct WLANs based on access points using both standards [Czerwiński, 2005].

WLANs based on 802.11g standard may easily be connected with existing LANs due to possibility of using the same protocols for example TCP/IP, IPX/SPX or NetBIOS. 802.11g standard offers two methods of networking: ad-hoc and infrastructure [Geier, 2002].

**Wireless network architectures**

In the ad-hoc mode network is based on peer-to-peer connection between work stations and it has no central access point. One group of connected computers is named the cell. To each cell it may be connected a number of computers. It is necessary to equip all cells in the network with unique Service Set Identifier (SSID), which controls connections to the cell. In consequence, different cells do not disrupt each other.

In the infrastructure mode it is Central Access Point (CAP), which is dedicated to provide and manage of access processes. Except CAP in WLAN it may be lots of other work stations, which are connected and work independently. CAP is a central base station, which performs a role of network gate and enables connections with external networks. Both WLAN architectures are presented in figure 1.
Main security methods in wireless networks

High risk of unauthorized access to WLAN is a main reason to find and introduce a lot of different security methods. Many of wireless networks, especially private local networks do not have any security systems or their systems are using methods, which do not offer sufficient level of access control. Very often users of these WLANs are not aware of risk related to using this kind of network.

Historically first security method used in WLANs was Wired Equivalent Privacy (WEP) protocol introduced in 1999. Central station and workstations have the same sequence of characters or numbers. This key is used to code of all data pockets traveling between specific workstation and CAP. WEP protocol is based on Rivest Cipher 4 (RC4) algorithm of data coding. Private key has a 40 or 104 bites and is used with 24-bit Initialization Vector (IV). In total 64-bit or rather 128-bit key is used.
special sequence, which is used to code an open text M and its ICV (Integrity Check Value) is created. The final cryptogram is defined according to formula (1)

\[
C = [M \| ICV(M)] \oplus [RC4(K \| IV)].
\]  

In formula (1) a symbol \(\|\) represent a concatenation operator and a symbol \(\oplus\) represent a XOR operator. Security level in WEP method is very strongly dependent on initialization vector. An idea of WEP protocol is presented in figure 2.

**Figure 2. The scheme of coding process in WEP protocol.**

Source: Own preparation based on [Lehembre, 2005].
This method is the most popular in WLANs, but using only WEP method without other protections may only be recommended for very small and small WLANs [Lehembre, 2005].

Usually using of WEP keys is complemented by a special authorization module defined in additional 802.1X standard. In this method, authorization, verification and access processes are not performed on CAP, but on each workstation separately, using dedicated software named 802.1X supplicant. The access verification and security control is enabled at the workstation level and may supplement WEP method at the central level of network. Often, this method is implemented and used in access points named hot-spots. Then, special Remote Access Dial-In User Service (RADIUS) servers are used to authorization clients (in one way systems) or to confirm of server and clients identity (in two way systems). Idea of RADIUS server is presented in figure 3.

*Figure 3. Client authorization with RADIUS server using.*

Source: [http://www.ovislinkcorp.com](http://www.ovislinkcorp.com)
The next step in introduction of effective security systems in WLANs was a Wi-Fi Protected Access (WPA) system. It unified conceptions of two methods described earlier: WEP and 802.1X, and eliminates some of their faults. Authorization is provided according to 802.1X standard optionally with using RADIUS servers. Additionally, Temporary Key Integrity Protocol (TKIP) is used to code data pockets and Extensible Authentication Protocol (EAP) is used to confirm clients identity by pre-shared passwords, which ensure higher security level. Both protocols are more effective than mechanisms implemented in original WEP and 802.1X systems. The extension of WPA system is Wi-Fi Protected Access 2 (WPA2) system. It is fully compatible with older WPA and is offered in two versions: Enterprise and Personal. In WPA2 Personal access to network is protected by using passwords and in WPA2 Enterprise access is protected by dedicated server. In both versions, according to a new CCMP (Counter Mode CBC MAC Protocol), a new algorithm of data coding AES (Advanced Encryption Standard) is used. AES standard requires a significantly higher computational power, thus in some wireless networks or their parts it may by impossible to update older algorithms to this standard [Kowasz, 2005].

**Additional security methods in wireless networks**

Apart from complexity of security methods in WLANs presented earlier, there are some simple, not expensive, additional methods to increase a security level in networks. All of these methods may be used both in classical LANs and WLANs.
One of the most popular additional protections in networks is Media Access Control (MAC) system, which is based on filtering of addresses. Every device, which works in the network has an unique physical address. All addresses are recorded in hexagonal code and the first six characters define a producer of device. A very simple mechanism is used to filter the addresses. Access to network is limited only for devices, which are placed on the authorization list. The authorization list is defined and updated on the access point specified for concrete workstation. Physical address may not be modified, but a lot of methods, which enable a modification of physical address of network card in a few seconds and fully automatically, are used [Jakubowski, 2005].

Routers, access points and many other access devices by default use Dynamic Host Configuration Protocol (DHCP) and 192.168.x.x or 10.0.x.x IP address classes. The DHCP protocol is one of the communication protocols, which is used to automatically obtain configuration data (IP addresses, sub-network masks, IP gate addresses, DNS server addresses) from the servers. The simple way to increase network security is switching off this service. It may cause some problems with automatic connection of additional workstations to network but identification of network by uninvited users is also more difficult.

All wireless routers and access points have a default name of network delivered by the producer of concrete device. This name is rather rarely changed by user and in consequence standard SSID may inform uninvited user about hardware used in network. In Internet there are available and often popular databases of default users, passwords for access points and
wireless routers classified by producers and device models. In every access point, headings, which identify concrete network, can be easily changed. In some devices it is possible to switch off a SSID retailing option. In consequence no uninvited user may know a name and other configuration data about network, which he wants to invigilate.

**Conclusions**

Security systems in networks may be defined as a set of mechanisms, which should provide authorized access, safely transport of data and capability of effective eliminating uninvited users access. These systems are one of the most important parts of every network. They play especially important role in wireless networks, in which the risk of unauthorized access and harmful actions is strongly higher due to using of radio waves to communication.

Statistics show, that more than 90% of hacking acts in Polish WLANs is a result of not using security systems or using only the most basic protections. This problem is especially urgent in small, local, private wireless networks. The best example is a fact, that in many of these WLANs, their administrators leave default passwords and configuration options. In consequence any intruder may use default authorization data and after obtaining access he may easily switch off protections. More than 80% of this kind of Polish small WLANs have no protection systems or their systems are implemented on very basic level [Stawiski, 2005] [Sokołowski, 2006].
Separate point is, that security mechanisms implemented in 802.11 protocols family do not offer a sufficient level of protection. The best example is WEP protocol, which is not expensive and therefore is willingly used in practice. In consequence, administration of wireless networks requires not only using security systems but following of common sense rules due to knowledge about weak points of this kind of networks.

References

EFFECTIVENESS OF SELECTED SECURITY METHODS 
IN WIRELESS-FIDELITY NETWORKS

Piotr Jałowiecki, Arkadiusz Orłowski, Ewa Jałowiecka
Department of Informatics, 
Warsaw University of Life Sciences (SGGW)

Summary: Wireless-Fidelity (Wi-Fi) networks are very popular base of many information systems, especially small, local, private Wireless Large Area Networks (WLAN). Their security systems are less effective than equivalents used in classic LANs. The main reason is a radio wave communication and necessity of more careful administration of wireless networks. In this paper three popular kinds of attacks on Wi-Fi networks protected by popular WEP protocol are presented. These methods could be described as: a key reconstruction, canceling of authentication rights and decoding of data pocket without a key. Also different aspects of security methods used in Wi-Fi networks are discussed.

Keywords: Wi-Fi network, WEP protocol, security system, coding algorithm.

Introduction

Wireless networks are more and more popular kinds of communication implemented in many information systems, especially small, local, private networks. In Wireless Large Area Networks (WLAN), data pockets are sent through the radio waves. Therefore a really serious problem is greater possibility of unauthorized access to WLANs than to classical networks using wires to communicate.
The 802.11 protocols family forms a foundation of WLANs applications. These protocols enable maximal data transfer with maximal speed of 54 Mbps and work at 2.4 GHz not normalized frequency or at 5 GHz normalized frequency. The protocols have implemented mechanisms, which cause that every WLAN may be easily connected to larger WLANs and classical networks.

In wireless networks there are two main kinds of devices: access points and workstations. These kinds of networks may function in ad-hoc or infrastructure mode, without or with Central Access Point (CAP). A group of computers connected to common access point is named the cell. All cells are equipped with unique Service Set Identifier (SSID), which controls connections to and from the cell.

Security mechanisms used in WLANs are not sufficiently effective. The most popular are Wired Equivalent Privacy (WEP) and Wi-Fi Protected Access (WPA and WPA2) systems. Apart from these protocols in wireless networks, other protection methods, which define a very different security level, are used.

**Parameters of wireless network used in examinations**

To examine an effectiveness of the most popular protection systems used in wireless networks, a small home network called the Our Network, was constructed.

The Our Network was built using of Planet access point equipped with necessary systems: WEP coding system, ability of SSID retailing switching off, Dynamic Host Configuration Protocol (DHCP) server and Media
Access Control (MAC) addresses filtering. An intruder client was a portable computer equipped with Wi-Fi network card.

Linux was an operational system of Our Network because of its reliability and available software used for tests. Testing software pocket consisted of Aireplay, Airodump and Aircrack applications on the GNU license. The Aireplay is an application dedicated to injection of spy pockets to the network. The Airodump is a sniffer application used to intercept of networks with WEP coding system. The Aircrack is a program dedicated to analyzing of intercepted initialization vectors and reconstructing its WEP keys.

**Wired Equivalent Privacy protocol**

Wired Equivalent Privacy (WEP) protocol was a first security method introduced in 1999 to use in wireless networks constructed according to 802.11 standards family. Central stations and workstations have the same sequence of characters or numbers assigned. This is a key used to code all data pockets sent in the network between central station and specific workstation. WEP protocol is based on Rivest Cipher 4 (RC4) algorithm of data coding. Private key has a 40 or 104 bites and is used with 24-bit Initialization Vector (IV). In total 64-bit or rather 128-bit key is used. A special sequence, which is used to code an open text M and its ICV (Integrity Check Value) is created. The final cryptogram is defined according to formula (1)

\[
C = [M \ || \ ICV(M)] \oplus [RC4(K \ || \ IV)].
\]  

\[1\]
In formula (1) a symbol $\|\$ represent a concatenation operator and a symbol $\oplus$ represent a XOR operator. Security level in WEP method is very strongly dependent on initialization vector. Implementation of IV vector in 802.11 protocols family is not obligatory and it may be sent in not coded form.

**The first scenario – keys reconstruction**

The main weakness of WEP method is similarity of coded data pockets connected with the same IV vector used often in coded form. Key used to coding is created by ordinary concatenation of private key with IV vector [Unsafe, 2000]. The first application, which can reconstruct a WEP key has been shown in 2001. AirSnort has analyzed and compared many of coded data pockets and its IV vectors and could reconstruct their keys. The only condition of applicability is adequately large traffic in network, which enables collection of sufficient data in short time. The next version appeared at the beginning of 2002 and was used to attack an optimized FMS (Fluher, Mantin, Shamir) method [FMS, 2002]. In this method, all bites of coded message are analyzed and not only the first bite like in the prototype version [Lehembre, 2005].

The second popular way of WEP attacking is an induction of Arbaugh method: suitably prepared data pockets are injected into the network using special applications (Aircrack, WepLab). The main task of injected pockets is obtaining of WEP keys and generating in the network an artificial traffic by defining again ARP (Address Resolution Protocol) demand pockets. This protocol is used to translate 32-bit IP addresses to 48-bit ethernet addresses. ARP demand pockets have a constant length of 68 bites and they are always

20
sent to broadcasting address FF:FF:FF:FF:FF:FF. By sending of repeating ARP demands to the same address (router, access point) it is possible to receive successively different IV vectors with the same coded message. An analysis of appropriate amount of coded versions of injected data pockets enables to reconstruct a 128-bit WEP key in 10-15 minutes, even in networks with small or incidentally traffic. As a remedy to this problem, a WEP key rotation was proposed but effectiveness of this method is very problematic especially for 64-bit WEP keys [Lehembre, 2005].

The first step of key reconstruction process is a switching on a network monitoring mode. This mode is equivalent of promiscuous mode in classical networks. If this mode is active, data pockets not assigned to concrete network card will not be declined. Before activation, it may be necessary to update network drivers. Then, interception and injection of all data pockets in concrete card is enabled. Switching on the network monitoring mode and its results are presented in figure 1.

**Figure 1. Switching on network monitoring oprion.**

```
root@sylabs:~# airmon.sh start ath0
usage: /usr/local/bin/airmon.sh <start|stop> <interface> [channel]

<table>
<thead>
<tr>
<th>Interface</th>
<th>Chipset</th>
<th>Driver</th>
</tr>
</thead>
<tbody>
<tr>
<td>ath0</td>
<td>Atheros</td>
<td>madwifi (monitor mode enabled)</td>
</tr>
</tbody>
</table>
```

Source: Own preparation.

The second step is a detection of nearest wireless networks and their clients. The results are presented in figure 2.
The main task of described attack is creating a big artificial traffic between an authorized client and central station to intercept unique initial vectors. The way to achieve such an intensive traffic in network is injection of many ARP demands presented in figure 3.

Source: Own preparation.
The process of data pockets injection is activated by Aireplay application and initial vectors of pockets sent are intercepted by Airodump application. The results of interception are presented in figure 4.

**Figure 4. Results of initial vectors interception.**

```
<table>
<thead>
<tr>
<th>BSSID</th>
<th>PWR</th>
<th>Packets</th>
<th>LAN IP</th>
<th>/ # IVs</th>
<th>CM</th>
<th>MB</th>
<th>ENC</th>
<th>ESSID</th>
</tr>
</thead>
<tbody>
<tr>
<td>00:30:4F:26:B4:10</td>
<td>46</td>
<td>484866</td>
<td>4230</td>
<td>9</td>
<td>48</td>
<td>WEP</td>
<td>test</td>
<td></td>
</tr>
<tr>
<td>00:30:4F:26:B4:10</td>
<td>48</td>
<td>00:20:ED:D1:7C:1A</td>
<td>48</td>
<td>1</td>
<td>test</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>00:30:4F:26:B4:10</td>
<td>44</td>
<td>0A:0A:0A:0A:A7:1C</td>
<td>44</td>
<td>471</td>
<td>test</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
```

Source: Own preparation.

After interception of enough number of initial vectors, the third step is a reconstruction of key using Aircrack application presented in figure 5.

**Figure 5. WEP key reconstruction.**

```
root@sylabs:~ $ aircrack -x -o out.ivs
Opening out.ivs
Read 8441 packets.

# BSSID ESSID Encryption
1 00:30:4F:26:B4:10 WEP (8441 IVs)

Choosing first network as target.
```

Source: Own preparation.

Successful WEP key reconstruction needed analyzing of 13180 keys in 8 minutes and 53 seconds. The result of key cracking is presented in figure 6.
The last activities are: reconstructed key registering, checking of IP address assignment by DHCP server and pinging some of internet servers. The result of successful pinging of google.pl server is presented in figure 7.

**Figure 6. The result of successful WEP key cracking.**

```plaintext
aircrack 2.2

[00:08:53] Tested 13180 keys (got 437587 IVs)

KB depth byte (vote)
0  0/  1 1A ( 46)  23 ( 15)  56 ( 15) E4 ( 15) E0 ( 15) 39 ( 10) B9 ( 10)
1  0/  1 43 ( 54)  49 ( 16)  20 ( 15)  24 ( 15)  92 ( 15) E3 ( 15) E5 ( 15)
2  0/  1 DC ( 39) C6 ( 39) E0 ( 15) E4 ( 15) C2 ( 14)  50 ( 13) A9 ( 12)
3  0/  4 BB ( 69) F6 ( 66) B4 ( 48) D7 ( 34)  72 ( 23)  68 ( 19) BE ( 18)
4  0/  2 4C ( 93)  05 ( 50)  3D ( 32)  22 ( 29)  22 ( 27)  12 ( 20)  19 ( 20)
5  0/  4 9D ( 45) CF ( 45) B2 ( 30) CE ( 24) C7 ( 15) B7 ( 13)  37 ( 8)
6  0/  2 BB ( 99)  59 ( 60)  29 ( 27)  28 ( 15)  33 ( 15) B5 ( 15) DC ( 15)
7  0/  1 47 ( 93)  93 ( 30)  82 ( 22)  58 ( 19) C5 ( 16)  58 ( 15) D0 ( 15)
8  0/  1 C5 ( 36) CF ( 45)  41 ( 12)  41 ( 12)  53 ( 12)  65 ( 12)  30 ( 10)
9  0/  10 47 ( 15)  56 ( 15)  58 ( 15)  94 ( 15)  98 ( 15)  55 ( 12)  70 ( 12)
10 0/  1 CC ( 97) E7 ( 18)  3C ( 15)  47 ( 15)  98 ( 15) B5 ( 15)  13 ( 12)
11 0/  1 55 ( 13)  05 ( 20)  39 ( 20) BC ( 20)  73 ( 16)  19 ( 13)  2D ( 13)
12 0/  1 CD ( 59) F0 ( 79) C9 ( 77) CA ( 54) CF ( 36) B4 ( 36) DF ( 33)


Source: Own preparation.

Figure 7. The results of final operations of successful WEP key cracking.

---

Source: Own preparation.
The second scenario – canceling of authentication rights

The other weaknesses of WEP protocol are: too simple encryption algorithm RC4, too short 24-bit initial vectors, too simple integrity checking algorithm CRC32 and absence of key actualization mechanism. In consequence, WEP protocol is receptive not only to key cracking, but also to canceling of authenticity, decoding of data pockets without key or falsifying of authenticity.

The tasks of authenticity canceling are: a reconstruction of not retailing SSID address, interception of connection during WEP parameters negotiation or blocking of concrete web service. Forcing client to repeat of authenticity process in connection with no authorization of control gates enables to falsifying of MAC address.

In practice this kind of attack begins from scanning network and choosing target. An injection of generated data pockets is realized using different commands. It may be realized in a form of massive attack too. Both versions of attack are presented in figure 8.

Figure 8. Operation of authentication canceling (a) and its massive attack version (b).

(a)  
root@sylabs:~# aireplay -0 5 -a 00:30:4F:26:B4:10
     -c 0A:0A:0A:0A:A7:1C ath0

(b)  
root@sylabs:~# aireplay -0 0 -a 00:30:4F:26:B4:10 ath0

Source: Own preparation.
Generally multiple falsifying of SSID addresses and sending data pockets forcing authenticity on retailing address are needed to obtain not retailing address and successful connection to network.

The third scenario – decoding of data pockets without key

Decoding of data pockets without an authentic key is possible with a proof-of-concept tool. Using of XOR operator in RC4 coding algorithm causes that each byte of coded message is determined from analogous byte from open message. A consequence of this fact is a possibility of changing last byte of coded message and sending modified data packet to the network.

The next step is trying to predict last byte of message. If operation will not succeed, all operations may be repeated, but successful prediction of last byte will cause of accepting and sending changed pocket to the network.

Repeating of described process for all bytes of message enables to obtain decoded message and WEP key. The number of initialization vector in next pockets is not required, so a reconstructed data pocket and intercepted IV vector may be used to coding of falsified data pockets.

The attack begins by network card monitoring mode switching on and identifying of target network and client. During interceptions of coded data pockets, Aireplay application creates and updates two files pcap, the first for decoded pockets and the second for original key stream. The procedure is presented in figure 9.
Figure 9. Decoding of coded data pockets process.

Pcap files may be read by many tools dedicated to text files reading. In figure 10 reading of pcap file with using of tcpdump application is presented.

Figure 10. Reading of decoded ping between workstations.

This method of key reconstruction is less automated than data pockets injection, but it is more flexible. The intruder can falsify any data pocket not longer than coding key.
Conclusions

Effectiveness of WEP is not too high due to earlier described kinds of attacks. The main reason is simple RC4 coding algorithm and too short 24-bit length of IV vectors. Using even a few thousands of data pockets with 24-bit initial vectors may increase a probability of collision to 50% [Lehembre, 2005].

Both of WEP successors: WPA and WPA2 protocols provide a significantly better protection level of wireless networks, but they also have weak points. The better protection effectiveness is ensured by using of new coding Temporary Key Integrity Protocol (TKIP) method. But new security methods do not provide full security confidence. For example a Denial of Service (DoS) attack during four-step key negotiation is one of the most dangerous and also one of the most popular kinds of attacks [Lehembre, 2005].

All protection systems in wireless networks have one important weakness. Unauthorized connection to WLANs is easier than in classic LANs. Unauthorized access is possible with any computer equipped with Wi-Fi network card and set of simple software tools. Additionally more than 80% WLANs in Poland have no security systems or use only basic protection methods. This situation is very common in small, local, private networks [Budny, 2005] [Sokołowski, 2006].

The final conclusion is that administration and using of WLANs must be realized with mixed security methods, with firm knowledge about its weaknesses and with greater dose of precautions than in classic LANs.
References

Summary: The prognostic models are often used in financial practice. In present work we show the concept of Stochastic Simulations Generator that make possible to simulate not only the separated values of the average best estimates but also allows parallel calculations the possible values for the correlated business lines. It would help to build the financial models by taking the multifactor synergy effect into account. The elements of such generator are presented, based on methods used to reserves calculations in insurance institution in frame of the Dynamic Financial Analysis. The main architecture, analytical techniques and implementation of the solutions using the tools of SAS System will be present.

Keywords: financial analysis, prognostic models, stochastic simulations.

Introduction

Dynamic Financial Analysis (‘DFA’) is a new approach to finance management of insurance company based on computer simulations. The most important characteristic of DFA is that it supports building an
integrated, holistic system to conduct financial and actuarial analysis in which different aspects of the company were calculated in common. DFA models the full financial structure by simulating projections to be used for the balance sheet and the profit-and-loss account (‘P&L’) of the company. Technically, DFA is a frame for various models and techniques from finance and actuarial science by integrating them into one multivariate dynamic simulation model.

**Figure 1. Logic of DFA System**

In the last few years insurance companies in the US, Australia and also countries in Europe have experienced with new systems of finance management. The developments impacted shareholder value as well as the solvency position increased market competition power of the company. In order to achieve this goal it was necessary to get an understanding of the economic risk factors. This include identification the risk factors and
modeling their random nature and interrelations. There are two primary techniques in use today to analyze financial effects of different strategies for property/casualty insurance companies over a specific time horizon. The first one – scenario testing – projects business results under selected deterministic scenarios into the future. The second technique is stochastic simulation, which is known Dynamic Financial Analysis (DFA). Thousands of different scenarios are generated stochastically allowing for the full probability distribution of important output variables, like surplus, written premiums or loss ratios.

**Architecture of the system**

The structure of the solution is hierarchical, consists of a few layers, and ensures the implementation of all the business functions the company requires. The system should be fed from a Data Warehouse. Control procedures of raw databases constitute the lowest system layer. Beside that the analytical procedure-level is placed. The system is also provided with a meta-base which describes, the cooperation of procedures. Individual procedures are arranged into process flow diagrams and thus carry out more complex processing. The definitions of processes are stored in the metabase. At this level there are mathematical models, database interfaces, and templates of result-presenting reports.

Reporting processes constitute a highest level. They enable the user to control the functioning of the system and share the results.

The IT system that implements the functions of all the modules should operate under the Windows or UNIX environment. The SAS system allows building an integrated system in which all the modules consist of the same
“bricks”. Thanks to that the implementation, management and operation of the system do not require separate procedures.

This architecture naturally reflects the logic of processing, from data access processes, through analytical and business processes, to information distribution. We have developed data and process models for the modules which constitute the system. They are based on a common information processing technology and knowledge we have accumulated.

**Figure 2. DFA implemented in SAS Systym**

Source: own.

A layer-based architecture makes it possible to integrate all the components for proposal into a single system. The system may be built and put into
operation sequentially. This is why the architecture description refers, in terms of functionality, to the following elements:

Data Mart constitutes the core element of the system. This makes it possible to administrate the system from "one place" and monitor all processing processes. The flexibility of the solution rests in the capability of extending the Data Mart structure with new data sources, processing processes, utility applications and reports while Data Mart is in use.

The analytical engine block carries out the calculations [SAS/STAT (2004)]. The architecture of the block features modules which implement consecutive processes necessary for the system to function properly (Fig 3). Both the Analytical Engine block and the Data Mart block are based on the same Metabase, which allows integrating the database with analytical applications and using common processes to carry out all the tasks.

**Figure 3. DFA processes**
The simulation model

The purpose of the simulation module is to allow analysing the influence of risk factors to possible financial effects such as different limits overflows by modelling of the future structure of balance-sheet, off-balance sheet items and others coefficients. Most notably the module allows:

- Generating market change scenarios and calibrating of parameters in prognostic models;
- Generating portfolio composition change scenarios, including the possibility to change the time limit structure to evaluate reserves;
- Building statistical models for the purposes of defining profitability curves, Monte Carlo stochastic simulations and adjustment what-if models.

The simulation model allows preparing a scenarios for calculations in other modules based on market data and portfolios that may reflect the planned or forecast changes. Owing to this, it may also be used for stress tests.

To generate simulation we propose two approaches. One taken from Corporate Metrics methodology [RiskMetrics Group (1999)] and the second based on copula theory [T. Roncalli (2001)].
To producing scenarios in Corporate Metrics methodology consisting of paths of monthly values that are consistent with the forecast distributions and reflect the correlation between these values, we should use the following routine:

1. Using the forecast procedures estimate the mean prediction and distributions for the time series values;
2. Using distributions from Step 1 and the historical correlation among monthly values, simulate in random walk model a monthly or quarterly path of values (Level I simulation);
3. Generate a correlated set of random variables. Then, using the simulated path values from Step 2, construct a corresponding path by ‘Wiener Bridge’ method for more frequent time intervals (Level II simulation);
4. The paths of scenarios between the quarterly points are generated repeat Steps 2 and 3 until you have a reasonable number of scenarios.

We develop forecasting models, and simulation algorithms required to generate paths of values using SAS System tools.

Thanks to the theory of copulas, the second method enables us to combine and simulate multivariate distributions with different marginals. The copula used by the model procedure is based on the multivariate normal. This particular multivariate normal has zero mean and covariance matrix obtained from historical data. To create the scenario, the following steps should be used:

1. Each model is estimated separately and their residuals saved;
2. The residuals for each model are converted to a normal distribution using their CDFs;
3. Cross these normal residuals, to create a covariance matrix;
4. A draw from this mixture of distributions is created using the MODEL procedure.

**Figure 3. Stochastic simulations**

*a) Corporate Metrics methodology*  
*b) Copulas based*

Source: own calculations based on premium forecast obtained for product from automobile-business-line in big USA insurance company.

**Reports distribution model**

Combining the full range of types of access to information, analyses and reporting in a single system makes distribution of work results and sharing of good experiences easy and effective. A common platform gathers previously isolated statistics, finance, marketing and logistics specialists and provides their entire community with access to standard analytical procedures and templates of reports used in the corporation.
Analysts and managers can use the analyses of the past for the purposes of accurate models and forecasts of the future.

The data presentation module covers:

- Preparing reports and data for presentation;
- Presenting the results of system calculations by means of a system-integrated module that enables the user to create various reports and export them to applications such as MS Office;
- Intranet distribution of reports prepared by analysts, which facilitates the analysis and printing of pre-defined reports.

**Figure 4. DFA – dashboard**

Source: SAS
Conclusions

By applying comprehensive performance of this module, the insurance company can derive the following benefits:

- Centralising and automating the process for managing data access, feeding the repository system and processing of the process-related data by making available administrative tools for monitoring and technological control of the modules by the IT department;
- Automating the process of the future reserves valuation process carried out in accordance with Solvency II;
- Ensuring the flexibility of the system, thanks to which it is possible to extend the data mart structure during the operation with new data sources, processes, user applications and reports;
- Understanding various dependences between financial processes, taking into account the actual risk level;
- Identifying opportunities for capital optimisation and better allocation of reserves;
- Promoting an integrated financial planning system and risk forecasting as well as processes which combine strategic and financial goals with an assessment of the overall risk related to business plans and performance management systems at the level of the whole enterprise as well as potential criteria for remuneration purposes.
• Obtaining recommended solutions in order to establish effective and efficient analytical system, promoting changes in the corporate culture aimed at enhancing risk awareness, communication and management in all independent organisational units.

References

WEB SITE FOR SCIENTIFIC CONFERENCE

Waldemar Karwowski, Andrzej Jakubiec

Department of Informatics,
Warsaw University of Life Sciences (SGGW)

Summary: The paper is focused to the problem of scientific conference web site. A variety of conference web sites have been studied and analyzed for discover their functionality. Typical architecture of scientific conference web site and most important functionality is described. Additionally possible technologies and methods of developing such web sites are discussed. Some technological solutions are presented and compared, moreover their possible consequences for conference web site are discussed. Requirements of web site for SIZ conference are presented and design and implementation of the conference web site is described. Finally some conclusions and experience from system realization are presented.

Keywords: Web site, Scientific conference, Information system, Management system, Design, Implementation, Analysis.

Introduction

During the last years importance of the Internet has grown rapidly. Nowadays almost every company has its web site, similarly every educational and scientific institution has at least simple web page. Information presented on a typical university department web site usually consists of description of its main activities, contact names, telephone numbers, important physical and email addresses. Besides there are specific
web pages for example with information for students, links to lecture pages etc. Although lectures and laboratories are main activities of universities but scientific activity is very important too. Each university organizes scientific conferences but potential participants work in different universities located in distant cities. Traditional communication methods like letter, facsimile and telephone are not enough; the first is slow, the others are fast and effective, but receiver has to be available at his office. Evidently today email correspondence displaces traditional letters, because almost every scientific worker has email address and access to Internet. This way of communication is fast, effective and cheap. Nevertheless, if data should be stored in the database some problems with email appear. For example it is not easy perform effective registration by email, because such method is inconvenient, data from email text should be rewritten into database. Moreover, collecting, maintaining and comparing reviews by the program committee chair may also become quite tedious, if not troublesome, due to the large amount of material, even when submitted by email. Good conference web site connected with database seems to be ideal solution for propagation information about conference, exchanging conference news, enable registration and store needed data.

The goal of our paper is to present most important functionalities needed at conference web site. We want answer to question, how such system should be organized in order to satisfy all conference requirements. We try to find and compare typical practical examples of conference web sites. Simultaneously we want to answer how utilize all opportunities of modern technology, especially how to select proper application from available
solutions. Finally we want to share our experience with implementing own software solution to manage scientific conference.

**Conference Web Sites**

User visiting scientific conference site sees the main page of the conference. Such page usually contains most important information about the conference and links to consecutive particular pages. On the main page most significant is the conference title, followed by short description about main conference topic, next is conference date. Besides, there is information about organizer – names of the university and department, or scientific society. Moreover we have address and location of conference, because many times conferences are organized outside universities. Here we have list of sponsors, if any, and often fee amount. Some conference pages have only email address and telephone number to contact and nothing more. Visitor interested in topic has to send questions about details via email or dial and ask through telephone.

Mentioned above functionality is not enough today, users want more. In majority of cases there are particular pages which expand matter mentioned at the main page. Typically they are: page with general scope of conference and precise list of conference topics of interest, page with description of conference objectives, page with program committee members, page with additional information about organizers, page with fee amount details together with bank account number, page with deadlines of sending Summary, article, paying fee and other important information. Many conferences have web pages with list of invited speakers, list of available hotels and travel guidance for guest from distance cities. Conferences with
longer tradition publish list of previous editions. Moreover visitor can find page with useful downloads. Among other downloads most often there are documents with information for authors about article formatting i.e. guidelines with complete descriptions of the fonts, spacing, etc.

All mentioned functionality can be performed using simple HTML pages, more extended functions need connections with database. Today websites are not simple web pages there are really information systems – conference management systems. Modern universities conference organizers, which want to ensure high level participant service, need to establish and maintain effective information systems to manage information and registration process. These systems, in turn, must integrate a well balanced set of functions selected on the basis of the existing Internet standards and practical needs. Conferences with advanced web sites offer visitor possibility to register online. Minimal scope of personal details is name, surname and valid email address; sometimes university name has to be given too. Registered user can at least receive conference news by email. During registration, in many cases, visitor should state if he is an author/co-author of a paper that will be presented at conference or just want to be an attendee of conference. Additional needed information is method of payment, for example: online payment by credit card or payment by bank transfer. Registration do not exhaust functionality, registered user sometimes can submit Summary and/or full paper through electronic submission system. There are special page with submission form and user must read and follow instructions for submissions. Such form typically consists of author and co-author information including titles, names,
university, department, address with postal code, country (for international conference), phone and fax numbers. Afterwards user has to fill data strictly connected with paper to submission: title and keywords. After than acceptance of personal participation in the conference and paper presentation has to be done, for example: “if this paper is accepted, I or one of my co-authors will attend the conference to present the paper”. At the end several legal issues remain to be done. User has to confirm, that paper has not been submitted, and will not be submitted to any other conference, nor is it currently under review for any other conference. Moreover that paper does not contain any plagiarized content in whole or in part.

At the first look conference web sites are similar, but after careful analysis functionality is not identical. For example possibility of registration and submission is not very frequent. To illustrate above remarks we analyzed many Polish conference web sites and finally chose ten typical examples. Then we compared chosen conference sites, four of these were international and a rest of them local. We analyzed where information about conference is available, is this site in two (or more) languages or not. Then we looked up if site consists from only one main page. Next we checked if is there possibility to register on a conference from web site and what kind of registration is available. At the end paper submission possibility was analyzed. Results of our analysis of Polish nationwide and international conference pages are presented in the table 1. As we can see general conference information is almost always available on page or/and as document, only in one case user has to call to ask organizers. Paper submission however is possible only in three cases.
### Table1. Examples of Polish nationwide conference pages

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information by phone</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Word document</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Pdf document</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Registration by Online</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Email</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Email Form</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Submission of papers</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

1. Komunikacja marketingowa w Europie wielu kultur.  
   http://www.ae.wroc.pl/wspolpraca/1012/komunikacja_marketingowa_w_europie.html

2. XI Konferencja Katedr Polityki Gospodarczej pt. “Polityka gospodarcza w teorii i praktyce”  
   http://www.sgh.waw.pl/katedry/kpg/Konferencja/grudzien

3. Międzynarodowa Konferencja Naukowa p.t. ROLNICTWO I GOSPODKA ŻYWNOŚCIOWA POLSKI W RAMACH UNII EUROPEJSKIEJ.  

   http://psi.szc.pl/konferencja_psi.htm

5. III Letnia Szkoła Algebry i Topologii.  

   http://149.156.125.5/~kzp/intro

7. V ogólnopolska konferencja ZARZĄDZANIE ROZWOJEM ORGANIZACJI W SPOŁECZEŃSTWIE INFORMACYJNYM  
   http://starx.ae.krakow.pl/k8/

8. Ekonomiczno-społeczne problemy rozwoju zrównoważonego.  
   http://www.e-ar.pl/konferencja/

9. IX KONFERENCJA ZARZĄDZANIE FINANSAMI PRZEDSIĘBIORSTW TEORIA I PRAKTYKA  
   http://zafin.ae.wroc.pl/start.php

10. XV Konferencja Informatyka w Technologii Metali.  
    http://www.isim.agh.edu.pl/konf/
Software for Conference Web Sites

Software for conference web site should not only be useful for a visitor, it also should enable conference management by organizers. Organizers must plan what they really need. They have to decide whether to buy and implement a ready-made system needed to this task or to find appropriate open source software possible to adapt. Of course if vision of the product is very clear and requirements are defined, it is possible to contract commercial company to this task or to develop it in a self-supporting way. Decision depends on existing offer and financial possibilities.

Requirements for conference site software are very close to CMS – content management software, but as we mentioned earlier some specific functionality is needed. Fortunately it is easy to find systems for conference management. In “Summary of Conference Management Software” [1] there are listed many tools, nevertheless this document is dated 1999 but anyway it is good point to start. We found and selected most interesting conference management software, finally we chosen few systems with free license:

- ConfTool [2] (a free license of the standard version is available for non-commercial conferences and events)
- OpenConf [3] (OpenConf is available for free as long as no fee is charged/paid for its install/use)
- IAPR COMMENCE Conference Management System [4]
- CDS Indico [5] (currently in production at CERN)
- Conference Management Service (CMT) [6] (sponsored by Microsoft Research)
• CyberChair [7]
• MyReview [8] (under the GNU General Public Licence)
• ConfMan [9]

Of course functionality of mentioned systems is not identical. We compared mentioned software for conference web sites, results are presented in the table 2. Analyzed applications were compared against listed below features:

• Online participant registration
• Registration of participants at the conference site
• Administration of participants
• Online submission of papers
• Online submission of reviews
• WebServer
• Platform
• Database

There are many other interesting tools for conference management especially commercial, but size of this paper does not allow us to describe all of them ([10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25]). We have to note that some organizations have their own systems, for example IEEE [26] other, like Academic Conferences International [27] rent out their conference system for many conferences.
Table 2. Comparing of conference web site tools

<table>
<thead>
<tr>
<th></th>
<th>ConfTool</th>
<th>OpenConf</th>
<th>IAPR</th>
<th>CDS</th>
<th>Indico</th>
<th>CMT</th>
<th>CyberChair</th>
<th>MyReview</th>
<th>ConfMan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Online participant registration</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Registration of participants at the conference site</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Administration of participants</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Online submission of papers</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Online submission of reviews</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>WebServer</td>
<td>Apache</td>
<td>Apache</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Windows Server</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Platform</td>
<td>PHP</td>
<td>PHP</td>
<td>PHP</td>
<td>Python</td>
<td></td>
<td>Python</td>
<td>PHP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Database</td>
<td>MySQL</td>
<td>MySQL</td>
<td>MySQL</td>
<td>ZODB</td>
<td>SQL</td>
<td>Server</td>
<td>MySQL</td>
<td>MSQL</td>
<td></td>
</tr>
</tbody>
</table>

1 ZODB (Zope Object Database) - Object Oriented database implemented in Python
Development of Web Site for SIZ Conference

Organizes of small scientific conference, like Information Systems in Management (SIZ), have to prepare appropriate system helping conference management. Of course, size of conference and financial resources determine available solution. All commercial systems are beyond organizers reach. We have analyzed some of free of charge systems, but we realized that there are problems with localization because our system should be in Polish language. In such situation decision was made to design and implement small but functional own made system. First step was to specify the project strategic focus in more formal way – to specify the objectives. The goal was to provide the system useful for conference management and opened for easy extension in the future and possible to integrate with other applications. At the beginning minimal set of system requirements were formulated. It was decided than system should satisfy the following requirements:

- system should be implemented as web application possible to use with any web browser;
- system should support 3 levels of users: guest, registered user, administrator;
- most important information should be presented of on the main page for all visitors (guests);
- registration should be based on valid email address, automated messages should be sent to users upon account creation;
should be performed authorized access to resources realized by system of logins and passwords together with method of password and username retrieval;

• possibility of bulk email correspondence to registered users;
• possibility of posting email question from registered users to organizers;
• submission of Summaries and papers for registered users;
• simple and flexible administrative tools.

According to general project plan we had to find out the project tools. From reasons mentioned earlier only we take interest in free of charge tools. After analysis it was decided that system should be written in PHP and use the MySQL database. The software team was organizers and voluntary student [28]. There were no financial resources for consultancy services, term was short and schedule was very tight. In practice there was no time for proper testing and many mistakes appeared during utilization.

**Conclusions**

Conference management system can simplify administration of scientific conference. The decision, to make such system from scratch by own resources, was very risky. From one point of view it was success, there was no cost of the development, tools and training. From other point of view many problems appeared. Time was so short that system was still under development during user registration, it caused many problems and misunderstanding. Organizers had to sometimes use additional email correspondence to clear up misunderstandings. We plan to improve and
extend our system, all user remarks are very important for us. To finish this paper, we have to state that gained experience will help to success next time.

References

2. http://www.conftool.net/
11. http://www.symphonyem.co.uk/
17. http://Summary.allacademic.com
22. http://www.confmaster.net/
27. http://www.academic-conferences.org/
SERVER MANAGEMENT TOOLS

Waldemar Karwowski, Arkadiusz Orłowski
Department of Informatics, Warsaw University of Life Sciences (SGGW)

Jacek Garbień
MAXDATA

Summary: The paper is focused to the problem of server and network resources management. Today in almost every company exist network, additionally there is possible connection through Internet. Servers are present in the center of every network. A variety of software solutions are mentioned and one - Intel Server Manager is described. Next hardware based solutions are discussed. Most interesting is out-of-band management, based on Intel vPro technology, it makes possible management even computer is power off. Security features for remote management are accurately analyzed for every solution. At the end practical case study for MAXDATA servers is presented, and some final conclusions are made.

Keywords: Server management, IT management, Information system, Management system.

Introduction

Today every company has computers and uses computer programs. Present-day computer does not work aside from others computers. Computers are connected through networks, because information exchange and sharing data are very important. Similarly many computer programs are not standalone programs, in the era of globalization modern information systems are
distributed among many machines and use many external resources. Big influence on computers and information systems has global network, during the last years importance of the Internet has grown rapidly. Next important factor is expansion of unwired networks, using network is easy as never before. Globalization causes that now companies are not located in one place or even in one country, many workers are today mobile workers and use laptops out of office and need remote access to company resources. All mentioned issues bring about importance of networks and network based applications. But in the very center of every network are servers, computers with special software. Servers not only supports communication among others computers, they provide many useful services. Most important task is assuring security of company network and computers. Moreover companies need tools to provide security of all data resources, especially databases. Monitoring and replication of databases is foundation of data security. To effective fulfill those tasks we need proper server management tools and instruments for IT infrastructure management. 

The goal of our paper is to present most important functionalities supported by modern servers and their special software. We want answer to question, how company system should be organized in order to satisfy all security requirements and how utilize all opportunities of modern technology.

**Server Management**

One of the biggest issues in managing today’s IT infrastructure is ensuring the availability and performance of critical business applications, by proactively identifying problems within the underlying networks, systems, databases and applications. One of the most costly aspects of IT is managing
the PCs on their network. Especially server management is very important and there are many sophisticated software tools to perform this task such as HP OpenView, Computer Associates, BMC, and IBM Tivoli. Intel supplies Server Manager (ISM) which helps manage computer and troubleshoot common computer problems. Administrator console is accessed through a standard web browser, command line communication is possible to. To access the console, a user must log in to the OS with administrator or power user rights. ISM provides extensive information about the computer’s hardware and software configuration. Moreover it enables an administrator to manage remote clients and servers on the network. ISM reports when the computer is in a warning or critical health state based on several health contributors such as temperature, voltage, free memory, and disk space. ISM enables monitoring the performance of various system objects such as drives, processors, memory, and services, administrator can view current processes and statistics for each process, and shut down processes if needed. System of alert actions notifies danger situations and threats. In ISM security is implemented for privacy and authentication. For example, for Windows three types of security are in force as the administrator console communicates with servers and clients: user rights as assigned in Windows user groups, SSL encryption of data and digital certificates. There is an additional tool Intel Server Deployment Toolkit which helps installation process. The newest version of ISM is Intel System Management Software 2.0 with Microsoft System Center Essentials 2007.

Besides software solutions hardware based solutions are available. Intel RMM2 is an add-on hardware-based module available for selected Intel
Server Products. It is an optional upgrade that includes a remote management card and GCM3 module connector for a dedicated network connection and adds extensive remote management capabilities. Once installed, the board uses its own dedicated IP address. Additionally, the Intel RMM2 provides remote KVM (a hardware device that allows a user to control multiple computers from a single keyboard, video monitor and mouse) access via a secured connection using a variety of supported Web browsers. The Intel RMM2 integrates easily into environments using additional server management software, such as Intel System Management Software. What’s more, the user interface is easily customizable through selection of icons, colors, and logos to promote individual OEM brands. Intel RMM2 saves time at every stage of the server lifecycle by allowing remote completion of tasks, from initial server setup to on-going system monitoring to server recovery and maintenance. With USB media redirection, IT staff can load operating systems and other software on remote machines from storage devices attached to their local machine. Intel RMM2 reduces server downtime by allowing administrators to proactively monitor system health and recognize emerging trends. Troubleshooting and repair can be performed from one console. Embedded web server connects administrators to remote servers over a secured connection to monitor system health and perform a variety of maintenance tasks with a supported web browser. It is possible to use SSL, SSH, KVM Encryption, authentication using LDAP or RADIUS. The authentication of users and the security of messages sent to and from the web server is a growing concern in the management of all systems. Per RFC 2617, digest authentication is
used to protect the user’s password. The 128 bit MD5 digest that is used by default, creates a hash using a server supplied nonce and the password the user types in. HTTPS connections may be enabled in the web server. SSL encryption protects the username, password and all data in a transaction. The firmware on the Advanced Edition module includes a telnet server. The telnet server provides administrator with control of the server by using Intel’s proprietary Command Line Interface (CLI) syntax called Common CLI (CCLI). The dedicated Ethernet controller supports Out-Of-Band (OOB) access. In other words, it runs separately from the OS and the BIOS. This separation allows the Intel RMM2 to operate continuously, thus supporting 24 X 7 management of the system. The management traffic does not share network bandwidth with the host system software.

**AMT technology**

One of the main problems is that today, PCs can’t be managed if their power is off or their OS is not operational. Some OOB possibility of RMM2 was mentioned above, but real solution is new Intel vPro processor technology. Intel vPro key features are hardware based management integration and it requires a certain version of the 965 chipset, the Q965. For mobile computers it is available analogous Centrino Pro Intel processor technology. Typically most business entities support PCs using software agents that reside within the operating system for common tasks such as remote desktop, distributing software updates and enforcing security policies. Intel Active Management Technology (AMT), it is a new embedded technology for Intel platforms that was developed in direct response to today’s IT problems. It uses vPro and Centrino Pro technologies. AMT allows web
service calls to Intel desktops and notebook clients for OOB management and services. It enables secure, remote management of systems through unique built-in capabilities, including:

- **OOB management** provides a direct connection, known as the OOB channel, to the Intel AMT subsystem through the operating system’s network connection or via its TCP/IP firmware stack.
- **Non-volatile memory** stores hardware and software information, so IT staff can discover assets even when end-user systems are powered off, using the OOB channel. IT managers can identify, list and track all systems on the network. It enables IT to diagnose and repair OOB systems. For example, if an OS has failed, IT establishes a remote control session to the failed system and remotely reboots it from a known good image on a remote drive. After reboot, IT remotely manages the reinstallation of the OS.

  - **System Defense** featuring inbound and outbound filters, combined with presence detection of critical software agents, protects against malware attacks. Additionally Intel ATM can reduce exposure to viruses and worms by helping to remotely monitor protection agent versions regardless of system state and push updates to PCs that are down wire.

The key to Intel AMT is that it uses nonvolatile memory to store system asset and health information as well as third party data to which management consoles or patch management applications need reliable access. Before Intel AMT, it wasn’t possible to access detailed hardware information—such as events, traps and component states—for systems that had crashed, hung, or were powered down. Also, there was no secure and reliable mechanism to remotely power up, power down, reboot, or access
hardware information for devices. Every company can write its own version
of management software. AMT Programmatic Interface, supported by Intel,
is a SOAP-based API exposed by the Intel AMT firmware to communicate
with ISV Management Console software running on remote hosts. The API
is described in Web Service Description Language (WSDL). There is a
WSDL file for each firmware service, also called an interface. The newest
Intel AMT Release 3.0 has support for WS-Management, this emerging
standard is available as a method for managing the Intel AMT platform, in
addition to the SOAP based API in previous versions.
Features supported by the advanced Enterprise model are available with
software provided by vendors who support Intel AMT. Recognizing the
advantages Intel AMT brings to platform management, major independent
software vendors (ISVs) around the world are adding Intel AMT support to
their products—providing leading-edge solutions for asset management,
remote diagnosis and repair, and network security. Intel AMT integration
enables IT efficiencies and cost savings not possible with previous-
generation solutions. Main vendors and their products are: Altiris (Altiris
Quarantine Solution, Altiris Real Time System Manager and Altiris
Network Discovery), Cisco Systems (Cisco Network Admission Control
and Cisco Security Agent), CA (CA Unicenter solutions), Hewlett Packard
(OpenView Client Configuration Manager, OpenView Management Suite
for Desktops), LANDesk (LANDesk Management Suite, LANDesk Server
Manager, LANDesk System Manager, LANDesk Security Suite), Microsoft
(Microsoft System Management Server 2003 - SMS) and others.
Physical protection and isolation of the Flash device is provided by the chipset hardware. Because Flash devices provide a limited number of write cycles (~100K operations per 4Kb Flash block), the chipset also provides mechanisms to detect and prevent flash wear-out, as well as to prevent Flash wear-out attacks by malware and non-partner applications. This functionality is augmented by mechanisms to prevent Application ID masquerade attacks (ID/interface binding).

Intel AMT integrates comprehensive security measures to protect data integrity throughout the system. The primary goal of firmware security is to ensure that only Intel-approved firmware images can run on the Intel AMT subsystem hardware, and that only IT administrators can apply approved Intel firmware update images. During the design phase, a Firmware Signing Key (FWSK) public/private pair is generated at a secure Intel Location, using the Intel Code Signing System. The Private FWSK is stored securely and confidentially by Intel. Intel AMT ROM includes a SHA-1 Hash of the public key, based on RSA, 2048 bit modulus fixed. Each approved production firmware image is digitally signed by Intel with the private FWSK. The public FWSK and the digital signature are appended to the firmware image manifest. At runtime, a secure boot sequence is accomplished by means of the boot ROM verifying that the public FWSK on Flash is valid, based on the hash value in ROM. The ROM validates the firmware image that corresponds to the manifest’s digital signature through the use of the public FWSK, and if successful, the system continues to boot from Flash code. Network security is provided by Transport Layer Security (TLS), and XML-encoded messages are encapsulated in SOAP over HTTP.
TLS mutual authentication is carried out using the cipher suites TLS_RSA_WITH_AES_128_CBC_SHA (export/import), and RSA certificates and keys generated off-line and provisioned (2048 bit modulus). Mutual authentication is required by means of preinstalled certificates on both the client and server. Two local Intel AMT features exist: 3PDS and Local Agent Presence. The traffic between these two features running on the host and Intel AMT goes over SOAP/TLS. The local interface is aligned with network interface security.

Intel AMT systems support Kerberos in order to achieve integration with Windows domain authentication. This mechanism is based on a well-accepted set of Internet standards, including Kerberos v5 (RFC 1510), GSS-API (RFC 1964), and SPNEGO (RFC 2478). This approach simplifies User ID management by using the group-based Windows authorization approach, rather than placing responsibility for creating a new approach on administrators. IT administrators are allowed or denied privileges to manage Intel AMT devices based on their group memberships in Active Directory.

Management applications that support the configuration of the wireless Intel AMT interface must address the variety of security topologies employed by their customers' wireless networks. The Intel AMT wireless management interface does not support open wireless networks, nor does it support Wireless Equivalency Protocol (WEP). Use of Intel AMT wireless connectivity typically requires the use of security included in or related to the 802.11i specification, such as Wi-Fi Protected Access (WPA) or Robust Security Network (RSN). It also optionally supports 802.1x authentication.
Case Study MAXDATA

One of the biggest server manufacturer is MAXDATA, company located in Germany. It is among the top ten of the European hardware producers for years. MAXADATA is IT manufacturer for high quality products and optimal enterprise solutions. The company has nine sales companies in all important countries in Europe, and its products are sold in many more countries. About 1200 employees have a hand in the success of the MAXDATA servers, computers, and notebooks and the displays with the Belinea brand. In Poland MAXDATA branch has operated since 2002. MAXDATA servers are used in Poland by many ministries (e.g. Ministry of Finance), government institutions (GUS, ZUS and others), universities (e.g. AGH), publishing houses (PWN), banks (NBP, PKO BP and others), insurance companies (Link4, PZU) and many others. This long list of clients proofs that MAXDATA products have highest quality. Plantinium servers line includes: PLATINUM 1500 IR M6, PLATINUM 2200 IR, PLATINUM 3200 I, PLATINUM 7200 IR. Servers have MAXDATA System Management for monitoring and administration of the server system remote or on-site. Of course client can use Intel Server Management or Remote Management Module, tools supported by other vendors like LANDesk Client Manager are available too.

Conclusions

Most promising technology in server management is Intel AMT. Widespread deployment of this technology will provide significant opportunity for a reduction in total cost of operation for client systems.
Implementation of Intel AMT can be an opportunity to improve client provisioning and fault responses, it can be integrated to keep device and software inventories more accurate automatically. More efficient and effective security management; integration with major security management capabilities has been accomplished –action tracing/logging is built in. Future capabilities align with Intel IT manageability roadmap–use SOA/SOI for management functions–use industry specifications (WS-Management). Server producers like MAXDATA utilize newest technology in their products.

References

A PROJECT OF OFFERS’ CHOICE STRATEGY IN E-COMMERCE ENVIRONMENT APPLYING KNOWLEDGE FROM PSYCHOLOGY OF CHOICE

Andrzej Kluza, Stanisław Jabłonowski
Department of Informatics, Warsaw University of Life Sciences (SGGW)

Summary: In the article a project of an approach to multi-attribute objects’ choice is presented. It is illustrated by a real estate advertisement example. Offers have big number of features and it is not easy to determine the best ones. In the paper preliminaries of a decision support project has been presented. Good decision support systems, essential in management, have to reflect knowledge from the domain of choice psychology. Case Based Reasoning method has been chosen to find the best offers in the data base.

Keywords: decision support, psychology of choice, Case Based Reasoning, similarity of multi-attribute objects, e-commerce application, real estate.

Problem

In the paper we refer to the article “Advanced Strategy of Real-Estate Advertisement Search in e-Commerce Environment Using Artificial Intelligence” [Kluza 2007]. A project of offers’ searching support in e-commerce environment has been presented there. In all management domains good decision support systems are desired. The authors [Kluza 2007] have paid attention to the necessity of a greater adjustment of knowledge from the domain of psychology of choice. At present, we put forward this approach’s modification. We place emphasis on providing for
psychological aspect. We also show some similarity examination methods used in taxonomy, especially in genetics, which can be used with Case Based Reasoning method (CBR) [Kolodner 1993]. This method is a good tool in finding the most suitable advertisements in the base.

**Taking decisions in terms of many possibilities**

B.Schwartz [Schwartz 2004], known specialist of psychology of choice presents the thesis that a choice in terms of too many possibilities can, paradoxically, result in bad effects. The reason is that people the most often do not know well what they want. A situation like that can bring on not only a dejection or delaying a decision but even a decision paralysis. Too wide choice should be limited, therefore. A client should be given implicit features’ values, search results should be not too many and should satisfy user’s desiderata as much as possible. An attitude proposed in the work [Kluza 2007] pointed out these postulates, but still it must be developed. Schwartz writes “(...) social scientists who study choice. If we’re rational, they tell us, added options can only make us better off as a society. Those of us who care will benefit, and those of us who don’t care can always ignore the added options. This view seems logically compelling: but empirically, it isn’t true”.

**Similarities’ examination methods used in the paper**

While using methods of finding the most relevant offers in a data base we must choose definitions of multi-attribute objects’ similarity or distance. There is quite a number of formulas stating similarity (or distance) between objects with many attributes. Among numerous methods of examination of
similarities between different objects we have paid attention on methods used in genetics. For instance, data obtained in the Random Amplified Polymorphic DNA (RAPD) reaction can be presented as 0 and 1 combinations. They represent live organisms under examination. Thus, the obtained data enable genetic similarities and diversity to be calculated numerically. Such 0 and 1 sequences and appropriate comparing methods are used in other fields of taxonomy, too.

The metrics described below, calculate the similarity of pairs of congeners or other multi-attribute objects. Each object is characterized by a sequence of 0 and 1. As an example, two seven-attribute objects which have been compared (i and j) can look like following:

<table>
<thead>
<tr>
<th>position number</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>i</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>j</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

We can assume a notation like below:

- \( n \) = the number of attributes
- \( n_{00} \) = the number of positions where \( i_k=0 \) and \( j_k=0 \)
- \( n_{11} \) = the number of positions where \( i_k=1 \) and \( j_k=1 \)
- \( n_{01} \) = the number of positions where \( i_k=0 \) and \( j_k=1 \)
- \( n_{10} \) = the number of positions where \( i_k=1 \) and \( j_k=0 \)

where \( k=1,\ldots,7 \)

The chosen definitions (\( p_{ij} \) is a similarity level between object i and j):

1) \( p_{ij} = \frac{2*n_{11}}{(2*n_{11})+n_{01}+n_{10}} \) – [Czekanowski 1913], [Dice 1945], [Nei and Li 1979]
2) \( p_{ij} = \frac{n_{11}}{(n-n_{00})} \) – [Jaccard 1901, 1908]
3) \( p_{ij} = \frac{n_{11}}{(n_{01}+n_{10})} \) – [Kulczynski 1927]
4) \( p_{ij} = 0.5^*(\frac{1}{(n_{11}+n_{01})} + \frac{1}{(n_{11}+n_{10})}) \) – [Kulczynski 1927]
5) \( p_{ij} = \frac{n_{11}}{n} \) – [Russell and Rao 1940]
6) \( p_{ij} = \frac{n_{11}+n_{00}}{n} \) – [Apostol 1993]
We see that these similarity measures except for 3) give values from the interval \([0, 1]\) and 1), 2), 3) and 4) are related by simple monotonic functions. We can notice that for these four metrics the more common positions equal 1 are in the objects (in the range of positions with at least one 1) the bigger similarity's value is. Let us notice that all these measures satisfy the condition of symmetry.

Let us also notice that similarity measures and relevant distance measures are known at different names sometimes. More information may be found in e.g.: [Gower 1985].

**Using a real estate advisory e-commerce system**

In the subdomain Domiporta.pl of Trader.pl thematic portal one can gain an access to a database with advertisements from the real estate market. The database is vast (more than 400,000 announcements only on secondary market in October 2007). It is not easy to choose the best offer from such a set. After filling in a form from the portal interface with basic information like type of an offer, real estate type or region, the choice is limited, but still a number of advertisements remains. Search process on the portal can be carried on by using simple or advanced search form while less or more filtering options can be adopted, but still too many offers remain, let alone decision problems. The results can be sorted by one selected feature, like living space, price, advertisement's inserting date etc., but a potential purchaser is usually interested in at least several real estate features at the same time. In the papers [Kluza 2006, 2007] a project of Case-Based Reasoning [Kolodner 1993] method application has been proposed.
Case Base Reasoning method (CBR) is based on comparing cases stored in a known cases base with an actual case and finding the most similar cases to this one.

Offers in the database are treated as known cases and for a specified query similar cases are sought. Local and global similarity measures between features’ values specified in a customer’s search query and those specified in an offer for sale are calculated. The customer can be shown a list of advertisements, which starts with the most similar to the input pattern.

Local similarity functions, $p_y(x_{0,i},x_{i,j},\Delta x_{\text{max},j})$, can be set in many forms, for example in the forms presented below (the form A for nominal features and B – for continuous features):

$$
A. \quad p_y(x_{0,i},x_{i,j},\Delta x_{\text{max},j}) = \begin{cases} 
1 \text{ for } x_{0,j} = x_{i,j} \\
0 \text{ for } x_{0,j} \neq x_{i,j} 
\end{cases}
$$

$$
B. \quad p_y(x_{0,i},x_{i,j},\Delta x_{\text{max},j}) = 1 - \frac{|x_{0,j} - x_{i,j}|}{\Delta x_{\text{max},j}}
$$

In these formulas $i$ is the number of an offer taken into account, $j$ is the feature’s number, $x_{i,j}$ – i-th offer value for j-th feature, $x_{0,j}$ – j-th feature value of the search query and $\Delta x_{\text{max},j}$ – absolute value of maximal difference between observed values in j-th feature dimension. Having query features’ values vector as:

$$X_0 = (x_{0,1}, x_{0,2}, ..., x_{0,n}),$$

where $n$ - number of all features of an advertisement that could be specified.
in a query, the formula of global similarity function, \( \text{SIM}(X_i) \) [Bergman 1996], can be defined:

\[
\text{SIM}(X_i) = \frac{\sum_{j=1}^{n} m_{ij} w_j p_{i,j}(x_{0,j}, x_{i,j}, \Delta x_{\text{max},j})}{\sum_{j=1}^{n} m_{ij} w_j}
\]

where \( w_j \) - given feature weight (positive real number), defining a degree of client preference and factor \( m_{ij} \) (equal 0 or 1) applicative case completeness rule to the subsequent computations. The multiplier \( m_{ij} \) is equal to 1 if \( j \)-th feature is considered by a potential client.

Sorting by global similarity function value takes into account a number of features concurrently, so probability of quick finding a convenient offer is boosted. The problem is that the formulas A or B are difficult to use because values \( x_{0,j} \) are often not known or have a number possible values stated by user. The values \( x_{i,j} \) are not always known either. In the paper [Kluza 2007] a project of ameliorating a search process is given. It points out using Case-Base Reasoning method and some knowledge from psychology of choice.

**Further modification of user service system**

Subsequent stages of user service could appear as follows:

**Stage 1.** Making a preliminary selection throughout stating primary information like name of voivodship, place, type of sought-after real estate etc.

**Stage 2.** Stating the prior features and their preferred values.

At this stage a substantial innovation should take place throughout maximal facilitating of user’s choice. Assuming, that prospective purchaser is not
decided, which features are the most valid and which of their values should be looked for, there should be suggested in an appropriate form, a small number of features (for example three), the most valid (with their weights) in an opinion of experts or on the basis of statistical analysis of queries introduced earlier. User could possibly change prior features’ choice, but while leaving their number intact. Further on, we suggest that the system should suggest a client which features’ values are worth choosing. This being so, referring to a well-known from psychology meaning of the number of seven\(^2\) [Corge 1981], there could be displayed, for each of stated feature, a suite of 7 scopes of variability. These scopes would be counted on the basis of announcements present in the database with taking into account the selection from stage1.

\(^2\) Corge, commenting on a well-known in many cultures role of seven, formulates an opinion that while estimating visually the number of several objects, seven may be a border between what is to be calculated and what doesn’t require counting.
On the form from fig.1 there is a list of prices’ scopes in developed shape. The scopes are counted under assumption that minimum price of selected at stage 1 real estates’ set is equal to ca 110 thousand zł and maximum ca 540 thousand zł.

After clicking on the button “Do you want to change features of top priority?” a user will see all available features by order of system ranking with an inquiry which one of three prior features is to be exchanged.

For nominal features, like “District”, the developed list of scopes includes seven groups of districts mentioned in the advertisements. This requires the
system to prepare seven groupings of districts according to their distances from the town center for instant. After using the button “Next step” an inquiry is displayed to user if he wants to determine next features and if the answer is yes, a new form is presented to him. Three alternate features are displayed (the most valued by experts or by statistical analysis of queries introduced earlier) in similar manner. The difference is in the forms’ heading (“features number 4, 5 and 6”) and in weights’ values proposed (4, 4 and 4). The forms’ projects submitted above are characterized by simplicity (only six input formants to fill, user has only to choose from proposed answers). User can focus on only three features simultaneously. In the prompts the information about data extent in the database has been contained.

Stage 3. Similarity measure counting.

The way of the global similarity $\text{SIM}(X_i)$ counting is unchanged. Local similarities, $p_{ij}()$, are very different from forms A and B, presented before, however. User stated selected features’ values reduce to seven item sequences composed from 0 and 1. These sequences are to be compared with an offer’s features’ values, submitted in the same manner. Distinct similarity formulas are to be applied for different features and the system should earlier transform collected offers into similar combinations of seven item sequences. Similarity definitions used may be like these presented in the chapter “Similarities’ examination methods used in the paper”.

And so, for instant in the case of the feature “district”, we must suggest an own one. That is, if for two seven item sequences being compared $n_{11}$ is not equal 0, local similarity value should be equal 1, otherwise it should be 0.
In the case of the feature “price” we can use, after prior preparing the offers’ data, the metrics 1), for example. If an offer gives price’s value for instant 250 thousand zł, to negotiation, the system should prepare this feature’s value like following:

0 1 1 1 0 0 0

because three scopes of variability: [170, 230], [230, 290], [290, 360] should be filled in.

**Stage 4.** Sorting by global similarity’s value.
The result list of advertisements, should start with the biggest values of global similarity.

**Stage 5.** Presenting to the user the result list in the prepared order.
The list of presented offers should not contain too many items. We suggest it should have from three to seven items.

**Summary**

Computer aided decision support is essential in management of different domains. In many areas of decision, computer aided support can and should be ameliorated again and again. The article is a presentation of some attitude to this problem in distinguishing offers from real estate market offers and is a continuation of a previous paper [Kluza 2007]. Chosen offers have to be as well adjusted to preferences of a potential client as possible. However, a client often doesn’t well know what he wants, what are actual real market properties and loses way in superabundance of features and possibilities. So an adaptation of some knowledge from psychology is necessary. The authors tried to do so by limitation the number of features presented to the
user to the most important only, by classifying available features scopes’ values into non numerous intervals etc.

The Case Based Reasoning method and some similarity examination ways used in taxonomy has been chosen to find the best offers in the data base.

References

5. Dice L.R., 1945, Measures of the amount of ecologic association between species, Ecology 26: pp.297-302
10. Information Systems in Management, Wyd. SGGW, Warszawa (in Polish); pp.36-45
Summary: The paper is focused to the problem of software architecture and question can we find tool to solve all software development problems. A variety of problems connected with software development are described. Next, UML most popular standard to design and document software systems is discussed. After than MDA ideas are described. Problems with practical application of UML and MDA are discussed. At the end practical case study of Altkom Akademia UML trainings is presented, and some final conclusions are made.

Key words: UML, MDA, software system, software architecture, analysis, design, implementation.

Introduction

Software is complex and at the same time intangible product of a human mind. Today computers have much bigger efficiency than twenty years ago presently PC has more operational memory, storage memory and faster processor than old mainframe. As consequence of this software systems are much bigger than twenty years ago and proportionally more complicated. Of course now programmers have modern tools to do their work, but software
construction still involves essential tasks: the creating of the complex conceptual structures and the representation of these Summary entities in programming languages. Every year Standish Group in “Chaos report” informs that only about 20% of software systems are prepared on time, budget and with planned functionality. Today software solves business problems but business environment changes frequently. Software has to be possible to modification and change, additionally in Internet era systems have to exchange data with each other. Moreover developer teams consist of many programmers who need documentation of every part of system. As a consequence large and complex software system should be properly designed and documented. Software architecture is a critical part of the design and development and an important research area in the software engineering community. Many architecture description languages and formal modeling notations have been proposed to model and analyze structural and behavioral properties of software systems. Nowadays Unified Modeling Language (UML) is the most popular standard for description of software architecture, design and documentation. The main objective of this paper is to answer if new notation itself can solve architecture problems.

Software complexity

Twenty years ago, in a well-known essay called “No Silver Bullet” [1] written by F. P. Brooks, Jr., the author suggested that software has four properties that can turn a project into “a monster of missed schedules, blown budgets, and flawed products”: complexity, conformity, changeability, and invisibility. He wrote: “But, as we look to the horizon of a decade hence, we see no silver bullet. There is no single development, in either technology or
in management technique that by itself promises even one order-of-
magnitude improvement in productivity, in reliability, in simplicity.” Is it
still true after twenty years? During those years a number of attempts have
been made to address the problems that arise from mentioned properties;
some of the products of these attempts are: high level languages, object
oriented programming, analysis and design, RAD (Rapid Application
Development) and CASE (Computer Aided Software Engineering) tools.
Standish report and our experience say that Brooks statement seems to be
still valid. The hard part of building software is the specification, design,
and testing of this conceptual construct, not the labor of representing it and
testing the fidelity of the representation. The complexity of software is an
essential property, and attempt of limiting this complexity rather makes
problem deeper. Modern tools help but from the other side they cause
additional complexity, it is true for RAD tools, frameworks, platforms and
specifications like JEE. Complexity nonlinearly increases with size of
system. Violently growing complexity causes the difficulty of
communication among team members, which leads to product flaws, cost
overruns and schedule delays. It is hard to see system as a whole, and
conception uniqueness is lost. From complexity of structure comes the
difficulty of extending programs to new functionality without creating side
effects. It looks that building software will always be hard. New languages
and tools do not solve problems by itself, we have good programs in C and
bad programs in C++. We can present here opinion of David L. Parnas,
inventor of modularization and information hiding ideas [2, 3, 4], about
object oriented languages [5]. They could be helpful but not really needed,
because language is not the issue. Design is what matters. It means that design skills, knowledge of design principles and experience in designing are more important than tools. Parnas formulated this opinion in 1996. Since than new tools in software development have appeared, most important is Unified Modeling Language (UML) [6]. Is Parnas opinion, concurrent with Brooks, still valid after eleven years?

**Information Technology and business aims**

Contemporary companies to achieve business aims utilize Information Technology (IT). Software systems and their architecture are elements of IT. IT as defined by the Information Technology Association of America (ITAA), is “the study, design, development, implementation, support or management of computer-based information systems, particularly software applications and computer hardware” [7]. IT deals with the use of electronic computers and computer software to convert, store, protect, process, transmit and retrieve information, securely. Definition is so broad that we have to narrow our area of interest to software engineering. The discipline of software engineering encompasses knowledge, tools, and methods for defining software requirements, and performing software design, software construction, software testing, and software maintenance tasks [8]. We limit our subsequent discussion only to few areas: choose of technology, requirement management, architecture, specification, quality assurance, and management of developing process. Can we find “silver bullet” to solve problems connected with these areas? Let us see the question from the business objectives side. From the business users point of view technology method of achieving goals is not so important, most important is
effectiveness: maximal outcome at lowest costs. If we want to achieve specific goal, and choose proper technology from many available, one question appears, how to compare them according to effectiveness? We can compare suppliers marketing materials but it is problematic, “success stories” are non adequate source of information and we have not reliable data. Generally it is not easy to measure quality of tools and quality of final effect – software, because we have not common standards to compare technologies in IT field. In practice expenditure of time and material means needed to compare possible solutions make impossible precision comparing. Moreover many times requirements are not precisely and properly defined. Finally, in the most of cases, technology is chosen on the base of current popularity and manufacturers marketing slogans. It means choice is made almost randomly. Of course we can ask experts, but for example in Poland, consulting companies are strictly connected with suppliers and their advice is not independent.

**UML in practice**

To choose technology we must have vision of whole system, in other words system architecture. We need a tool to precisely describe general architecture of software system and to describe particular design issues. Additionally communication among team members seems to be key-issue, and we need solution to support such communication on every stage of software process. It seems that UML can provide base for this communication. UML is commonly accepted language possible to use among users, business analysts, software architects and designers, programmers and testers. We have to note that UML is very popular, and
there are many reasons to see in UML a candidate to be expected solution of software problems. Can we treat it as “silver bullet”? What indicates that it is awaited solution? Firstly UML is standardized, known and popular. It is in use at every phase of development process, we can describe requirements, static view of system (class structures) and dynamic view of system (interactions among objects). UML is used independently of analytic or design methodology. Of course UML is strictly connected with Rational Unified Process (RUP) [9] but not limited to it. We have to note that contemporary methodologies frequently based on RUP and iterative approach to development process is commonly accepted. Methodologies are sometimes simplification or modification of RUP according to some special assumptions. In RUP and other methodologies UML is used for both modeling and documenting. There is another reason to use UML: it is independent on programming language and system environment, we can model on general level or on specific level. In OMG vision UML is a part of bigger whole. OMG elaborated Model Driven Architecture (MDA) [6], it is idea of development approach based on transition between models. MDA separates the fundamental logic behind a specification from the specifics of the particular middleware that implements it. This allows rapid development and delivery of new interoperability specifications that use new deployment technologies but are based on proven, tested business models. Organizations can use MDA to meet the integration challenges posed by new platforms, while preserving their investments in existing business logic based on existing platforms. General design should be independent from environment, when we choose specific platform, model is transformed into
platform specific model. We have four MDA models: CIM (Computation Independent Model), PIM (Platform Independent Model), PSM (Platform Specific Model) and PM (Platform Model). The requirements for the system are modeled in CIM model, describing the situation in which the system will be used. Such a model is sometimes called a domain model or a business model. Typically such a model is independent of how the system is implemented. It is useful, not only as an aid to understanding a problem, but also as a source of a shared vocabulary for use in other models. CIM requirements should be traceable to the PIM and PSM constructs that implement them, and vice versa. CIM is the base for PIM. It describes the system, but does not show details of its use of its platform. The architect will then choose a platform (or several) that enables implementation of the system with the desired architectural qualities. The architect will have at hand a model of that platform PM. Often this model is in the form of software and hardware manuals or is even in the architect’s head. The platform specific model produced by the transformation is a model of the same system specified by the PIM; it also specifies how that system makes use of the chosen platform. A PSM will be an implementation, if it provides all the information needed to construct a system and to put it into operation, or it may act as a PIM that is used for further refinement to a PSM that can be directly implemented. Idea is very clear and logical but transformation from PIM to PSM needs not only good description of the platform it needs additional information how to transform. It is a source of problems, especially if we want to perform transformation automatically. First creating models is labor-consuming, often it is easier to describe ideas using text
description. Users are connected with CIM and rather not interested in the way model is transformed, moreover generally do not understand it. Additionally it may happen that requirements in CIM are not properly defined. It means that transformation is not easy automated. Extended precision and uniqueness on PIM diagrams is hard to understand by user. If we lack connections between models it is impossible to verify correctness of the model. From the other side programmers frequently input into PIM elements connected to specific platform, they have problems with expression concept independently from transformation method and final environment. Practice shows that in software development teams we have two separate groups, first group users and closely connected with them analysts and software architects are strictly different than second group designers and programmers. Differences between team member groups are essential. From architectural point of view the analyst-architect role is most important. He is responsible for conforming requirements by CIM model and CIM to PIM transformation correctness checking. In developing or implementing team main architect with system idea is absolutely indispensable. He should have coherent vision of whole. Programmers cannot have influence on requirements and as CIM as PIM models. Transformation PIM to PSM may be troublesome but is not essential from general architecture point of view.

There are many difficulties in UML itself. From one side it is weakly formalized because idea is to be possible to understand notation by non professionals. From the other side it is strictly connected with object oriented technology which is hard to understand by users.
generally object oriented analysis and design had to fill a gap between
analysis and design characteristic for classical structured analysis. In
classical analysis on purpose different notations are used. UML according to
its name should be unified language using at every stage of development
process. It seems that gap between analysis and design still exists, and many
times unified notation only masks real problems. Formally good projects are
in practice not correct. When managers repeat many times: “we must
consequently applied UML”, and at the same time we have never ending
discussions about data base, application server or operating system, it means
that we have not proper system architect responsible for system concept and
consequently no proper requirements management. There are symptoms of
non understanding of most important issue: software architecture. We have
to note one thing, last years very popular is, so called, agile approach, there
are many agile methodologies [10]. This approach is quite good for some
specific projects but has many dangers. One danger is connected with
business issues, simplifying we can write it as: if we agree that project price
is determined in regard to time (in man-months) and resources, what is
advantage for contractor, but form user point of view cost may exceed
reasonable limit. Next danger is that for big projects realization in
accordance with agile methods frequently leads to catastrophe (see Kevin
Brady, Clarety Consulting, audits for agile projects [11]).
Of course MDA ideas are important, models separation is useful and should
be consequently used, but UML itself cannot replace conception, analysis
and design. Advanced notation elements should be used in moderation, they
are hard to understand and many times incomprehensible for not skilled
user. We have to remember that using UML is not only for saying “we use UML”. Project documentation cannot consists only from UML diagrams, additional description is needed because it is for human not for computers. UML is not graphical programming language (no automatic transformation to source code) and finally we can use for architecture description other tools like BPMN (Business Process Management Notation), ERD (Entity Relationship Diagram), DFD (Data Flow Diagram) or others.

**Pragmatic approach of Altkom Akademia**

During last years UML position in Polish training market in software engineering area has grown rapidly. For two years UML trainings in Altkom Akademia [12] have been more popular than “pure” technological trainings. Altkom idea is the following: if company wants UML to be project documentation and communication tool it is absolutely necessary to train whole team. UML specification is very exhaustive and is impossible to teach every person whole material, therefore training should be oriented to the role performed in project. Training for clients, users, analysts and architects should be oriented to modeling connected with CIM and PIM. For designers and programmers concentration on PIM and PSM is proper. General not directed trainings are non effective. Altkom offers profiled UML trainings for selected group of people. Trainings are connected with Enterprise Architecture software by Sparx System. Currently it is possible to choose UML 2.1 training from:

- UML2AT – Analysis and design programs with UML 2.1 and Enterprise Architect application (4 days).
• UML2PG – Design and program generation with UML 2.1 and Enterprise Architect application (4 days).

There are additional trainings which forms requirements management training path. Idea of this training path is to provide tools for analysts and users. Path is directed to prepare proper documentation of requirements, perform analysis of characteristics and properties of use cases. Expected result is preparing proper project specification. Structure of this path is the following:
  
  • PTO – Foundation of object oriented technology.
  • ZW – Management of requirements.
  • UML2AT - Analysis and design programs with UML.
  • ZWWAR - Management of requirements – workshop.

There are possible additional complementary trainings:
  
  • MPB – Business process modeling.
  • UMLPB – BPMN for people knowing UML.

**Conclusion**

There is no available technology possible to solve in short time all software development problems. UML is no exception to the rule. F.J. Brooks thesis is still valid. UML itself can not lead to improvement of effectiveness, simplicity and reliability during ten years. The last fashion in technology, strengthen by marketing buzz is not good base to make decision. Similarly success stories need to be critically analyzed. If we want to choose technology we have to apply limited trust rule, we need think over many possible technologies. Most important issue is skilled team with good,
experienced architect who can cooperate with designer. Good training in
analysis and design area may helps a lot. Of course it is not guarantee of
success but increase chances to develop fully functional software in time
and within budget. Finally we have to note that similar procedure should be
applied in selection of operation systems, programming languages or data
bases.

References

3. Parnas D.L. “Designing software for ease of extension and
contraction”, Proceedings of the 3rd international conference on
4. Parnas D.L. “On the criteria to be used in decomposing systems into
modules”, Communications of the ACM, Volume 15, Issue 12,
December 1972.
29, Issue 2, February 1996.
7. Information Technology Association of America
   http://www.itaa.org/
8. Guide to the Software Engineering Body of Knowledge (February 6,
   2004).
10. Manifesto for Agile Software Development.
    http://www.agilemanifesto.org
THE METHODOLOGY OF INITIATING THE SALE AND THE DISTRIBUTION MODULE OF THE SAP R / 3 SYSTEM AT A TRADE COMPANY

Rafik Nafkha

Department of Informatics, Warsaw University of Life Sciences (SGGW)

Summary: For large firms acting on world market information represents more and more value, an exactly access to current data in such case is essential. Straight line exists here dependence: for a good and easy administration, a company must have an access to date representing the company shape and condition in any time. The integrated systems of management in this case permit enterprises to assemble all information and accumulating their in one place, then their processing, analysing and in consequence undertaking how the most accurate and profitable for enterprise of decision. The initiating of an integrated system ERP (Enterprise Resource Planning) class is a complex character undertaking. The system enclose many varied actions, therefore just on beginning one should already strike over integration of processes as well as the flow of information in individual modules of the system.

Keywords: integrated systems of management, enterprise resource planning system.

Introduction

The process of initiating of integrated enterprise resource planning system with rule lasts many months (from one to 3 years as mentioned in [1]).
engaging a dozen or so persons and his result surely influences on competitive position of given enterprise on market.

The bringing to success of initiating is aim of all sides obviously. According to [3], measured success is to receipt system, peaceable with requirements and expectations in planned on beginning budget customer and deadline. Except the workers' initial enthusiasm, vision of new way of functioning of the enterprise, the content - related knowledge firm, it is necessary the exact method of initiating, which step after step will define what works, when and who has to execute. Such method has to be checked, leaning on solid bases and it has to have confirmed effectiveness

**Methodology of initiating the system the SAP / R3**

The system initiating methodology distributes on several phase the whole undertaking. A qualified organizational structure team of project realization must be appointed. Every person at organization has assigned role which define task, responsibility and decisions authorizations. Every phase was distinguished with regard on uniform partial product, got on end of phase - that is the one-mile stone. thanks to division of the initiating on smaller particles, considerably better become the planning of individual works, and the control of current status of their realization. The obtained one-mile stones can be verified by Customer, thanks what one know that the undertaking follows good direction. Just checked and accepted by customer one-mile stone it is basis to continuation of works in next phase. Every phase of initiating divides on individual working, put in whole schedule of works temporarily and related each with cause - effect dependences.
The most often applied methodology of initiating the SAP R/3 system is the methodology named the Accelerated SAP. This Method is used by SAP (in Poland SAP Poland [2]) as well as her based on partnership firms. Methodology Accelerated SAP consists with five phases:

- project preparation,
- business blueprint,
- realization,
- final preparation,
- go live & Support

Second, but the more seldom applied methodology of initiating the SAP R/3 system which is used by IMG Poland named the Promet - SWW. According to [4] methodology this consists in six phases:

- the initialization of project,
- general conception,
- detailed conception,
- realization,
- the preparation of productive start take-off,
- productive start.

The next methodology of initiating the SAP - R / 3 system (used mainly when initiating the systems based on Oracle Applications [2]) is the Fusion methodology. It consists with eleven phases:

- start and organization of the project,
- analysis of present state,
- qualification of future state,
- organization of project infrastructure,
• building of target solution,
• building of solutions covering the functional lacks,
• preparation of productive infrastructure,
• study of procedures and preparation of trainings,
• testing target solution,
• starting target solution,
• review and opinion of the project

It is proper to underline, that introduced above the methodology of initiating both the MRP and ERP systems are exclusively theoretical guidelines. The detailed methodology of initiating is established in every case with customer, near what one gets under attention the specific of trade in which it acts as well as the pattern of the enterprise management.

Initiating of "Sale and Distribution” module at a trade company

Range of initiating in first stage hugged functional areas the most so as significant for company such as sale, warehouse economy, controlling, finances and Human resource management.

Data of logistics generally

The following general notions (used by [5]) were defined:

• the area of pricing - as area of pricing was qualified the institution.
• the area of credit control - was qualified was as company meanwhile all economic divisions were attributed to this area.
the institution divisions - the division on individual divisions was executed taking into account separate locations of headquarters, shop and trade section of company which are dispersed in Poland.

**Figure 1. The Institutions of the company**

```
SP 10
Spółka S.A

Centrala 1100
Sklep 1200
Odział I 1300
Odział II 1400
Odział III 1500
```

Source: own study

Economic sections - It was established, that division on economic sections will feet the division on institutions.

The field - It was coordinated, that division will not be applied on field. One general field was accepted with sign "00".

**Data relating sale and distribution**

It as accomplished the following Sections of Sale and the Sale Office:
Figure 2. The Sections of Sale and the Sale Offices of the company

Source: own study

Channels of distribution

It was distinguished the following channels of distribution of goods and services:

- the sale areas - the Areas of sale are the combination of section of sale, channel of distribution and the field. With attention on only one general field is taken into account the division on areas of sale will meet the introduced division on sections of sale above - the channels of distribution

It was accepted, that the following types of position will be used:

- materials,
- trade goods,
- non pricing unit. (assembled computers in the company.),
- service,
- packaging.
General review of logistic processes realized in the SAPR/3

Retail Sale - shop

The foundation object of sale is the goods trade assuming, that sale of goods is not connected with sales of services or units installation. In case pronouncement such works customer will be sent back to Trade Section. In process of sale we can distinguish the following stages / steps:

- make an offer to customer

In SAP system the offer of sales to customers will be recorded. System will permit to print offer, or also to send her to customer via e-mail. In case, when customer accepts the offer, order of sale will be founded with reference to offer, which will permit to keep the same information (price, quantity, itp.), which were in offer. In case of rejection of offer by customer, the information about cause of rejection is introduced to the system,

- the party of payment on account from customer

The party of payment on account will be recorded in system. After accomplishment of transaction of sale the payment on account will be related with the invoice which is related to order of sale,

- the transaction of sale

All transactions of sale will be introduced to SAP R / 3 system as orders of sale. In case of retail sale, the order of sale will be made only on materials which are on store-house in the Shop- without creating of unaccomplished orders. The control of accessibility of materials will enclose the only being on store-house, without analysis of planned materials (the open orders of purchase).
In single customers' case system will require the application of data relating customer (name, address, tax number).

The type of order of sale (for retail sale) will restrain the process of introducing to system the order to the following steps (as solved in [5]):

First the introduction of order, dispatching on his basis will be created automatically, then the expenditure of goods from store-house, at the end the printout of invoice of sale or the fiscal receipt.

In case of payment using the credit card the type of credit card will be introduced to system,

- invoicing

For every sale transaction realized across the channel of distribution of "retail sale" when system draws up the invoice, the fiscal receipt will be printed and the invoice of sale document will be generated. In case when customer demands invoice, it will become printed. System will co-work with fiscal printer.

**Retail Sale - individual recipient**

The course of the sale and the purchases process

- The composition of offer

All offered potential customers offers will be recorded in the system. Offer will contain information about offered products as well as services, as also information about products / alternative services. The offer contains also information relating the prices, let off, deadlines of payment, conditions of deliveries. Every of plumb-line can fold customer offer, in that case Trade Plumb-line should be informed in order to complete information if needed.
After rejection by customer offer, the information about cause of rejection of offer will be introduced to system.

- The realization of order of sale

In situation, when customer accepts offer and then will fold order, on basis of offer the realizing section will found the order of sale with reference to offer. In case of signature with customer any contract, the responsible person for his signature adds in system the contract with reference to offer. Then in reference to contract the realizing sections will make the orders of sale bet.

In situation, when customer folds order without any composition of offer before composition, the responsible tradesman will bet in system the contract, in reference to which the realization sections will can make the orders of sale bet.

The system distinguish the following types of sale:

- The sale of trade goods from store-house - the sale of trade goods bought on the customer's individual order. The sale of articles - completed in the company. (exp. computers). The sale of trade goods with direct delivery from supplier to customer. And finally the sale of services.

- The purchase of materials / goods on need of contract

In case of sale of trade goods bought on the customer's individual order as well as the sale of trade goods with direct delivery from Supplier to customer, demand on purchase of goods will be generated by system automatically. In case of sale of services as well as the compiled in the company articles, the realizing section after analysing the size of warehouse
stores will be in system the demand on purchase of goods / materials. The Section of Logistics will be the addressee of demand.

In case of purchase of trade goods bought on customer's individual order, in aim utilization to compile ready-made article, or realization of service. The position of demand will contain the decree object, which will be the number of order of sale as well as the line of order. This will permit on unique attributing of bought goods to suitable order of sale. The order of sale will be the object of decreed in case of sale with direct delivery. The bought on need of realization of services, materials will be decreed on suitable line of order of sale also.

- Expedition

Expedition will be realized by attributed to line of order of sale - order point. When realizing expedition for some assortment positions system will require the introduction of serial numbers.

- The receipt of executed service

During introducing on order of sale position type "service", the line will be automatically blocked to invoicing with code of blockade "blocked till moment of acceptance of service". After reception by customer the service and the signature for realization of order report, the responsible person, to make possible the invoicing of service will have to unblock the line of order. Such procedure will make impossible accidental printing the invoice using from tool "the processing of invoices letters".

- Lock, accounts contract

After realizing contract, or earlier lock, the responsible person for realization of contract will be suitable status of rejection of document type "
closed contract”. This creating in reference the next orders of sale to contract will make impossible.

**Wholesale Sale - to mediators**
The process of sale to mediators is approximate to process of sale for individual recipient. It differs only with kind of recipient. The only trade goods, purchased with method of direct delivery from tradesman to final customer, are subject to the wholesale sale. Wholesale dealers receive additional let off.

**Export Sale**
The export sale will be realized using the suitable channel of distribution "The export sale". All indispensable documents to the accomplishments of customs briefing will be worked out apart from SAP R/3 system.

**Sale of services from the department**
The department - line of Service and Installation services was divided on two main areas: the service of Hewlett Packard printers as well as the service of computer equipment.

- **Service of printers**

For every division realizing the service of printers is put the following depot on: the depot of own materials, the depot of new materials being the Hewlett Packard property, the depot of used materials being the Hewlett Packard property.

Stock in trade of the servants' materials to repair the HP printers being the property of the company, will be kept on the depot of own materials. Delivered by Hewlett materials in order to accomplish the guarantee repairs
will be stored on consignment depot of new materials. These stock in trade will not influence on general value of stores of the company.

**Summary**

Approaching to process of choice and the initiation of an integrated system of management, one should first of all answer on questions related with following criteria:

- the branch in what the company acts,
- the size of the company,
- the culture of work,
- the kind and the circulation of documents,
- degree of process in the company,
- the Consulting company initiating firm.

They are certainly key questions on what one should find answer. If though on one from above-mentioned category lack is concrete position, then the process of initiation can turn out fruitless. the most often about choice of system decides, what system has competitive firm, about which system told was the most and which is the most well-known. Doubtlessly the strategy of firm, is essential when start choosing the ERP system because it shows the future directions of development. After accomplishment of choice of concrete system, having not taken under attention of strategy of firm, after three or four years, it can turn out, that the given system is already nobody unnecessary. Such conduct charge firm only costs, and not bringing her any advantages.
The Initiating of SAP R/3 system, similarly like other systems to aid management in enterprise, is not small expense, but it turns comparatively quickly. Well initiated and skillfully acting system it permits the board of firm to undertake accurate decisions and thanks this the competitive position of enterprise on market will be kept.

References

2. BCC – quarterly magazine – nr 4(15) 2003
5. SterProjekt S.A. materials- Warsaw 2004
CRITERIA AND CHOICE OF THE INFORMATION SYSTEM SUPPLIER

Rafik Nafkha, Wiesław Szczesny
Department of Informatics, Warsaw University of Life Sciences (SGGW)

Summary: Choosing suitable for needs of firm a computer system helping the management decisions, makers should act with many factors. The exact recognition of different systems offers is very important in this case. Before however firm will approach to comparing offers, it should specify exactly to qualify one's need such as present state and target state. Making an analysis more in detail makes the choose of the suitable system more easily, and costs of his initiating more appropriate. To appearing the best information system supplier and solution, a three degrees' cycle of investigation of offers and Performer's choice will be considered in this paper.

Key words: the computer systems, criteria of choice of systems. computer system helping the management decisions

Introduction

The manager of an enterprise, often for the first puts together with Integrated Computer Systems during exhausting process of IT system's choice. Unfortunately the majority of organization uses with quick procedures of choice, depending or on undertaking the decision, that this SAP\(^3\) or IFS\(^4\) as expressed in [1],[2]. will not be surely and then looking for

---

3 System SAP R/3 belongs to SAP AG Company.
cheaper solution, or pass on this duty to one of consulting firms. Both these approaches have weak points. In this case giving in influence, pressure and fear, the customer begins the search of the information system supplier, not taking into account exactly the identified conditions of choice and without vision of value of whole system. Consequence of this failure is written in [3]. The most four obstacles making difficult proper the information system supplier’s choice according to Gartner Group [3] are:

1. **Time.** The project teams often come to conclusion, that within process of ERP system choice, can be engaged to 20 workers even by 14 months, from what the majority of efforts will be first consecrated on identifying the key criteria of opinion as well as meeting on information about the potential system supplier’s subject.

2. **Cost.** Though connected the majority of costs from undertaking the decision be hidden in the time, which the remembered workers higher will have to dedicate the choice of system, then remaining can make up to 30 proc. of total costs even. They in their composition come in: the study of tender offer, assembling and authenticating the data about product, contacts as well as the costs of staff trip when defining the key criteria.

3. **Objectivism of data.** Ordering, clients have not any objectivism, authenticated data access on subject of products and testified by system supplier services. Therefore often undertaking the decision, they depend answers on exclusively, marketing and presentation firms which answered to auction.

4. **Lack of structuralization of process choice.** Without rigorous, transparent methodology of selection, many firms finish the process of
choice or focusing on very limited gathering of criteria, or gives in the pressure of internal strengths and the own feelings

Criteria and choice of the Information System Supplier

The information system supplier choice joins with study of Specification of Essential Conditions Order (SECO) on delivery and initiating the IT system, establish of weights as well as the criteria of choice, recommendation of the best offers and finishing negotiations by signing the contract.

The criteria as well as the meaning should be specified and described exactly in SECO, because this will permit us on restricting the supplier's number and the accomplishment of process of opinion individual offers.

The requirements structure contained in Specification of Essential Conditions of Order, except business functionality requirements as well as the formal requirements, contains the following elements:

- the software technology requirements,
- the system initiating process organization,
- the system initiating approach,
- after system initiating guarantee service.

Note the main pressure should be laid on selection of requirements in preferring the fulfilling the requirements of business character and the suit methodology of initiating.

the supplier's primitive choice should be decide on their position on market as well as the size of offered solution. The supplier checking can be based on what competitions applies as a solutions in given trade.
To choose the most profitable with many offers, the best to qualify the detailed criteria of opinion and the choice of offer. the methodology of ERP systems supplier's choice concentrates round 5 main criteria:

- functionality,
- technical architecture,
- the price (the cost of services and the technical support),
- ability to realization (tradesman's financial position),
- vision (future market and supplier vision).

The most remaining often happened criteria belong:

- quality (functional and esthetical proprieties)
- the costs of exploitation
- the conditions of guarantee
- guarantee of service
- technical help after contract realization
- order deadline realization

**Functionality** is the most important element of majority of opinions, but as criterion in definite supplier's choice, it should decide in it more than 30%. This Criterion creates the possibility of concentrating on opinion of functions, what should fulfill the object of delivery. However not all functions give to value oneself across party of appropriate algorithm, which leads often to an estimation based on acknowledgement evaluation. Indispensable here the detailed description of opinion of offers. It is recommended also to qualify other criteria in detail as well as to show their punctual range
The technical architecture uncovers the adjustment among computer systems, and the final user's needs across the environment opinion, in which the application is accessible (e.g., the data base, or customer - server technology), kind of user interfaces (mark / graphic or else in other modes), the developmental tools and management connected with given application (the commercial versus dedicated) as well as the data models and the implemented processes inside the application. In this case, orderer should list technical parameters, which will be estimated and qualified their meaning, attributing every of them the appropriate number of points. Parameters can be considered as conditions. Then can be definite as element which must be met otherwise leads even to offer rejection or, when met, suitably higher opinion will be awarded the price.

One should check also, or given system integrates with older applications, coming from different suppliers.

Price - Companies, often act with minimum price when they make the choice of any supplier, what unfortunately in a complex computer system not always leads to choice of the best solution. However, the settlement of realistic expectations which to general cost of system has the key meaning in gaining over suitable strengths, which will engage in project.

The criterion of price should concern price, taking into account tax from goods and services (TVA). In case this criterion the company should remember about additional aspect, like deadline of payment. One should however remember to meaning of this criterion answered definite need ordering and it stayed in reasonable proportions in relation to remaining criteria.
Supplier financial position - Having on attention the consolidation which has and will take place in the closest years on ERP software market as well as growing meaning of this kind of application for enterprises, the financial position of The Supplier of application (ability to realization of project) can not be underestimated and it should be one of more important criteria in process of opinion.

Supplier vision - At last, the customers should consider supplier's vision, and in peculiarity, what modifications of products and what kind of services will be planed within the next 3 -5 years and if they will be well-fitting to aims of whole market ERP in generality and the customer's firm in peculiarity.

Quality - It is difficult to qualify, it is in principle a notion no measurable. The criterion of quality procures many difficulties in his description, with regard on problem in his evaluation. One should make think how estimate the quality of computer system? Criterion this requires detailed description of way of his evaluation. The companies can take under attention speed here as well as the efficiency of working of the computer system, the supplier commitment in the customer's service, the support after initiating, ect.

Costs of exploitation - Applying this criterion, the specifying of costs of use, should be expressed and what kind of cost use must be taken into account, or else some of them, and what period of exploitation will be taken under attention also.

Conditions of guarantee - The conditions of guarantee can also make up the criterion of evaluation of offers. In this criterion can be estimated some matters like deadline (in context his extension) of the given guarantee and
her range, assurance of service after guarantee or access to exchangeable parts.

**Guarantee of Service** - The first question what appears during investigation service and technical support it, sounds: how supplier will be us treated after this, when we pay already for realization of contract. Because the costs of installation and the cares over system can access 7 even-10 cross the initial costs of software, the service and the technical support of the application become the essential part of reference of success both by supplier, and by customer. The criterion of service is connected with conditions of guarantee inseparably. Thanks him companies have the possibility of rating the suppliers in term of the accessibility of service, time of work of service points, location of service points, hour of work of service point, the time of service realization calculated from notification of repair, ect.

**Deadline of realization of order** - In case of opinion of offers, the deadline of realization of order can be essential, because deadline of realization can sometimes be in process of the supplier's choice the border condition. This criterion is measurable, as it decides a concrete date or concrete period of realization of order.

If we have all criteria described in detail, we can approach to opinion of offers. In this aim company should attribute the weight every of criteria. It can establish then the proportional number for every of criteria assuming, that all criteria make up 100% together. It can also, have subordinated from supplier information the evaluation from range 0 to 5, assuming 5 state the best opinion.
All criteria should be countable, which will permit us later on preparing in points the ranking of offers, settled on basis the total of points for individual partial evaluation, multiplied through weight every of criteria. One for the most profitable solution, should consider the offer which balance of all considered criteria is the most profitable.

**Method and criteria of a computer system offer evaluation**

The Method contains three degrees' cycle of investigation of offers and performer's choice.

**Preliminary evaluation** - The preliminary evaluation will conduct the verification of general correctness and the completely of delivered offers. Every offer will be estimated from side of content - related correctness (critical requirements), technical and formal.

**Detailed evaluation** - The evaluation depend on opinion of different aspects of offer as well as qualification the principal proposed solutions and then assign them the detailed score. This opinion leads to work out a list Bidders, which after sorting according to final evaluation will be the basis to undertaking of decision about the shape of the Bidders' list and beginning the last step of the tender procedure. This is the third cycle of the method.

To evaluate the suppliers offers, the following criteria and their weight can be applied:

**Table 1. Evaluation of criteria and their weight**

<table>
<thead>
<tr>
<th></th>
<th>Price offer</th>
<th>30%</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Bidder's Experience in adequate projects</td>
<td>18%</td>
</tr>
</tbody>
</table>

---

3. Method of realization and the works organization 10%
4. Consultants’ team designed to works 15%
5. The expected effectiveness of realization of services 20%
6. Bidder’s economic credibility 7%

Price of offer - The next formula can be applied in this criterion:
the punctual evaluation = (the minimum price / the price of offer studied) x the weight.

Bidder’s experience in adequate projects - In frames of criterion it gets under attention the projects conducted by different Bidders in the last three years. To introduction of score one, can use the following:

Table 2. Bidder’s experience In adequate projects

| 1. Projects with field: the computer system information analysis and the preparation of initiating the integrated system as well as help in the performer's choice. | up to 50 pts. |
| 2. Projects with field: analysis and tuning business processes. | up to 20 pts. |
| 3. Projects with field: audit of the enterprise system information technologies or the audit of computer system project. | up to 20 pts. |
| 4. Projects with field: the management of system information project as well as different consulting projects in field of uses information systems technologies. | up to 10 pts. |

The next formula can be applied in this criterion:
the punctual evaluation = (total of points in all categories) x the weight.

The method of realization and the organization of works - In this criterion the following score can be applied:
Table 3. The method of realization and the organization of works score

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The project schedule. Deadline of realization of service be estimated as well as proper planning out works.</td>
<td>up to 30 pts.</td>
</tr>
<tr>
<td>2</td>
<td>Organization of project and the method of management the project</td>
<td>up to 25 pts.</td>
</tr>
<tr>
<td>3</td>
<td>Degree of commitment of the Ordering workers - estimated permitting on transfer of knowledge to Ordering team</td>
<td>up to 20 pts.</td>
</tr>
<tr>
<td>4</td>
<td>Definitions of products</td>
<td>up to 25 pts.</td>
</tr>
</tbody>
</table>


The next formula can be applied in this criterion:
the punctual evaluation = (total of points in all categories) x the weight.

Consultants’ designed to co-operation team - In this criterion the following score can be applied:

Table 4. Consultants’ designed to co-operation team score

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Personal consultants’ experiences in similar projects in given or concrete sector</td>
<td>up to 25 pts.</td>
</tr>
<tr>
<td>2</td>
<td>Personal consultants’ experiences in similar projects in remaining sectors</td>
<td>up to 45 pts.</td>
</tr>
<tr>
<td>3</td>
<td>Number of consultants’ designed to permanent work</td>
<td>up to 15 pts.</td>
</tr>
<tr>
<td>4</td>
<td>Personal experiences of the additional consultants’ fulfilling the parts of assurance of quality or auditing.</td>
<td>up to 15 pts.</td>
</tr>
</tbody>
</table>


The next formula can be applied in this criterion:
the punctual evaluation = (total of points in all categories) x the weight.

The expected effectiveness of realization of service - In this criterion the following score can be applied:
Table 5. The expected effectiveness of realization of service score

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Offer - quality, transparency, legibility and conformity with tender content.</td>
<td>to 30 pts.</td>
</tr>
<tr>
<td>2.</td>
<td>Independence of Bidder's - it is estimated: proper structure of the Bidder's company, the position on Polish computer market, the partnership relations with equipment and software suppliers</td>
<td>up to 50 pts.</td>
</tr>
<tr>
<td>3.</td>
<td>The amount of works expressed in hours.</td>
<td>Up to 20 pts.</td>
</tr>
</tbody>
</table>


The next formula can be applied in this criterion: the punctual evaluation = (total of points in all categories) x the weight.

Bidder's economic credibility - In this criterion the following score can be applied:

Table 6. The Bidder's economic credibility score

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>current Fluency = (rotatory property) / (short-term obligations)</td>
<td>up to 40 pts.</td>
</tr>
<tr>
<td>2.</td>
<td>Debts of assets = (the short-term obligations) / (total of assets)</td>
<td>up to 40 pts.</td>
</tr>
<tr>
<td>3.</td>
<td>Covering durable property own capital = (own capital) / (durable property)</td>
<td>up to 10 pts.</td>
</tr>
<tr>
<td>4.</td>
<td>Profitability of sale = (the netto profit) / the (sale receipts)</td>
<td>up to 10 pts.</td>
</tr>
</tbody>
</table>


for the calculation, coefficients as, exp. for first half-year of given year or in a year backwards, can be used

The punctual evaluation = (total of points in all categories) x the weight.

Summary

The process of suitable choice for given enterprise of computer system is very complicated and with regard on far goes consequences, the company
that is thinking on an initiation of an enterprise information system, should engage enough wide team of workers. For a medium size company where the use of the computer system is limited, the company does not need to formulate any commitment or experts’ users. The choose usually based on a ready well known solution, that is widely recommended or promoted by specials journals in a given environment, however for a good and reliably decision, the proceeding should be different in a large company. In such company, it is necessary to formulate a commitment of the following persons: The chief management of firm, Manager or the sections Managers (being the Owners of projects), the experts' users ( the super users) - the management of the average rung which will be directly working with new system as well as the Computer Section ( the IT) of the enterprise.

References

4. The office of Public Orders (www.uzp.gov.pl )
Summary: In large financial institutions, Efficiency Management is realized by splitting the business process into Profit Centers – small, autonomous business-lines processes. The amount of data needed to be processed into information rises up. It requires advanced and sophisticated tools that allow the integration of all components to the one high-efficient information platform called Business Intelligence. BI platforms enable companies to obtain their targets by providing a more comprehensive knowledge of the factors affecting their business, and defining key performance metrics in sales and internal operations. BI systems generate reports for operational and long-term management. In this article we present some topics of BI systems in large financial institutions in Poland.

Keywords: Business Intelligence, Data Integration.
**Introduction**

Any large financial institution is divided into many branches. From financial point of view other splitting is more useful – separated units called Profit Centers. But such look requires suitable processes for data preparation and analysis to guarantee proper decision taken on current data without useless delays. Financial management get from the Profit Centers reliable information in each area of activity that this Centers is responsible, i.e. precise estimation of profit and lost statements taking particularly into consideration risks measures and suitable clearing system figures which allows reconciliation of income and cost between Profit Centers.

Industry of financial services changes rapidly. Risk factors such globalization, deregulation and competition from other financial and non financial institutions force technological innovations and re-thinking the business strategy. Integrated Software Systems are a significant factor that makes viable the adaptation the strategy of financial companies to the market. With simple access to large amounts of sophisticated data from different databases the companies are able to follow their customers by identifying profitable segments of customers and products that takes up their costs and management.

There are few classes of solutions which can help companies improve their activities: (i) systems supported registration of customer transactions, (ii) HR and ERP systems, (iii) systems allowing data integration through the whole organization, (iv) financial management systems, (v) risk management systems, (vi) client transaction management systems.
Last four items are included in system called management information systems (MIS). Research companies which support measuring the effectiveness and efficiency of business provide their solutions within the following areas:

- **Data Integration.** The discipline of data integration encloses the industry practice, architectural techniques and tools for achieving the consistent access to data across the databases without regard on data subject areas, structures or storage formats in the enterprise, in order to meet the data requirements of all applications and business processes.

- **Business Intelligence.** Business intelligence (BI) is a business management term, which refers to applications and technologies that are used to gather, provide access to, and analyze data and information regarding company operations. Business intelligence systems can help companies to collect more comprehensive knowledge of the factors affecting their business, such as metrics on sales, production, internal operations.

- **Data mining.** The process of finding hidden patterns and relationships in the data. Analyzing data involves the recognition of significant patterns. Specialized data mining tools are able to find patterns in large amounts of data. These tools are also able to analyze significant relationships that exist only when several dimensions are viewed at the same time.

- **Risk management.** Risk management includes also operational risk in risk capital calculations, and deliberately links the efficient and
profitable provision of capital across all aspects of business to risk measurement and management activities.

**Independent Software Vendors**

There are a lot of companies specialized in preparing and selling IT software tools for large financial institutions. Some of them have opened branches office in Poland. The most important of them are SAS, ORACLE, Infovide, Asseco. As the experience of recent years has shown, Banks that have used sophisticated MIS software have improved significantly their business effectiveness (see Sczesny W, Szczesna M. (2007)). Closely related to consulting, Gartner Group provides research analyses and reports for IT professionals, technology companies and the investment community in the form of reports, briefings and visual snapshots of a market's direction, maturity and participants called Magic Quadrant. The Magic Quadrant is a graphical representation of a marketplace at specific time period. It presents Gartner's analysis how leading vendors measure against criteria for that marketplace, as defined by Gartner. Completeness of vision, ability to execute are the X-coordinate and Y-coordinate of the point of the The Magic Quadrant. Figure 1 and 2 present world's leading providers of business software solutions for MIS. From figure 1. and 2., it follows that SAS Institute Inc. is the leader in specialized MIS software market. Since 1994, SAS has offered to polish customers tools for data integration, intelligence storage and advanced analytics.
Figure 1. Magic Quadrant for: (left) Data integration tools, (right) BI Platforms

Source: Gartner research note: G00141484, G00155507

Figure 2. Magic Quadrant for: (left) data mining Platforms, (right) Basel II Software

Source: Gartner research note: G00145685, G00143398

Actually, in polish banking sector Management Information Systems are becoming more and more important role. The following Table 1 presents the software vendors in terms of clients applications. From Table 1 it follows that SAS, Oracle and Infovide are the leading provider of specialized MIS software.
### Table 1. Commercial banks and Vendors

<table>
<thead>
<tr>
<th>No</th>
<th>Commercial banks</th>
<th>Vendors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PKO BP</td>
<td>SAS, Asseco, Oracle, Sat Soft</td>
</tr>
<tr>
<td>2</td>
<td>BRE</td>
<td>Infovide, Business Object, SAS, SPSS, MATRIX</td>
</tr>
<tr>
<td>3</td>
<td>Kredyt Bank</td>
<td>Infovide, SAS</td>
</tr>
<tr>
<td>4</td>
<td>BPH</td>
<td>Infovide, SAS, Business Object, SAP</td>
</tr>
<tr>
<td>5</td>
<td>ING Bank Słąski</td>
<td>SAS, Asseco, Stat soft</td>
</tr>
<tr>
<td>6</td>
<td>WBK</td>
<td>Business Object, Oracle, SAS, SPSS</td>
</tr>
<tr>
<td>7</td>
<td>City-Handlowy</td>
<td>SAS, Oracle</td>
</tr>
<tr>
<td>8</td>
<td>BOS</td>
<td>SAS, Oracle, Infovide</td>
</tr>
<tr>
<td>9</td>
<td>Pekao</td>
<td>SAS, Prokom, Oracle, Hogart</td>
</tr>
<tr>
<td>10</td>
<td>Genin</td>
<td>Oracle</td>
</tr>
<tr>
<td>11</td>
<td>Milenium</td>
<td>Oracle, SAP</td>
</tr>
<tr>
<td>12</td>
<td>Fortis Bank</td>
<td>MATRIX, SPSS</td>
</tr>
</tbody>
</table>

Organizational chart which represents the logical structure of the information systems of one large financial institution is presented in Fig. 3.

**Figure 3. Software Chart**

Source: own.
Let us note that the most important part of the IT system used by management of company is Operational MIS, which includes interactive systems to collect and present data for business purposes obtained from a wide range of sources.
Analytical Data Marts help financial services (back office) in many ways. For example, to identify profitable customers and products, to increase effectiveness of marketing campaigns and to reduce risk and minimize losses by understanding risk exposure.

**Business Intelligence**

In this Section we present some elements of the BI solution offered by SAS. There are a number of products and tools that can be used in BI frame. The following three types of tools are referred to as Business Intelligence Tools:
- Multidimensional Analysis Procedures - also known as OLAP (Online Analytical Processing) - software that gives the user the opportunity to look at the data from a variety of different dimensions,
- Query Tools - software that allows the user to ask questions about patterns or details in the data,
- Data Mining Tools - software that automatically searches for significant patterns or correlations in the data.

Business Intelligence Solution offered by SAS includes: (i) a set of client applications designed for a specific type of business or analyst, (ii) SAS server processes designed to provide specific types of services for the client applications a centralized metadata management facility.

SAS Intelligence Platform offers following features and functions:
• **OLAP** (On-line analytical processing)—refers to the sophisticated tools that allow for the navigation of dimensions such as time or hierarchies,

• **Query and Reporting**—being able to ask questions of the data that may not have been asked before. Querying usually involves users entering SQL commands,

• **Advanced Analytics**—refers to the data mining, forecasting or predictive analytics.

• **Collaborative BI**—refers to the concept of taking structured data, analysis and/or reports and combining unstructured content (such as comments, discussions, attachments) so that facts can be augmented by additional content.

• **Corporate Performance Management** (portals, scorecards, dashboards)—this general category usually provides a container of several screens and methods to plug into the other parts of system to aggregate detailed data and tells a story of changing company positions.

One of the most powerful property of the SAS BI Solution is the ability to create centralized definitions of business logic i.e., SAS programs via Stored Processes and data structures via Information Maps. This definitions are automatically moved across the businesses via a variety of tools designed specifically for end-users. This is shown on Figure 4.

From technical point of view the SAS Intelligence Platform is built as a Service Oriented Architecture (SOA) that brings together data integration, intelligence storage, analytical intelligence and business intelligence in one comprehensive platform. The benefit of SAS’ complete platform is that it allows line-of-business managers – for example in chain supply, customer
service or product development departments – to quickly implement technology they need and deploy solutions required to support their business processes.

SAS can also interoperate with third-party services by calling out appropriate functions from its platform or solutions. The Figure 5 presents the structure of SAS Enterprise Intelligence Platform.

**Figure 4. Clients interacting with centralized metadata server**

![Figure 4](image)

Source: ThotWave Technologies, Paper 0099-31

**Figure 5. BI Chart**

![Figure 5](image)

Source: SAS
Conclusion

Integrated business intelligence platform, gives the organization a possibility to improve the quality and speed in answering their questions in hours or minutes, instead of weeks or days. These technologies allow companies to turn data coming from disparate sources into an efficient flow of information. Companies can use this information to maximize value, minimize risk or optimize performance. Large financial institutions frequently have specialized requirements demanding software features. Before applying MIS software for financial institution, it is important to look at various analysis of IT offers provided by independent firms like: Gartner, Datamonitor, Butler Group and AMR Research.

References


INFORMATION QUALITY IMPROVEMENT METHODS IN
MANAGEMENT INFORMATION SYSTEMS

Filip Pudło,
PTC Sp. z o.o.,

Tomasz Ząbkowski
Department of Informatics, Warsaw University of Life Sciences (SGGW)

Summary: Article presents fundamental definitions related to data and information quality issues and classification of information quality improvement methods with short descriptions. Application of two statistical methods was presented for the purpose of practical experiment.

Key words: information quality, Management Information Systems, methods of information quality improvement

Introduction

Information is one of the most important resources in organizations’ dynamic environment. This reflects a need for information systems and continuous improvement of systems already implemented. Nowadays companies deal with huge data dispersion, plenty of diverse systems, and number of organization units that possesses data and information. The bigger company the problems with a data and information quality are more visible and burdensome. The existence of data dispersion problem is mainly due to variety of data storage formats, many platforms, local and corporate data bases, very complex organizational structure, etc. Information quality which is the subject of this article derives from data quality and information
that is processed on lower levels of company’s structure. Unfortunately, information on this operational level is very sensitive to all of data quality problems. Nevertheless, new information technologies as well as applications of sophisticated computational methods like artificial intelligence, data mining techniques, are very popular even though only small number of companies is ready for implementation just because of data and information quality problems which makes impossible to use them.

**Information quality**

Taking into consideration information quality definition it is worth looking on the information as a product. Total Quality Management (TQM) philosophy defines quality as a complete fulfillment of customer needs. Philip Crosby defines, for example, quality as compliance with customer requirements [English1999]. These definitions are related to quality of products but we can use them and treat information as a product. According to this assumption we can agree that information quality represents compliance with requirements of the customer.

**Table 1. Information as a product.**

<table>
<thead>
<tr>
<th>Production</th>
<th>Information production</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input</td>
<td>Material</td>
</tr>
<tr>
<td>Process</td>
<td>Production line</td>
</tr>
<tr>
<td>Output</td>
<td>Physical product</td>
</tr>
<tr>
<td></td>
<td>Information system</td>
</tr>
<tr>
<td></td>
<td>Information as product</td>
</tr>
</tbody>
</table>

Source: [Wang et all. 2000]

In publication [English1999] there are two types of information quality presented:

1) inherent information quality – which is the level of data precision
to describe the facts;

2) pragmatic information quality - which is the level of information utility to describe processes that exists in organization.

While the first type of the information quality is quite obvious and understandable the second one needs some criteria to measure a quality. As a result, a multidimensional approach was proposed to estimate information quality level within organizations. These criteria (dimensions) are: currency, coherence, consistency, completeness, accessibility, timeliness, security, ease of operations, understandability, relevance, reliable, and accuracy. Very often information quality is identified with data quality and its basic problems (missing values) but in fact this issue is much wider and more complex that it seems to be.

**Methods of information quality improvement**

Information is one of the most important resources which have particular impact on enterprises operations. Effects of using poor quality data to describe company processes can result in high costs. That’s why continuous care for high quality information should be the key issue of every company. As a result of different problems related to information quality a number of methods were proposed to improve it and to manage this difficult field.

Methods of information quality improvement can be divided into:

a) organizational – mainly methods related to enterprise organizational structure and include activities such as creating new units responsible for data and information quality, data and information processes. Some other
can involve restructuring in order to assure information quality, quality ambassadors’ appointments, quality issues committee, etc. This group of methods also includes rules and procedures for particular organization’s units related to quality issues, data and information definition databases, information workflow diagrams, etc.

b) statistical - these are mainly methods that help to measure data quality. Statistical methods are crucial in finding the reasons of poor quality data and estimating the costs of wrong decisions made. A great number of methods in this category come from the field of statistical quality control (SQC) which is based on experiments in the area of product and service quality.

Key aspect related to information quality improvement is information quality estimation. Providing values of information quality and variability over time is very important. Lack of information about estimated quality in given area of warehouse or database cause nobody use these data. Authors’ experiment revealed that only estimation of data quality in one of unused areas of warehouse cased popularization of mentioned area (the method of data collection was questioned) [Pudlo 2004].

c) technical – these methods include techniques of data processing and data organization in enterprise. Centralized data collections, like data marts, data warehouses are one of the solutions that improve information quality and flow, especially in companies where huge data dispersion is present. Also centralized data management model provides easy way to control the information flow within the company.
Applications of statistical methods to improve data quality

Clustering techniques for missing values imputation

Missing values are typical example that represents data quality issues. In management systems it influences final results of every analysis and reports and if missing values are present in data they can lead to wrong conclusions [Nguyen at all. 2003]. Many statistical methods don’t accept such observations and that’s why imputation techniques are very popular. There are many reasons of missing data, but they can be classified into two categories. First group include, so called, human factor problems such as users errors, software and application errors, multiple data migrations and integrations. The other group consists of the problems that appear due to external factors such as hardware damages, data getting older (some data can be out of date and don’t match with others). Due to many analytical methods don’t accept missing values the key is not to exclude such observations from analysis but rather to find suitable methods for data imputation. As an example we, can use an equation that can calculate expected percentage of complete cases in dataset: \((1-\alpha)^k\), where \(k\) – number of variables, \(\alpha\) – probability of missing data in \(k\)-number of variables. Let’s assume that we have 100 variables and \(\alpha=0.01\) which means that every variable has 1% of missing values. In this way there are only 37% of data left for the analysis. At the same time we should pay attention to existence of more than 10-20% of missing values and even exclude such variable form analysis. In order to show the application of imputation methods a dataset with 600 observations and three variables X, Y, Z was prepared. Variables X, Z have bimodal distribution and variable Y distribution close
to normal where mean is -0.176 and standard deviation is 3.22 (Fig. 1). Additionally variable Z has ten missing values.

Figure 1. Distributions of X, Y, Z variables.

![Histograms of X, Y, Z variables](image1.png)

Source: Own calculations.

Analyzed data represents two groups (Fig. 2a) and when the missing values are replaced by mean value then as a result we obtain a new group (Fig. 2b). In this case it is quite appropriate to use clustering technique with an average linkage in a group. Such method is very effective when observations form separate groups and this case is present in our example. Figure 2c presents the results after clustering where data with missing values were classified to form cluster colored blue (black points represents observations that were imputed based on clustering results).

Figure 2. a) Data b) Mean imputation c) Clustering imputation

![Data, Mean imputation, Clustering imputation](image2.png)

Source: Own calculations.
Fuzzy logic and text mining for data standardisation

Data cleansing is one of the tasks in processes of loading data to data warehouse which is extremely sensitive to data quality especially if it involves integration of data from different heterogenic sources. If the loading process fails on some levels then the data cleansing techniques are implemented on higher levels (even in already used systems) or simply, if nothing is done, the data remains the same with errors. Both situations are not acceptable. Let’s describe two examples of methods implemented in SQL Server 2005 that are utilized for data validation and to eliminate data reduplication. Part of Integration Services SQL Server 2005 (SSIS) has data mining techniques implemented to support data cleansing processes. These are fuzzy logic and text mining algorithms.

Fuzzy Lookup Transformation can be characterized as a technique that supports validation of data transferred to systems (such as data warehouses) based on reference tables (Fig. 3).

While new data are being entered to system every element of given variable is compared with reference table. The result of comparison is twofold. Firstly, a measure of similarity between entered value and reference value is calculated. Secondly, confidence that such similarity exists is derived and it has values within the range of 0 and 1. The value 1 indicates perfect match and value 0 is assigned in case no reference value was found in reference table. Confidence indicator used to eliminate situations when there is a high similarity of two values but matching them would be a misclassification. Comparison of values „A.Kowalski” and „B.Kowalski” to reference value...
“C.Kowalski” can result in high similarity but will assign at the same time low confidence value.

*Figure 3. Data validation with Fuzzy Lookup Transformation.*

Fuzzy logic implemented in Integration Services SQL Server 2005 is used only for the purpose of estimating the scale of similarity between text variables. Procedures are mainly based on algorithms that are analyzing texts in a way that text string is decomposed into smaller elements and, so called, error tolerant index is calculated. In staging area of the data warehouse data go over automated primary validation, due to usually high data volume loaded. Data that were rejected are left for manual validation (depends on scale).
Fuzzy Grouping Transformation is a technique used for duplicate data elimination. It performs grouping tasks based on given reference variables. The outcome of the method is group assignment and its representative indication. The method needs to enter a threshold terms in order to give a measure of similarity between analyzed observations. Fuzzy Grouping Transformation module like Fuzzy Lookup Transformation applies fuzzy logic to calculate similarity between text strings as well as text index and additionally algorithm that finally groups observations.

Table 2. Data grouping results in Fuzzy Grouping Transformation.

<table>
<thead>
<tr>
<th>key_in</th>
<th>key_out</th>
<th>score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>0.93</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>0.74</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>0.89</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>5</td>
<td>0.84</td>
</tr>
<tr>
<td>7</td>
<td>5</td>
<td>0.75</td>
</tr>
</tbody>
</table>

Source: Own calculations.

Summary

Information quality assurance for the purpose of Management Information Systems is a complex issue. This area of research is very popular both, in commercial and scientific environments. Information quality aspects imply application of methods on the organizational, operational and primary levels. In practice, we deal with number of methods and techniques of information quality assurance: organizational, statistical, technical. Examples with application of chosen methods presented in this paper.
confirm the usefulness and high performance in the process of information quality improvement.

References

THE DEVELOPMENT OF A WEB-BASED INFORMATION SYSTEM SUPPORTING THE WORK OF A DEAN’S OFFICE

Silva Robak, Grzegorz Arkit
Faculty of Mathematics, Computer Science and Econometrics
the University of Zielona Góra

Summary: In the paper the problems associated with an in-house design, development and implementation of a transaction processing information system have been presented. The main functions of the web-based system Dziekanat2 that has been developed and applied at the University of Zielona Góra embrace the admissions, the grade records, the course records and the needed connections to the financial institutions. The major applications of Dziekanat2 information system are the registration system, the student transcript system and the curriculum class control systems. The guidelines for an in-house system design, development, implementation and the operation and the advantages and drawbacks of such approach are presented.

Keywords: information system, development issues for software assets, web-based application.

Introduction

An information system can be defined as a set of interrelated components that collect (or retrieve), process store and distribute information to support decision making and control in an organization [1]. An successfully applied information system creates new value for an enterprise and represents an organizational and managerial solution to the challenges caused by the
system’s environment i.e., the supported organization with its business functions and the information technology infrastructure.

An information system can be applied at the different levels of the organization beginning at the basic, operational level, through the management level into the strategic level. The functional areas of the information systems across the levels comprise the enterprises’ Sales and Marketing, the Manufacturing and Production, the Finance and Accounting and the Human Resources. Furthermore, there could be also some other functions needed by the particular organizations. Broadly speaking, there are four major types of information systems - Transaction Processing systems at the operational level, the Decision-Support Systems and Management Information Systems at the managerial level, and also the Executive Support Systems at the strategic level.

There are also different organizational types according to the Mintzberg’s classification of the organizations [2]: the entrepreneurial structures, the machine bureaucracy, the divisionalized bureaucracy, the professional bureaucracy and an adhocracy. Therefore, the different features of the information systems of each of the organizational type will be distinctive.

For example the entrepreneurial structures typical for a small start-up business could apply a hasty developed, small information system which will rapid grow out, as opposed to the big and steady professional bureaucracy systems used at the universities and in the school systems, the law firms, and the hospitals.

The dean’s office information system, a typical professional bureaucracy transaction processing information system, developed and applied at the
University of Zielona Góra will be presented in the next Section. In Section 3 we present the consideration about the choice of the architecture and information technology of the system, and also a rationale for a choice of the data base and a user interface. In Section 4 we conclude our work.

**The Information System Dziekanat 2**

The system Dziekanat2 is an information system aimed at supporting a work in a dean’s office and it is applied for collecting, processing and managing data associated with the students, alumni, grades and courses at a university. The system Dziekanat2 has been developed at the University of Zielona Góra and its first modules have been applied since 1998. The main functions of the system include a registration and an admission of the students, keeping and maintaining the grade records, the course records and the alumni records. The applied modules allow processing of the diverse queries about the courses, the involved persons (individual students, students groups, teacher) and the rooms and at the same time a performance of the associated course planning and room reservation activities. The modules of Dziekanat2 also support a generation of the reports, such as the listings of all involved persons, the course protocols and also some external reports e.g. in connection with the Central Statistical Office, the financial institutions (management of the fees), etc. In the system there are also possibilities for online planning and monitoring the usage of the rooms for the courses.

Recently the system Dziekanat2 has been extended with some new issues such as the support of the flexible studying system (in conjunction with the introduction of the obligatory ECTS system for an individual choice of the
courses) and the usage of the electronic student identity cards. Another challenge has been the extension for the web-based access to the system and the associated security and reliability issues.

In the next Section the rationale for the in-house-system built information system as opposed to buying a ready-made one will be presented, followed by the choice of the system architecture according to the requirement analysis and the implementation of the underlying software technologies.

**Development of an Information System implemented in-House on Example of Dziekanat 2**

Each organization, also a university has to decide whether to buy and adapt a ready-made system needed to streamline its business processes or to develop it from scratch in a self-supporting way. The system can be also built upon the adapted legacy assets. The given approaches have their pros and contras and the decision is whether the needed system is to be made in-house, or should be bought from the commercial marketplace, mined from own legacy assets or commissioned with a contract to a third party organization.

An in-house designed dean’s office system will be developed specially for the needs of a particular university. Therefore such system will not include any unnecessary or redundant modules. In a case of the needed changes in the internal business processes the system can be quick adapted to the individual requirements. Nevertheless, the main barrier for house-made systems is often a lack of the qualified and skilled staff and necessary resources. These are accompanied by a need for buying and constantly updating the hardware and software assed required by the system. Another
problem is that of keeping of the time-to-market (a time of delivery of the system). Further issue to consider are the problems associated with managing the changes, as e.g. the need for adequate reaction to the alterations in the legislation and the standards to be supported. The dean’s office systems purchased from the commercial marketplace and that works at several universities (colleges) possess the majority of the needed options. The problems with a quick reaction to the changes in legislation etc. are solved. Moreover, there is no need to provide the additional staff for the development and maintenance of an information system. Nevertheless, not every college can afford buying a commercial system. There will always remain a severe problem with an accommodation of an organization to a delivered system, what could unfortunately result in a necessity of a change of the proven business processes applied at a university.

The choice depends also on a size of a college or a university, its character (technical or non-technical) and a degree of a differentiation between the faculties. From the type or character of the college follows whether it could have the needed skilled personnel for a development and maintenance of an own information system. Another problem is the existence of a NIH (not invented here) – syndrome, caused by the fact that universities are the strongly autonomic institutions. Therefore an in-house development has been preferred at our university.

**Choice of Software Architecture and Technology**

There are two possibilities for the client-server architecture needed in a case of the web-based applications. The first one is the client-server architecture
with a blocked database access. The second is the possibility of a direct database access. Both of the mentioned configurations have their advantages and drawbacks. In the first case, the advantages of the blocked access to a database are an easier security management and an elimination of the quotes that could have disturb the work of a database, for instance any by unnecessary time- or memory-consuming operations. Just the input data can be validated or some simple operations can be completed formerly. The drawback of such solution is the necessity of the disposition of the supplementary staff to enact the above-mentioned operations. What is more, if there are any modules realized in diverse software technologies, the security mechanisms should be replicated for each of them. The second possibility is the direct database access.

For small colleges with a mere differentiation grade between the faculties a good choice may be a simple sealed system i.e., with a blocked access to a database. Such solution does not necessitate any additionally security solutions to apply. It also is quite stable because it does not allow querying the system in a non-optimized way. Nevertheless, it could involve the assistance from the additional staff for an accomplishment in some additional or untypical tasks like the special queries or reports. For large universities, or such with a high degree of the differentiation between the faculties, an open system allowing the particular faculties a direct access to the database for the end-user will be a better choice. In such a case the database server (whole business logic) will takeover a control of data deployment and consistence, the security issues, etc. Also in this case the additional staff for execution of the special queries or reports still will be
needed. It is very important to ensure, that the faculties will cooperate in the questions of change and configuration management of the system that will allow keeping the information system’s consistency.

A choice of a database server is another serious matter [3]. The commercially available systems should closely satisfy the needs of the planned system. A desirable database server should have a comprehensive security system (authorization and access rights). Another important issue is a possibility of defining logic in a database by using the functions, procedures, and triggers, as it is for instance possible in PL/SQL language (Oracle). Also maintaining of the database reference integrity is required.

A fundamental issue is a choice between the commercial or non-proprietary (free) systems as the platforms and databases. Important is the vendor’s support and the stability of the vendor, and whether the offered upgrades are as often as needed, and whether they will satisfy the needs of the planned system. By and large, the universities prefer the usage of Unix (Linux) operation system. The choice of a free database results regrettably in a lack of a technical support for the developed application. Therefore the appealing solution is to use at the beginning a free database for the aims of the software development and in the first stages of the implementation of the system. In the next step follows a transition to a full version of a commercial database, as the most database vendor support that option.

By the choice of a free database server an appropriate solution was the PostgreSQL database (http://www.postgresql.org.pl/). For the commercial there is a greater choice, the most popular solution is one offered by Oracle.
Another possibility is the option is MSSQL, however it is tight coupled (http://www.microsoft.com/poland) with the Windows platform.

A choice of the user interface of the system in the first step is the answer whether to use a textual interface or a graphical (GUI). Considering the quantity of the handled data in our system and their complexity the usage of GUI is preferable. Additionally, for the GUI development is a good tool support. Then in the next step a choice between a terminal or application server, a browser or a desktop application for the GUI is needed.

The dean’s office systems require high degree of economics in their usage. For that reason a browser application would not be an appropriate solution in this case. Another aspect is that to a terminal application (or a browser) it is not possible to add own software modules. What is more there is also no possibility to control the printers or other needed devices, for example if the system is connected to an alarm system. For a dean’s office system one of the supported tasks is printing of the identity cards for the students, so such issues as control of the margins, resolution, precise positioning of the printed text, etc are very important. Therefore, as more suitable a desktop application has been developed. In this case also apply the same considerations as in the case of the choice of a platform or database. The university has limited financial possibilities and therefore the popular tools, such as those taught at a university (or a the project leading unit) would be preferred.

The described system Dziekanat 2 has a web interface allowing the access for the stakeholders. The students have the possibility to get information about the valuation, to choose and subscribe to the courses, and to get
information about the financial matters (the scholarships, fees). The academic staff may any time reach the timetables, and input or check the grades for the students and courses. They also have an access to the current plans for the courses and have a possibility of publishing of additional materials for the courses. To decide is the question of allowing the online (or offline) access to all information and whether the data should be kept centrally in the information office or at each of the faculty servers.

**Conclusions**

Generally speaking, a technical college or university is able do develop a required information system in-house and support its usage. A problem is a disposability of the developers with an appropriate expertise within the university and the means for the possibly needed additional staff. The decision whether to make, to buy, to mine or to commission the required system, will be taken according to the organization’s capabilities. The needed software components can be developed from scratch or may be purchased from the commercial marketplace and then adapted. Not to underestimate, in addition the costs of the development, are the possible costs of the needed tools and training. By purchasing a database its maturity and robustness, stability of the vendor and the expected product update should be taken into consideration. Another issues are the vendor’s support and a degree to which their product satisfy the needs of the planned system. In Poland there are some known dean’s office systems in use [4], such as Dziekanat 96, HMS, Dziekanat 2.3, Edukacja CL, and USOS. The first of them, Dziekanat 96 (http://www.cs.put.poznan.pl/socrates/, now Socrates, was developed by the Technical University of Poznań by using the Oracle
database, with Oracle Forms&Report tools. The second of the mentioned systems (http://www.kalasoft.com.pl/), a commercial product HMS with a textual UI applies the Progress database. The next system with a GUI Dziekanat 2.3, has been developed the University of Zielona Góra with Gupta (Centura) database. The system Edukacja CL has been developed by the firm Computerland, with a partially support of the Technical University of Wroclaw. The most universities in Poland nowadays apply USOS (http://usos.mimuw.edu.pl/), the last of the mentioned systems that uses of the same technology and tools as Socrates. In the future, by the administrative decision some parts the system Dziekanat2 will be replaced by the system USOS. Nevertheless some independent system parts of Dziekanat 2 will still remain in usage.

References

Summary: This paper provides some issues related to some technologies of XML processing in relational database based on Microsoft SQL Server 2005. Besides state of the implementation of XML technology in SQL Server in the first section were shown XPath, XSLT and SQL as tools of processing XML data. In the second section was established query language for XML structures. There were presented main features of this language and its extension (XML DML). The third section includes comparison of languages on account of XML data querying.

Keywords: XML, XQuery, XSLT, XPath, SQL, SQL Server

Introduction

It seems that it is hard to find a field of informatics, in which no member of a XML family would be used. We could say that the using XML data applications became just ubiquitous. Representing semi-structured data and storing documents in XML format made it standard, which can be helpful in database management. So no wonder all known database servers have been extended with XML support. The introduction of support for a native data type to database systems was a natural consequence of some faults of the relational model, and on the other hand the lack of possibility of the
sufficient mapping of the XML data model to the relational one (on account of representing hierarchical, nested and heterogeneous data, and necessity of preserving document order). Despite much progress of standardization, various systems (e.g. SQL Server, Oracle, DB2) provide various possibilities of processing XML data. However, most systems support all fundamental XML technologies: XSD, XPath, XSLT, etc.

**XML implementation in SQL Server and data querying**

One of the most often used relational database management is SQL Server 2005, which allows native storage and query processing of XML documents and XML content fragments. The most important features are: XML data type, support for typing XML data with XML schemas, ability to constrain XML data type columns, XML indexing, methods on XML data type, enhancement of the FOR XML clause of the SELECT statement, implementation of XQuery language, language for data modification.

In SQL Server 2005 a new XML data type was introduced. It allows storing XML documents and XML fragments with text nodes or an arbitrary number of top-level elements. XML variables and parameters of functions or stored procedures are also provided. XML columns, variables and parameters can be associated with an XML schema collection, which store imported XML schemas for validation of XML. Note that XML data can be promoted to a computed column. To enforce additional constraints on data, the relational constraints can be used on XML data type columns (except for unique and key constraints). We have three options for XML storage, which differs in essential way for data processing: native storage, large object
storage, or mapping between XML and relational storage. These approaches can be combined, thus various XML data are stored in various ways.

The manipulation of XML data in SQL Server 2005 is supported through XML data type methods. `query` allows performing query over XML instance, returning XML instance. The existence of XML instance can be checked by using the `exist` method. `value` enables extracting scalar values from XML source. An XML document can be decomposed into relational data with the help of the `nodes` method. These methods are called using the user-defined type method invocation syntax in `SELECT` statement, with specified XQuery (in particular XPath) expression as an argument. Such expression evaluates a list of XML nodes in the form of sub-tree rooted at each of these nodes in document order. Another method (`modify`) will be established later.

An important feature of SQL Server 2005 is an ability of indexing XML data. Since XML values are stored in XML data type column as large binary objects, execution of some queries is sometimes very slow. SQL Server allows two kinds of XML indexes, which can speed up execution of various queries: primary and three secondary (`PATH`, `PROPERTY`, `VALUE`). The primary XML index is used to execute any query except for the case when we need the entire document. Unfortunately, the size of primary index is larger that of XML data type in the table, because it creates $B^+$-tree containing among other things tag names, node values and primary key of the base table. If there are relatively few tags and even a lot of values, then the size of index is close to the XML data size, otherwise the primary index may take even up three times the space of the XML content. XML indexes
usage is recommended for the relatively large XML instances and when an extracting XML data have relatively small size. In practice, either XML column is often included to relational index, or XML index with full-text index on XML column is combined. Thus the XML content is indexed, but the XML markup is ignored (attribute values are not indexed). Such approach allows combining full-text search with XML querying.

Although SQL is non-XML query language, it has been adapted to such usage in many systems. Features of clause `FOR XML` to the `SELECT` statement have been considerably enhanced in SQL Server 2005. This clause allows returning results of an arbitrary query as XML instance. We receive well-formed XML documents, so XQuery expressions can be used through XML type methods, to search or shape query results. One of the necessary extensions of the `FOR XML` clause was the integration with new XML data type. Other features were added: generating of an XSD inline schema and mapping `NULL` value. Some existing modes were modified:

- **RAW** generates element `<row/>` with attributes matching selected columns for each returned row. XML data are placed as child elements;
- **AUTO** returns results in the form of XML instance with hierarchy of simple tree mapping relationships in database: table is represented as element and each selected column as attribute;
- **EXPLICIT** allows determining almost any requested shape of XML document but in quite complicated way ("query from hell").

The new **PATH** mode enables to use of XPath syntax in the name of column, to obtain requested structure of XML instance. This mode is similar in effect to **EXPLICIT**, but usage of path expressions is more convenient and flexible.
in generating complex XML hierarchy. In this way we can map column into attribute, element, child element, element content or text node, and together with the ability to nest queries we can obtain almost any structure of document. Moreover, in SQL Server 2005 some limitations of FOR XML were eliminated. We can use this clause with directive TYPE with GROUP BY or aggregations and in nested SELECT statements. A directive ELEMENTS allows mapping column to elements in all modes except for EXPLICIT.

The mentioned XPath language introduces syntax for addressing parts of an XML document based on path expressions. If we need to select a node from an existing XML document, then XPath expression is the best choice. However, it cannot create a new XML instance or modify existing instance in this way, also we do not obtain results in the same form as input data (set or sequence of nodes instead of XML instance). We cannot aggregate or sort data, use variables and bind namespaces (although XPath uses them); moreover type system is very simple. Therefore, this technology does not satisfy the fundamental requirements for query languages.

XSLT provides more advanced querying than XPath, usage of path expression to address parts of an XML document. XSLT is perfect for recursively processing an XML documents or transforming XML into other data format (e.g. XHTML or text). It allows to create new XML instance, to use variables and namespaces. XSLT works only with sequences of nodes. User-defined functions, joins and other operations can be hard to implement, because XSLT often requires solving problem in untypical way. A sorted outer join in particular cases may be difficult in realization,
however XSL templates can be optimized. Since XML Schema appeared later than XSLT, so XSLT uses a different type system, which is not large.

**XQuery language in SQL Server**

XQuery is declarative query language created as extension of XPath. It provides very important tool in processing XML data, which is required in database systems. Since nineties many query languages for XML data appeared, based first of all on SQL or XML structures. Since 2003 W3C XML XQuery Working Group established a few working drafts of formal requirements for implementation of XQuery and just in January 2007 published six specifications, completely describing standard of the language. Almost all requirements for XML query languages were taken into account in language model except for access to the XML schema or DTD for a document, if there is one. In SQL Server 2005 the support for XML Schema was introduced through mentioned XML schema collection. The fundamental statement of XQuery language is FLWOR expression, which returns sequence of elements, performing iteration. This expression is placed in the body of query and may be preceded by a prolog intended for some static context information. FLWOR expression stands for five optional clauses (first or second clause is obligatory):
- the *for* clause enables to define iteration over an input sequence;
- in the *let* clause we can declare variables and assign values;
- the *where* clause filters the results by applying a boolean expression;
- the values in result set are sorted according to the *order by* clause;
- the *return* clause defines the result of a query.
According to the theoretical requirements XQuery have various features: functions and operators (altogether almost 200), XML constructors, quantifiers, conditional expressions, ability to define functions and to create modules or libraries, data typing with XML Schema, validation, support for namespaces, ability to group, aggregate and join data from different sources, type casting operators, type-related expressions. However, not all of these features were implemented in SQL Server. Typical XQuery expression in SQL Server has structure in accordance with standard and may contain FLWOR expression (without the let clause), another XQuery expression or an XPath expression. To provide integration of relational and XML data, two functions for accessing to relational column `sql:column()` and variables `sql:variable()` were added. So, we can select XML data based on condition made on relational column or aggregate data of relational and XML data type columns of any tables.

To provide a mechanism for modifying XML instances stored in database, Microsoft developed XML Data Manipulation Language (XML DML), which is required extension of XQuery. Also, in SQL Server 2005 we have three additional keywords, which allow realizing typical operations of processing XML instances. We can insert nodes in a document (insert), delete nodes (delete) and update the existing node (replace value of). These operations may be performed only within the XML data type method `modify`, which is called in the `SET` clause to `UPDATE` statement. XML DML operations often use mentioned functions for accessing to relational data.
Best practices for XML data querying

FLWOR expression is the most important of XQuery expressions on account of iterating, usage of variables, filtering, sorting, grouping and joining data from different sources. It is very similar to SQL SELECT statement and XSLT `<xsl:for-each>` loop.

The similarities between XQuery and SQL are obvious. We have the `where` clause, which filters according to a specified boolean condition and the `order by` clause, which sorts according to given criteria. Variables can be declared and assigned values. The ways of iterating and constructing results are different. SELECT returns values as flat sequences selected from the arguments of the FROM clause (tables or views). SQL is not positional, so it is uncertain in which order the iteration will be performed. In XQuery sequences are always ordered and they may be hierarchical. The `for` clause describes collections, paths or more complex expressions, and the order of iteration is significant. The `return` clause does not return only values from data sources, but allows constructing new ordered structures.

The most obvious difference between XSLT and XQuery is that XSLT is written in XML syntax. It is easy to observe that the `for` clause of FLOWR works similar to the `<xsl:for-each>` loop. However, a single FLOWR may have any number of the `for` clause, and `<xsl:for-each>` loops have to be nested to achieve the same effect. Variable assignment in XSLT is realized using `<xsl:variable>`, similarly as the `let` clause (in SQL Server we should use inline expression). The effect of the `where` clause may be achieved in XSLT using either predicates in selecting expression or
The \texttt{order by} clause matches the \texttt{sort} expression, and the \texttt{return} clause matches the body of \texttt{for-each} loop.

Other important differences are that XQuery returns sequences of atomic values, has a richer and more complex type system (based on built-in support for XML Schema), allows composition (iterating over the results of other expressions). Moreover, in XQuery it is easier to join two data sources, to perform some grouping operations. As a language, XQuery is more complex than XSLT, though on account of compact syntax it is not more complicated to use, especially for querying XML, transforming structures into summaries and other structures.

Unlike XSLT, XQuery has procedural approach to query processing (user-defined functions), though it gives similar results. XSLT allows to obtain non-XML results (e.g. DocBook into XHTML), when XQuery is focused on generating XML, so it is not intended to take a place of XSLT in transforming XML documents. XQuery allows manipulating sequences of values and nodes in any order, not according to document. Moreover, XQuery provides ability to construct temporary XML results inside query and then navigate into that.

**Conclusions**

Usually we have two dilemmas when we use XML documents: manage documents and schemas in a file system or choose database system to native XML support and which model of storage should be chosen - relational or XML? If XML data coexist with relational data, automatic checking of well-formedness and optional checking of validness is required, or XML
data are often queried and modified, then the native XML support allowed by database management system is recommended. Thus, SQL Server 2005 provides a few possibilities of processing XML data. Choice of the suitable approach may be based on the following tested rules:

- generating XML document from multiple columns and multiple rows is possible only with usage of the `FOR XML` clause;
- XQuery and the `FOR XML` clause with the `TYPE` directive allow to construct XML instance faster than usage of multiple XML DML statements;
- modification of existing XML instance can be done using XQuery or the `FOR XML` clause with multiple calls of XML data type methods.

Some mentioned similarities are not accidental. XQuery performs similar tasks as SQL, however provides more important features. SQL and XQuery are similar in style and syntax. Both may be used in querying, but it should be remembered that they work on totally different data sources. But XSLT, as well as XQuery, is a declarative language with similar abilities in XML querying and transforming data source of the same kind.

XQuery language is a very effective tool for processing of XML data, take into account a wide range of possibilities of its usage: querying, data constructing (reshaping and composition), computations (aggregations), integration of heterogeneous data and constructing dynamic WWW pages based on database. Server-side XML processing with usage of XQuery reduces network traffic and ensure a better data protection. Note that compared languages (except for XPath) are effective query languages and XQuery does not substitute them in every task. Each of them is useful in various cases. XQuery should be a supplementary tool for XML data
processing, though in some tasks it may be irreplaceable, especially as it is convenient to analyze and prone to optimize.

References

5. W3C Recommendations 23 January 2007: *XQuery 1.0: An XML Query Language, XQuery 1.0 and XPath 2.0 Functions and Operators.*
Summary: In the article the methodology of modeling business processes by applying IT devices supporting processes modeling was presented. The integrated process management system ADONIS of the company BOC Information Technologies Consulting was used. The analysis of effectiveness of modeling business process was conducted. Processes realized in an universal bank were the subject of the analysis and modeling. The evaluation of using ADONIS methodology for modeling processes of granting a home loan and giving a picture of various behaviors of the universal bank were presented. The choice of the process is caused by great popularity of home loans. The development of bank services and equaled level of these services are the reason for considerable competitiveness on the market among banks. Improving the processes which take place in banks may shorten the time and cost of customer service which, accordingly, may influence the organization’s competitiveness. Moreover, minimization of costs connected with introducing changes may by achieved by applying specialist IT software which models, stimulates, optimizes and evaluates various behaviors with no need for introducing unnecessary and erroneous changes in the organization.

Keywords: Business process, Adonis System, Business process modeling,
Introduction

Contemporary enterprises have to face strong competition and dynamically developing environment. It forces organizations to control, all the time, stimuli from environment as well as to control clients’ expectations, particularly those connected with quality and service. Economic organizations, in order to gain competitive advantage, need to identify and alter their business processes. More and more often gaining competitive advantage and increasing business potential depend on applying information technologies, which enable to manage business processes. As Brilman proposes [1] applying modern concepts and management methods may enable to adjust to the conditions in which changes, competition and clients necessitate flexibility and speedy reaction. The assumption that the organization’s activity can be described by processes constitutes the basis of process management. An interesting space for research on process management is the capital market in Poland since it is a young market, subjected to changes. Solutions which appear on our market were frequently taken from other countries’ experiences, e. g. the United States or Western Europe. The development of bank services and increasing excess of demand over supply on the property market in recent years favor a wider range of home loans offered by banks. Funding the purchase of properties is attractive for banks because of stable loan security which is mortgage. Currency of this topic induces to look closer at the issues connected with processes of home loans modeling. Fighting off competition which is so strong on the loan market, efficient management supported by IT technology may emerge to be helpful. Integrated Information System
ADONIS of the company BOC Information Technologies Consulting GmbH is a useful information device supporting process management. The aim of this article is to analyze the effectiveness of business processes modeling by applying ADONIS system. Processes realized in an universal bank were the subject of analysis and modeling.

The concept of process

In every organization a whole range of business processes are realized. Statistically, 80% of them are repeatable and are carried out regularly in a similar way. These processes ought to be controlled and correctly managed. This is why, the concept of process is a key term in a process approach to management. The term has its genesis in Japanese philosophy Kaizen [2], which focuses on small, gradual, frequent improvements in all areas, not only business but whole life. Apart from orientation to pursue a defined goal and constant search for new solutions, also process orientation is vital. In the literature the concept of process was defined by several authors. According to Hammer and Champy [3], it is a group of activities which necessitate input at the beginning and produce output at the end, effect of the process realization, which have some value for a client. According to Davenport [4] the process is the flow and transformation of materials, information, operations and decisions. Backer and Kahan [5] stated that the business process serves as a means of achieving company’s goals and describes the enterprise’s activity which includes connections with client’s, supplier’s and other business partners’ processes. It might be useful to mention that in literature the terms process and business process are not usually distinguished and in colloquial language they are often considered.
equivalent [6]. In the business process Shmelzer i Sesselmann [7] distinguish the following components:

- client’s demands and expectations,
- input,
- service which has some value for a client,
- output,
- a person responsible for the realization of the process (owner, process manager),
- the goal of the process,
- measures directing the process.

Business process starts and ends at the client’s (fig. 1).

**Fig. 1 Components of business process**

Source: Personal study on the basis [7]
It should be also noted that the definitions mentioned above and many other definitions formulated by such authors as Adaira and Murray [8], Gabryelczaka [9] or Jocou and Lucas’a [10] defining the concept of process are equivalents to some extent. To sum up, it can be stated that a business process is a series of activities which workers perform in order to transform input resources into a final product. Not all processes need to have visible physical character like production processes. Management processes are those whose course comes down to transforming information and they are invisible. Such processes take place in financial institutions, insurances etc. Detailed description of the methods of business processes identification and stages of business process modeling were presented in the work [11].

**Business process according to Adonis methodology.**

In order to learn how the processes occur in an organization, it is necessary to gather information about their activity. The processes which occur in an organization may be identified by means of one of the three methods:

- Classic substituting (*top-down*),
- With model of keeping (*from borders*),
- Reengineering (*white sheet*).

Detailed description of methods of business process identification and modeling was presented in works [11]. During process identification diagrams, similarly to the model of business process which is also presented in a form of a diagram. It allows to obtain a clear form of process and simplicity in its reception. Modeling of organization processes is mainly concentrated on three elements:
• business model,
• map of business processes,
• map of work flow.

Process modeling only by means of a pencil and a piece of paper is not very effective as enterprises are dynamic structures operating in changing environment. Thus information processes are used for modeling. The main advantage of applying devices of BPM (Business Process Modelling) type is definitely organization and visual observation, processes documentation, the opportunity of facilitating with regard to time or making improvements with no need for making experiments on “a living organism. In the Adonis system graph models are used in order to create models of business. The main elements of the application are as follows: activities, decision, sum, parallelism, the beginning and the end of the process (fig. 2).

Fig. 2 The main elements in the Adonis system

A- activities, B-the beginning, C - the end of the process, D - decision, E - parallelism, F - sum.

Source: Personal study

160
Graphic elements used in the Adonis system: Activity, the Beginning of the process, the End, Decision, Parallelism, Sum. The source: Personal study. The beginning and the end of the process have to be determined for each modeled process. The beginning allows to determine the number of modeled processes. Activities in the Adonis system have such attributes as time, cost and a particular performer. Each activity should have a defined direction of transaction flow, and the transaction is an object which the process flows through, e.g.: loan application which flows through a loan office. The direction of the flow is determined by the head of the arrow which point at the activity. As far as the element decision is concerned we have two or more arrows which point at possible directions of the further course of the process. The choice of the next step after the decision can be determined by particular layout of probability or can depend on the characteristics of transaction. During performing the process in the element parallelism, we can define a process which runs parallel across various paths which will join in the element sum. A typical graphic model generated in the Adonis system was shown in the figure 3.
Fig. 3 The model generated in the system Adonis.

The generated model which has a structure of a graphic is translated into the software language which enables to distinguish and describe separate elements. After this process the model is not a graph any more but it is possible to add various attributes of the elements and, in the next stage, analysis and simulations of the whole model. To model business processes in this stage, systems use such languages as BPEL (Business Process Execution Language) and BPMN (Business Process Modelling Notation).
Modeling business processes on the loan market

Home loan market is developing very dynamically. The research shows that only 15% of clients are intending to purchase a house for their own means. Thus banks appear to have 85% share in providing credits. The development of this market segment is the reason for a dynamic increase in loan activity of banks.

The principles of the model

The model of granting a loan was based on models defined in the library ADONIS Standard Application Library. The types of available models are as follows: the map of processes, the model of business processes, the model of work environment, the model of documents and diagram of uses. It was assumed that the model represents the process of granting a home loan in a universal bank for an individual client where mortgage on the purchased house was a security. It is assumed that the bank operates on the territory of Poland and abides by the bank law. According to the tendencies on the market, the bank is characterized by centralized analysis. It means that the decision about a loan is made in a central office, and an advisor is the one who only begins the loan procedure and is responsible for the contact with a client who is a potential borrower. In the model the process of advertisement and spreading the information about the loan offer were omitted. The process of granting a loan begins when a client and an advisor meet for the first time and it ends when a contract is signed or when the client is informed that his application was rejected. In the next stage loan monitoring is carried out, namely debt service, risk monitoring and solving problems with a difficult loan. Modeling was carried out on the basis of a
classic substituting method, the result of which was a map of processes (fig. 4), models of processes and models of sub-processes. What is more, models of documents, models of work environment and models of resources were made. Connections between these models were used in the process of simulation.

Fig. 4 The map of processes generated in the Adonis system.

Source: Personal study.

In the proposed model of work environment only those workers were take into account who were the performers in the process of granting a loan, or organization units where workers were employed. Additionally, the number of bank branches was reduced to one because of making the model simpler which is enough to carry out a simulation. It was assumed that the organization structure of all branches were identical. In the model it was assumed that business processes use resources in the form of information systems.

Model simulation
The system enables to define preliminary research, due to which one is able to search objects in models, connections between objects and their attributes according to criteria defined by users. The result can be presented in a
tabular form or a diagram and they can be saved in a file. Preliminary researches, similarly to constructions describing resources usage, are written by means of AQL (ADONIS Query Language). The next stage available in the Adonis system was the possibility of generating a model of a present state ("the way it is"). Documentation of a studied model was generated to the file in RTF format. It will enable to archive the documentation of the next versions of the model. The file includes data about all models. In the next stage, by means of algorithm of the path analysis, the results of the process which took place on various paths, including sub-processes, were obtained. It was possible to obtain the results of the algorithm due to defining average time and cost of the processes in the studied model of business. It is also possible to observe the run of various paths, in both a graphic and text form. The frequency of the run depends on the value of probability which path is chosen in the decision point. By means of the systems, the time and cost of the processes may be counted by adding up times and costs of activities which were carried out on the given path of process. The analysis of burden was based on processes simulation and connections between processes and work environment were taken into account. With the use of the model of environment, demand for staff was determined considering average time in which the process was conducted. As a result of evaluation, the results of the simulation were assigned to models and its mechanisms enabled to process the outcomes. Evaluation by means of supposed preliminary evaluation research was carried out. Preliminary research showed all activities which caused total costs higher than the supposed amount in the model. The result of the preliminary
research was different from the same inquiry in the model of analysis. Three activities generating the highest costs were determined: telephoning, searching the Register of Unreliable Clients, investigating application for a promise. Furthermore, the evaluation by means of supposed preliminary research oriented to processes was carried out. The results of preliminary research on costs of all processes were obtained.

**Summary and conclusions**

Process approach, identification and management by means of IT systems business processes are a significant element in business engineering and modern management.

It might be useful to mention that processes inside an organization might necessitate going outside its boundaries. Then we talk about interorganization processes, e.g. the advertisement of a new product. In the process of identification and creating a structure, it is necessary to answer the question: which aspects of the process will be taken into account in the model of this process. Business processes are modeled in a very realistic way and they take into account such conditions as: various runs of processes depending on criteria, work schedules, resources, intensity of the flow of transaction, time of performance, queues. The results of the simulation might be estimated by means of statistical packages. Due to the obtained results, statistical analysis of empirical data (real intended processes) and theoretical data (coming from model simulation) may be carried out. The effect of the results obtained from statistical packages, reports of analysis and simulation is making a decision about what should be improved, how to modify the structure of the process and which parameters ought to be
changed. Applying the module of the system Adonis simulation enabled to observe the processes for next few months, even for two years which, in real time, took only a few minutes. Process optimization concerns both qualitative and quantitative changes in modeled business processes.

References

THE IMPLEMENTATION OF ADVANCED ERP SYSTEMS IN SUBSIDIARIES OF GLOBAL CORPORATIONS

Maria Szczesna

Warsaw School of Economics, Pre-doctor Study

Summary: The article will discuss the consequences of implementation of advanced ERP systems. It will focus on differences between local companies and central. The IT standardization in global corporations has many advantages such as increased control via profit centers. However potential dangers can not be overlooked. The system developed for corporations needs to be customized to adhere to local requirements. The effectiveness and cost of such modifications should be open for discussion. Companies implementing advanced ERP systems should not expect quick results as the success of each implementation depends also on so called soft factors.

Keywords: ERP - Enterprise Resource-Planning, Real Time Systems, Process Reengineering, profit center, soft factors

Introduction

Nowadays the most important key success factors for the enterprise are the time of new product implementation (“Time-to-Market”) and its flexibility. Those requirements are satisfied by advanced ERP systems. They offer speed that allows achieving competitive advantage. Enterprises are going to create integrated system that connects whole company and even suppliers and clients. Such IT system becomes lifeblood of the company. Each data set in a child company is saved in real time. Hence data is immediately
transferred. For example integrated system registers the order of raw materials for production, then it generates automatic process consisting of: ordering, transport, paying, invoice printing, delivery etc. Every change of the parameter (e.g. price of the raw material) is registered in real time what allows live updates in other parts of the company. As a result not only calculations are amended but even results accounting. More complex integration of IT system can include not only local and foreign offices, but also suppliers, banks and customers. The highest level of the integration is achieved when company connects its business activities around the world. Modern ERP (Enterprise Resource Planning) systems allow this level of integration.

**Conditions of ERP implementation in child companies**

Whilst implementing ERP systems, child companies tend to use solutions offered by their parent businesses. The so called “roll-out projects” adjust global solutions to cater for local needs. The main objectives of roll-out projects are: the standardization of business processes, harmonization of reports and cost reduction. The success of each project also depends on the independence of local office. Child companies are often obligated by the corporate policy to enforce standard solutions. Those do not take into the consideration local business environment. Roll-outs are often implemented by internal consultants who rarely speak local languages. This might cause communication problems. With low budget and short timescales for implementation, roll outs might be considered beneficial. However they might prove difficult as well.
Benefits and threats of implementation

The implementation of ERP systems in child companies brings relevant benefits. The standardization of processes allows using the best solutions in a given business sector. There is only one reporting system in a corporation. This reduces the effort required to prepare monthly or quarterly presentation of company’s results. Common terminology and view on company’s development facilitates internal communication. The implementation of new IT systems gives opportunity to fix many processes. The company can abandon processes that are not adding value and optimize other solutions (Process Reengineering). Advanced ERP systems allow the introduction of effective controlling and management. The cost center accounting and profit centers assure the comparison of planed and real results. It also allows control through Responsibility Centre Budgeting. The profit and loss accounting enables the analysis of multilevel contribution margin. The cost calculation assures precise analysis of unit cost at every stage of production. Numerous studies confirmed the benefits of ERP systems. The 2007 ALPHA Business Solution AG research (questioned 120 German companies) proved that most companies were satisfied by implementation. The results are shown in Diagram 1.
The opinions about ERP systems were mostly positive. 71% of respondents were satisfied or very satisfied. According to the research the implementation of ERP systems reduced costs and improved:

- effectiveness of the staff and processes (20%);
- customer service (20%);
- quality of products and services (16%);
- customer satisfaction (16%);

It also increased flexibility (16%) and innovation (9%).

The above advantages encouraged companies to roll-out ERP systems in child companies all over the world. The main benefit of roll-outs is lower cost as compared with bespoke systems catered for the needs of local countries. Due to the use of one technical solution, those implementations are much cheaper. As a result of using shared software and servers, there is a significant reduction of time and costs. The implementation of ERP systems in child companies is usually supported by internal consultants. The
economies of scale allow using expensive solutions such as 24/7 on-line support. As integrated IT systems are process oriented, they allow more efficient management of company’s resources. Hence all parts (horizontal integration) and levels (vertical integration) of the company contribute to its business intelligence. As a consequence, the company needs to change its culture. All parts of the enterprise should be integrated and work together. Where there is no integration, some parts of the company can work towards different objectives. In practice this element is usually missed. The next common mistake is to consider implementation as technical exercise only. This approach leaves the whole process to the IT department and technical consultants. As a result the company can not improve organization structure. That is why all necessary departments must be involved at all times. The support of people with the knowledge of organization and project management experience allows adjusting system’s flexibility. This concept will optimize those processes without user going into technical details. The problem mentioned above is often ignored resulting in maladjustment between implemented modules and practical assignment. The problems of implementation should also be considered as early as at the planning stage. Careful planning and preparation is necessary as it is hard to modify projects well advanced. If any corrections are needed, either during implementation or just after the launch, planning or project management were simply not good enough. Integrated IT system can not work alone, it must be related to the strategy and company’s objectives. Hence the planning should start with questions about company’s strategy and key success factors. Modern applications for
integrated IT systems offer increased flexibility. They should be customized and address all needs of the company. The crucial question at the planning stage is: Should the rest of the company be adjusted to the new solution? There are two possibilities. First one, new IT implementation will be followed by Process Reengineering what leads to quality and financial reorganization. Alternatively, integrated IT system will be combined with existing software structures. There will be no improvement to the company’s processes. Some companies assume that standard software packages such as SAP, Baan, Oracle or PeopleSoft guarantee a success during the implementation and no failure is possible. This is a false assumption. On the contrary, those applications impose higher risk. Majority of those software solutions depend on so called soft factors e.g. qualifications and learning abilities of the staff, positive attitude to the changes and acceptance of new processes. Successful implementation of ERP systems can only be achieved when soft factors, IT systems and business processes are thoughtfully combined. The critical points associated with the implementation of new IT system are summarized in Table 1.

**Table 1. Reasons which makes suboptimal and problematic solutions**

<table>
<thead>
<tr>
<th>Reason</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low budget of implementation</td>
<td>Set and ready standard instead of optimal</td>
</tr>
<tr>
<td></td>
<td>Not estimated additional cost of configuration (customizing)</td>
</tr>
<tr>
<td></td>
<td>Lack of integration with another systems in the company</td>
</tr>
<tr>
<td>Problem &amp; Cause</td>
<td>Inadequate Solutions &amp; Consequences</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------------</td>
<td>----------------------------------</td>
</tr>
</tbody>
</table>
| **Time pressure**                                                             | Processes not defined ; wrong control system  
Insufficient testing and staff training |
| **Lack of the organization (no quality control and bad project management)** | Terms and costs are not under control  
The board of directors is not properly informed about current situation and is unable to react on time |
| **Too high trust in corporate consultants**                                   | Lack of internal know-how  
Forcing solutions which work well in the corporate abroad headquarters but not necessarily in the local market  
Not adjusting the system to local law |
| **Insufficient personal resources**                                           | Overloading the staff with additional project work (quality suffers)  
Not enough staff during tests and trainings (internal needs missed)  
Process-owners are not involved in the project |
| **Lack of Process – Reengineering**                                          | Holding tight onto old processes |
| **Resistance against changes**                                               | Delay in implementation |

Summary

There are many advantages of roll-out implementation; such as standardization and cost reduction. Strong dependence on the headquarters is convenient but also risky because of different business environments. The company should be aware that local requirements can differ from global and it should be taken into the account during implementation.

References

THE ROLE OF THE WAP TOOLS IN CHOICE OF ADVANCED ANALYTICAL CRM SYSTEM AT LARGE RETAIL BANK

Wiesław Szczesny

Department of Informatics, Warsaw University of Life Sciences (SGGW)

Marek Karwański

SAS

Summary: In many companies implementing IT systems is not an easy task. Especially if it contains advanced analytical modules. Much efforts were put in development tools supporting process of valuating offers. The Over Representation-Map [Kowalczyk et al. 2004] and underlying technology was used to get a clear comprehension of volatility among the experts valuating the proposals due to their experience and knowledge.

Keywords: Data Mining, Over Representing-Map, implementation phase.

Introduction

Global economy factors have forced banks to develop new business models that will keep them operating competitively in today's high-tech, multichannel banking industry. The key is making the right strategic decisions in the short time. The challenge is bringing together the reams of customer, supplier and organizational data that are scattered throughout dozens of operational and transactional system silos throughout your enterprise.
Banks all over the world face the same challenges: how to lower costs while increasing profitability? The answer are banking IT systems tailored to meet the unique needs of the banking industry ensuring that your customer relationships, marketing efforts and corporate strategies achieve optimal results – all based on customized data architectures and analytical applications from.

The second reason why the banks should have sophisticated IT systems are regulatory requirements. The bank’s management is responsible for ensuring that the banks have appropriate processes and effective internal controls consistently with stated policies and procedures, the applicable accounting framework and supervisory guidance commensurate with the size, and complexity of the bank’s market activity. Banks should have a system in place to reliably achieve industry standards and practices specified by banking supervisors.

Competition is the main factor that forced huge - often in advance - investments in analytic tools, with expectations that helps to win and to reach the stockholders’ satisfying profit. The effects of investments should bring to:

- effective delivery products and services to the customers satisfying theirs needs and supporting the efficiency of sales.
- maximalization the gain over the customers by elimination deficiency customers, on the basis of complete study their history

It seems that the choice of proper system is comparatively straight lines, because of:

- there are a few global vendors operating on the market
• it will suffice to send request for proposal,
• using the WAP tools choice the proper vendor and implementing firm and start to realize the project

Overview of Data Mining tools market.

As occurs in many companies implementing IT systems is not an easy task. For years such systems were implemented by building in-house applications to deal with the operations. But it provides to situation the bank possessed several systems not necessarily integrated which implied low response. Given this, now the most often IT systems come from the third-party vendors.

Unfortunately there are some bad experiences in functionality of such systems as well as in using external consultants. The overtime and over budget are the most frequent reasons of failures. But there are many factors that could affect too the implementation of projects in the big bank such as:

• large retail banks are completely divided on the autonomic business-lines (practically separate institutions), which act in individual segments of the market,
• the costs optimization of investment requires buying the common tools for several business lines, which regard on their tasks and the level of engaged personnel cause often conflicts due to lack of commitment
• the IT at large institutions is very often not able to give clear processes related support how to choice the sophisticated analytical tools.

In this time there are few vendors offered analytical tools to analyses financial data. To see the actual market positions of the products offered by
the vendors Gartner’s Magic Quadrant was used. The Magic Quadrant is based on two axes:

- **Ability to Execute**: that summarizes factors such as the vendor's financial viability, market responsiveness, product development, sales channels and customer base.
- **Completeness of Vision**: reflects the sales and market strategy how vendor drives or follows the market, business model used and innovation.

**Figure. 1. Magic Quadrant for Customer Data Mining, 2Q07**

Source: Gartner RAS Core Research Note G00145685, May 2007

Some of the firms mentioned above operate in Poland. There are SPSS, SAS, MATRIX(KXEN), Stat-Soft (Statistica). Offered products for banks
and other financial /non-financial companies include as its parts Data Mining analytics.

**SAS Banking Intelligence Solutions:** include pre-built data models, processes and techniques that speed up both implementation and results, giving you a fast track to significant ROI. Because the solutions are built on a banking-specific architecture – the most extensible environment on the market today – you can respond quickly to changing business needs and realize value in each step of the intelligence creation process. [see: http://www.sas.com ].

**SPSS Financial Analytics Solutions:** help financial services firms maximize customer value and minimize risk. Predictive analytics makes it possible to leverage the distinct multi-channel nature of their business transform their data into applied customer insight with real-time predictive analytics. Process data from every channel — ATM transactions, Web data, even textual data like notes from call centers and branches—in a closed loop that applies results to improve their values. [see: http://www.spss.com ].

**KXEN Analytic Framework:** with a wide variety of products offered to the banks, aimed at customers with differing and changing requirements, enables business decision makers and data mining professionals to transform data into knowledge in a fraction of the usual time. It helps to increase revenues by: identifying behaviors of customers, new target markets and additional cost-effective delivery channels. [see: http://www.kxen.com ].

**STATISTICA Data Miner:** used to understand customer needs, and behaviors in financial institutions by turning to the powerful data mining
techniques. These techniques help companies to uncover hidden trends and explain the patterns that affect every aspect of their overall success. With the recent advances in database technology and data mining software have financial institutions acquired the necessary tools to manage their risks using all available information, and exploring a wide range of scenarios. Now, business strategies in financial institutions are developed more intelligently than ever before.[see: http://www.statsoft.com ].

**Description of the process of choice analytical tools at the bank**

The proper choice of analytical tools is vital to the successful implementation of the whole system supporting managers activity. The project should be proceeded by the appropriate products choice process that requires adaptation of dedicated methodology.

The first step in the project is the identification and prioritization of organizational objectives for that project. This provides a focus point and helps in prioritizing competing issues (e.g. increasing revenue vs. decreasing losses) that come up during development. A special ranking scorecards are prepared.

The next step is creating the request for proposal (RFP). It should include a clearly defined project scope and timelines, and address issues such as deliverables and implementation strategy.

The RFP also identifies all the risks for the project and assembles a multi-departmental project team. The list of project team members should include responsibilities, executive sponsors, as well as identification of members whose signoff's are required.
The selection process consists on the rounds of presentations. Each offerer presents his solution and explains its experience implementing the system especially including all the costs (software+consultancy), the implementations plan, trainings, post-sale support, maintenance and any additional technical related requirement.

Each solution was evaluated on the aspects: technical analysis, functionality, implementation and costs. Each solution is ranked in all mentioned aspects and a final grade is obtained according to specific weights defined at the first step [Wierzchoń 2006].

One to tree vendors are selected in the first round. These companies are invited to participate in the final negotiation. Selected vendors usually prepare additional more accurate information about their solutions. These new proposal are evaluate in the same manner as the previous.

At the end of the negotiations the contract is undersigned and the project could start.

**The choice of analytical system and vendor - case study.**

As an example of using sophisticated analytics by choice tools and vendors we describe the procedures use during implementation of Customer Relationship Management (CRM) in one of the biggest polish banks. Our experiences show that it is not always easy to decide what system should be the most suitable.

Four offerers participated in the process. We are using its symbolic number names 1 to 4 in the rest of this document because of security.

Evaluation was made by team consisted of 7 consultants representing different business and IT departments. There were experts from various
fields of banking business possessing different experiences in analytical tools. The WAP system supported building scoring cards that allow ranking the offer in a row and choice optimal solution.

The solutions were evaluated using scores defined according to the functionality area. 6 aspects were involved to the process and the different weights were attached to each area:

1. Functionality - evaluation from user’s point of view
2. IT technical side - evaluation made by IT depend on analyzing compatibility, flexibility and other features
3. Knowledge transfer - analytical power of solution
4. Price - all costs associated with the solution in a few years time horizon
5. Offer quality and reliability
6. Implementation - terms of implementation, previous local experience in implementing similar project

*Table 1. Weights of scoring scales*

<table>
<thead>
<tr>
<th>ID</th>
<th>Areas</th>
<th>Individual weights</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Functionality</td>
<td>36%</td>
</tr>
<tr>
<td>2</td>
<td>IT technical side</td>
<td>7%</td>
</tr>
<tr>
<td>3</td>
<td>Knowledge transfer</td>
<td>32%</td>
</tr>
<tr>
<td>4</td>
<td>Price</td>
<td>xxx%</td>
</tr>
<tr>
<td>5</td>
<td>Offer quality and reliability</td>
<td>4%</td>
</tr>
<tr>
<td>6</td>
<td>Implementation</td>
<td>21%</td>
</tr>
</tbody>
</table>

More detailed criteria could be obtain from authors.
Results

During the selection process the most serious questions were:

- What tools the bank need to show diversification of opinions and how to choose the best opinion?
- How to sort outliers in opinion space?
- How do to explain and how to measure the variance of different opinions?

The Over Representation-Map [Kowalczyk et all. 2004] and underlying technology was created to address these challenges. ORM is a picture that would get a clear comprehension of volatility among the experts evaluating the proposals due to their experience and knowledge. The ORM is a representation that balances rich description with the ability of understanding. The state provides the context in which comparison between opinions can be interpreted. [Szczesny et all. 2006].

It is easy to conclude from the map that the volatility of opinions is very large. If the valuating consultants were agree in their ratings the map should have one suitable colour. Because of differentiation of opinions it is very hard to order they in linear fashion. The horizontal bars relate to the values of opinions got by consultants. The quality of the extracted information is shown by the width - the wider bars are better.
Figure 2. Simple ORM used in project

Source: own calculations.

After clustering ORM achieves more concrete and measurable outcomes obtained by integrating information:

Figure 3. The averages of value for individual areas (1-5 areas) and offerents (1-4 offers)

From the ORM picture it could be see that the best is the offer number 3 (code).

Source: Own calculations.
Conclusions

It organize the second meeting summarize up the analyses and the results of ORM were presented in graphical illustration. This permitted to choice the short list with three offers to future negotiations. The results of repeated valuation were very close together and pointed the offer number 3 as a winner.

Without some form of graphical visualizations, business had no way to select the best offer. Banks can leveraged the breadth of this functionality to obtain the powerful and objective tool in their looking for solutions. Thanks to use of advanced ORM technique to valuating the opinions one of the offers was chosen and actually it is implemented.

References:

Summary: Total e-advertising expenditure in Poland in 2006 increased to 215 mln PLN. The advertising sector is currently undergoing rapid growth. There are many different forms of e-advertising and new, innovative forms are still arising, from static banners to advanced interactive games. The most important parameter for all these types – efficiency is measured by a proper rate. Together with e-advertisement, management systems are developing. Some of them control only the number of clicks, different ones, the more advanced calculate the rate of conversion. The majority of systems collect all available data in order in their database to prepare accurate statistics and analysis, needed for a more exact orientation of current advertising campaigns.

Advertising on the Internet

The Internet is currently rapidly growing medium and expenditure on the advertising rise significantly too. Millions of people surf the World Wide Web (WWW) 24 hours per day, 7 days a week and 365 days a year. Through the Internet potential buyers and sellers contact conveniently, effectively and quickly [5]. Internet advertising is the placement of electronic messages on a website or in e-mail to generate usually awareness for a given brand or stimulate interest for services or products [6]. There are
many ways to advertise, the one of the popular form is a banner. Picture 1 shows popularity of different formats of banners. Use of super banner and medium banner rose significantly across Europe in the last 2 years, however the traditional banner use dropped to 13%.

Figure 1. Popularity of different formats of banner in Europe.

A banner is a small rectangle with graphic, which can be placed anywhere on website. There are two types of banner static and dynamic. Dynamic banners have evolved to more advanced forms like toplayer, skyscraper or super banner which are more invasive, especially toplayer. Most internauts
have a negative attitude to this form of advertising, because of their quantity and big size. To close banner, people have to look for usually hidden button or wait for a few seconds to automatic close. Each of major Internet portals displays many advertising banners which often cover messages, important for users. Very popular form of online advertising is SEO (Search Engine Optimization) and SEM (Search Engine Marketing), these can be probably the most effective advertising systems. SEM consists in display links on right hand column of search engine results page or over search results. Links are dependent on chosen keywords however their position on designed cost per click, besides SEM programs often include many of keywords which require proper advert text. Quantity of keywords depend on a certain budget and may reach over 1000. Usually advertising campaigns have included about 30 keywords, which analysis permit to identify biggest and most aggressive competitors and manipulate advertising in order to make it more effective. Important advantage is method of payment, you only pay when an interested person clicks on your advert. The main aim of SEO is to increase quantity of people visiting website from organic search results. While SEM – (in Pay Per Click campaigns) involves paying for each visit. SEO can be understood as making specific changes to target website to increase organic traffic (for which there is no need to pay per click fees). SEO consists of many different methods of optimization. Basic optimization may involve nothing more than ensuring that a website does not unnecessarily become part of the invisible Web (the portion of the Web not accessible through search engines) and content of website is in correlation to chosen keywords. Advanced optimization may include significant research into almost every
element of page design, site structure, content and others criteria. Ideal optimization allows to land in the top ten on a search engine results page, position as high as possible on this page is very important from point of view of competitiveness of website [4].

**Figure 2 Forms of e-advertising, budget on online advert**

![Diagram showing percentages of different forms of online advertising]


Picture 2 shows popular forms of online ad. On the third place in regards to popularity are announcements, these are two or three short sequences driven in other sequences about similar subject. Other formats of online advertising are rarely used, due to more expensive preparation. This research doesn’t take into consideration advertising games. Games are a popular and relatively large category on the Internet, but they are most suitable for
specific types of online advertising. These formats of adverts are the most often sponsored by brand names and used to communicate advertising message. Advert in search engine, games and announcements are less invasive and thanks to this it is more effective. Efficiency of online advertising is being measured by the proper rate like CT (click-through)[2], CTR (click-through rate), CR (conversion rate) [1].

**Efficiency of e-advertising**

Efficiency is the most important rate of estimation of advertising campaign. Firstly this was calculated as numbers of clicks (hits) on the advertising, next as average number of click-through per hundred adverts impressions, expressed as a percentage. This parameter, called CTR, measures what percentage of people clicked on the advert to arrive at the given website; it does not include the people who failed to click, yet arrived at the website later as a result of seeing the advert. Merely getting visitors to a website had value when Web site traffic was generally accepted as a measure of success. Unfortunately, number of clicks can be misleading as a measure of website activity, because a visitor can generate many of clicks depending on website structure. More reliable coefficient is CR, which measures the percentage of visitors who actually purchase something or take another desire action. Desired action in this case, can take many forms, for instance sales of given products, newsletter subscriptions, membership registrations, software downloads or any activity beyond simple website browsing. Next rate used to estimate efficiency advertising is acquisition rate, percentage of visitors who indicate an interest in a website’s products by registering or visiting a product’s pages. Attrition rate measures the percentage of visitors who
purchase once and haven’t come back to given website for a year. Abandonment rate measures the percentage of visitors who begin a shopping, ordering or filling registration form but then fail to finish and more often then not leave or close the website. Retention rate measures the percentage of visitors who often buy or take another desire action. Each of measures of efficiency is applied to individual campaigns depend on expected results.

**Table 1. Expected result chosen rate.**

<table>
<thead>
<tr>
<th>rates</th>
<th>main expected result</th>
</tr>
</thead>
<tbody>
<tr>
<td>page views</td>
<td>webpage popularity</td>
</tr>
<tr>
<td>click-through rate</td>
<td>brand awareness</td>
</tr>
<tr>
<td></td>
<td>webpage popularity</td>
</tr>
<tr>
<td>conversion rate</td>
<td>profitability</td>
</tr>
<tr>
<td>acquisition rate</td>
<td>product awareness</td>
</tr>
<tr>
<td>attrition rate</td>
<td>profitability</td>
</tr>
<tr>
<td>retention rate</td>
<td>customer loyalty</td>
</tr>
<tr>
<td>abandonment rate</td>
<td>usefulness and structure of page</td>
</tr>
</tbody>
</table>

Source: Own work, 2007

Except rates shown in table 1, there is defined one more coefficient called stickiness. This rate measures average length of time visitors remain at the page, it is rarely used in practice due to low popularity and no standard tool to measure. In the future this rate will squeeze click-through rate as more efficient, because statistics of CTR are misleading, that is not indicative of the true impact of e-advertising. There is a close relationship between site visits, page popularity, residence time and the company profitability, therefore measuring rates of efficiency is one of the main aim of advertising campaign.
E-advertising management

In order to increase popularity or profitability, companies must manage advertising campaign by continuously monitoring, adjusting and optimizing keywords and creating encouraging banners, text and other form of advert. The advertising management systems can be differentiated into two types, internal which we have a full access to webpage server and external. Main advantages of internal management are more number of applications on the market and low costs. The internal management is more efficient because it has a full access to Web site traffic and can estimate more measures of efficiency of e-advertising [9]. The most popular external management system is applicable to searching engines as sponsored links, where advertising contains a title, a short description, and a web address. This advert may appear next to and sometimes, above the search results on the page. Management of SEM is usually integrated with the user account in the search engines. In easy way we have to receive number of advert view, click-through rate and CPC (Cost Per Click).

Table 2. Monthly results of advertising campaign for the chosen keywords detective office.

<table>
<thead>
<tr>
<th>keywords</th>
<th>advert views</th>
<th>CTR</th>
<th>CPC</th>
</tr>
</thead>
<tbody>
<tr>
<td>detektyw</td>
<td>9 669</td>
<td>78</td>
<td>0.25 PLN</td>
</tr>
<tr>
<td>detektyw łódź</td>
<td>2</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>obsługa wierzycieli</td>
<td>0</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>podслуш</td>
<td>4 108</td>
<td>48</td>
<td>0.28 PLN</td>
</tr>
<tr>
<td>poszukiwania zaginionych</td>
<td>0</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>poszukiwanie osób zaginionych</td>
<td>115</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>sprawy rozwodowe</td>
<td>33</td>
<td>0</td>
<td>-</td>
</tr>
</tbody>
</table>

Source: advert campaign of detective office; www.inter-securus.pl, 2007
CPC is an acronym for “cost per click”, it is a useful technique used by advertisers, where the advertiser pays a fee for each click an advert receives [7]. In SEM we have to manage: monthly costs, geographical location of advertisers, keywords and maximum of CPC. Table 2 shows chosen keywords and their available rates in detective office advertising campaign carried out at search engine marketing. Unfortunately, rest of measures is unavailable, because the application does not have access to required data, which are stored on the advertising company server. Selection of property keywords is essential in advert efficiency, and is a very specific to each website, see table 2. Keyword “detektyw” is very popular (9,669 per month), but phrase “detektyw Łódź” almost was not searched. There are many programs which will help to select keywords and also will show how many advertisers are bidding on this keyword, how many people are searching for certain keyword. E-advertising management system used in searching engines is very easy and is focused at choosing proper keywords. Therefore the best of management system is individual application which uses the Internet traffic on webpage server. Statistics are significantly important for business and investment decisions, this artificial traffic may help some companies arouse interest of investors or increase sale. Tracking visitors is more efficient thanks to knowing where they come from, what keywords they use to find certain website, how long they remain at the site and how often they return. This last information is needed in order to measure customer loyalty, by cookie or IP address (Internet Protocol address). IP is unique sequence of digits and identifies computers on Internet, unfortunately for customer loyalty exist two types, static and
dynamic [8]. Static IP is usable as an identifier, because it does not change, however a dynamic IP is one that always changes. Every time user connects, he receives a different IP address, nevertheless this address can inform about geographical location of user. Second way to receive more information about visitors is cookie. Cookie files are short pieces of data used by web servers to help identify users, allows a website to store information on a user's computer and later retrieve it. The cookie file can be deleted at any time, some browsers can block it or delete it just after closing the browser. The most reliable information about visitors, we can obtain from databases where data are stored by registration form located on the website. The main advantage of this method is quantity of received information like age, sex, interests and a lot more, however the disadvantage is dependence on Internet user behavior, his truthfulness and desire.

**E-advertising management poll analysis**

The data used in this chapter were collected by the Department of Innovations and Marketing at the Technical University of Lodz. The survey was conducted between the April 2, 2007 and June 8, 2006. The Internet poll was conducted among micro and small businesses on online advertising management. There were 92 respondents, by only 78% (72) indicated they had a business or worked in such business. 72% of business advertised on Internet, but only 28% used professional advertising company, it follows that small business can't afford it, what is confirmed in last question of poll. The main aim of e-advertising is obviously profitability, the second aim is brand awareness (27%) and webpage popularity (23%), the least important aim it is customer loyalty (8%), unfortunately.
Table 3. Poll results.

<table>
<thead>
<tr>
<th>The business page was advertised on Internet?</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>yes</td>
<td>72%</td>
</tr>
<tr>
<td>no</td>
<td>28%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Who manage the e-advertising campaign?</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>advertising company</td>
<td>28%</td>
</tr>
<tr>
<td>employees</td>
<td>67%</td>
</tr>
<tr>
<td>I don’t know</td>
<td>5%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Two mains aim of Your e-advertising?</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>brand/product awareness</td>
<td>27%</td>
</tr>
<tr>
<td>customer loyalty</td>
<td>8%</td>
</tr>
<tr>
<td>desire of product</td>
<td>15%</td>
</tr>
<tr>
<td>interest of product</td>
<td>19%</td>
</tr>
<tr>
<td>profitability</td>
<td>96%</td>
</tr>
<tr>
<td>webpage popularity</td>
<td>23%</td>
</tr>
<tr>
<td>other</td>
<td>12%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Monthly expenses on e-advertising management (PLN)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0 – 100</td>
<td>47%</td>
</tr>
<tr>
<td>101 – 300</td>
<td>46%</td>
</tr>
<tr>
<td>301 – 500</td>
<td>5%</td>
</tr>
<tr>
<td>more then 500</td>
<td>2%</td>
</tr>
</tbody>
</table>

Source: Own work, 2007

Conclusion

There are many existing advertising management systems on market, some of them require the installation on our server, the rest are comprehensive and possible to use from their own servers. All advertising campaigns have the main aim, which can be obtained by using proper method. However methods are closely related to efficiency measures (table 1). Most micro and small businesses take advantage of own employees to manage of e-advertising, in most cases employees are not experienced. Nevertheless 72% of businesses notice high development of Internet as an advertising medium.
The internal management is more efficient but it requires experienced staff. The external management is easier to manage due to quite a lot of numbers of available applications.

References

8. Szpringer W.: (2005), Prowadzenie działalności gospodarczej w Internecie od e-commerce do e-businessu, Difin, Warszawa
E-BUSINESS TECHNOLOGY IMPACT ON FIRMS AND ECONOMY

Miroślaw Woźniakowski
Department of Informatics, Warsaw University of Life Sciences (SGGW)

Summary: The paper concerns technological change and implications of e-business technologies on firms and industry structure as a concrete example. The presence of network effect is yet another factor that can influence market structures and firm performances. The most recent approach assumes that ICT has become a decisive factor in strategic changes, and the widest application of ICT is the new range of information systems (IS). The theory is empirically tested.

Keywords: ICT, e-business, technological change, firm performance, market structure

Introduction
The paper concerns technological change and implications of e-business technologies on firms and industry structure as a concrete example. Particular attention is given to technological interdependencies. It is shown that increasing returns to adoption can arise if related technologies do not substitute each other in their functionalities. This can lead to an endogenous acceleration of technological development. Hence, the probability to adopt any technology is an increasing function of previously adopted, related technologies. The theory is empirically tested using two different exceptionally large datasets and different econometric methods. Information and communication technology (ICT) can be effectively used in the creation and implementation of an organizational strategy. The most
recent approach assumes that ICT has become a decisive factor in strategic changes, and the widest application of ICT is the new range of information systems (IS). A complementary approach is the creation of a dynamic organizational environment, which leads to knowledge-based organization. This concept would not be feasible without modern e-business technologies, either. Outputs of the paper are based mainly on Woźniakowski (2007). Implications of these findings are discussed both for economists and management researchers.

**Industry structure**

The relationship between technology, innovative activities and market structure is complex and has been subject of extensive research in the industrial organizations literature. The results of these ongoing research activities are relevant both for policy makers and business managers. Technology influences cost structures and, thus, plays an important role for determining market structure. Market structure is determined by the size of the market, the number of firms in the market, and their size class distribution. The optimal size of firms in a market is given by the shape of their cost function, which depends on the presence of economies of scale and scope. The size of the market is related to the position of the demand function, which might be subject to network externalities. The interaction of the aggregate supply and demand function pose limits on the feasible number and size distribution of firms in equilibrium. Thus, they shape the boundaries of the industry market structure.

According to Panzar (1989), an industry configuration is a number of firms, \( m \), and related output vectors.
where \( p \) is the vector of market prices and is the system of market demand equations. Thus, supply equals demand. Formally, a market structure is feasible if \( p \times y^i \geq C(y^i) \forall i \), i.e. no firm in the market makes negative profits. Efficiency of an industry can be defined as

\[
\sum_{j=1}^{m} C(y^j) = \min_{m, y^1, \ldots, y^m} \sum_{j=1}^{m} C(y^j) \equiv \sum C'(y^I),
\]

where \( y^I \equiv \sum y^j \) the total industry output and \( C'(y^I) \) is the industry cost function. Therefore, according to Panzar (1989) an industry configuration is efficient and sustainable if and only if it is made up of a number of firms and a division of output that yield the lowest possible total industry costs of production. However, as the technological environment changes, the cost functions and/or the output vectors of firms begin to change and an industry structure that was feasible and efficient in the past might not be sustainable anymore. This could lead to exit of enterprises from the market and greater concentration or encouraging new entry and higher competition.

**Network externalities**

The presence of network externalities is yet another factor that can influence market structures. It relates to the shape and the position of the demand function for a new network-based technology. Generally, an externality is said to be present whenever the wellbeing of a consumer or the production possibilities of a firm are directly affected by the actions of another agent in the economy. Externalities can be positive or negative. Networks exhibit
positive consumption and production externalities (Economides 1996). Network externalities are a concept that is directly related to technology, in particular technological infrastructures that are organized as networks, i.e. components which are physically or virtually linked like rail-ways, telephone lines, or the Internet.

A network externality occurs if the components of a network are compatible, hence if linking the components gives rise to complementarities (Economides 1996). The value of such a network depends on the number of components that are connected to it. For example, in a telephone network each owner of a telephone is a component in the network and the value of the network to each user is the greater the more other users have a telephone. If such a network has n users, then there are \( n \times (n - 1) \) potential components, i.e. people one could call if the components are compatible.

Thus, the value of the network is proportional to \( n^2 - n \), hence it increases exponentially in the number of users. The willingness of each potential user to join the network and her willingness to pay for it consequently depend on the expected number of other users.

**ICT Intensity in UE and Lodzkie Voivodeship**

In Poland in food and agriculture sector there is still delay in the process although there are some stimulating activities launched by the Polish and European administration. This is the reason why the Department of Econometrics and Information Technology of Warsaw Agriculture University (SGGW) launched systematic research in the field of impact e-business technologies on firms in the food sector and industry structure.
Some outputs of the survey is given on Fig.1. and Fig.2. Calculated results show smaller ICT intensity ratios for polish firms. One of the reason of such situation is specific nature of Food Industry in Poland and its relations with local markets causes situation where small and medium enterprises (SME’s) play a big role. They represent 98,7% of all subjects of agricultural industry. They employ 64% of the workforce in the sector and sale 58% of goods. These indices mean, that average level of concentration in AFI is very small.

*Figure 1 Comparison ICT intensity ratios for food sector*

Figure 2. Comparison ICT intensity ratios for food industry, depend on type of commune


**Chosen E-business Technologies Impact**

Following Woźniakowski (2007) we use a simple linear random utility model of impact ICT on firm’s performance. We assume that these utilities are linear functions of attributes, $X$, and an additive error term, $\varepsilon$. Hence they can be expressed as:

$$ U_{i0} = X_i \beta_0 + \varepsilon_{i0} \quad (2) $$

$$ U_{i1} = X_i \beta_1 + \varepsilon_{i1} $$

Let us define a dichotomous variable, $Y$, so that $Y_i=1$, if the i-th technology gives an growth of firm’s turnover and $Y_i=0$ if it does not. Then the probability that the i-th person is an Internet user can be expressed as:

$$ P (Y_i=1) = P(U_{i1}>U_{i0}) = F[X_i(\beta_1-\beta_0)] \quad (4) $$

where $F$ is the cumulative distribution function of the error term. Assuming that this function is a logistic, the model can be estimated by means of a
logistic regression. This enables to disentangle the effects of unobservable market
This enables to disentangle the effects of unobservable market characteristics and the effects of the observable firm level characteristics, for which we obtain coefficient estimates.
We observe a cross-section of a large number N of heterogeneous firms with index j=1, ...,N. Performance depends on a vector of observable firmspecific characteristics x. In addition, performance also depends on unobservable market-specific effects u and unobservable firm-specific effects ε. Thus, performance is a function of various firm-specific characteristics and unobservable error terms:

\[ Y = f(x, u, \varepsilon) \quad (5) \]
Identification requires to assume that ε is independent of all observable factors x. Yet, the advantage of the model is that we do not need to assume that the market-specific effect u is independent from the firm specific effect ε, \( E[u \mid \varepsilon] \neq 0 \). Also, we do not assume independence of u from the observable firm-specific characteristics \( E[u \mid x] \neq 0 \). Clearly, such an assumption would violate basic economic reasoning.
Table 1. Results of logit model estimation.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Turnover increased (model 1)</th>
<th>Turnover decreased (model 2)</th>
<th>Turnover unchanged (model 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Value of estimation</td>
<td>Value of statistics z</td>
<td>Value of estimation</td>
</tr>
<tr>
<td>Product innovation</td>
<td>0.404918*</td>
<td>6.552875</td>
<td>0.176321*</td>
</tr>
<tr>
<td>Process innovation</td>
<td>0.470332*</td>
<td>7.364896</td>
<td>-0.163260</td>
</tr>
<tr>
<td>Logarithm of employment</td>
<td>0.120635*</td>
<td>5.854090</td>
<td>-0.155141*</td>
</tr>
<tr>
<td>Empl. with university degree</td>
<td>0.001121</td>
<td>1.101308</td>
<td>-0.001545</td>
</tr>
<tr>
<td>Year of establishment</td>
<td>0.486737*</td>
<td>7.314152</td>
<td>-0.237186*</td>
</tr>
<tr>
<td>KMS</td>
<td>-0.071855</td>
<td>-0.879832</td>
<td>-0.137186</td>
</tr>
<tr>
<td>ERP</td>
<td>0.085783</td>
<td>1.146133</td>
<td>-0.167561</td>
</tr>
<tr>
<td>SCM</td>
<td>-0.088278</td>
<td>-1.094653</td>
<td>0.223512*</td>
</tr>
<tr>
<td>E-learning</td>
<td>0.040652</td>
<td>0.597351</td>
<td>-0.078306</td>
</tr>
<tr>
<td>CRM</td>
<td>0.076219</td>
<td>0.985176</td>
<td>-0.047687</td>
</tr>
<tr>
<td>On-line sales</td>
<td>0.121775*</td>
<td>1.926034</td>
<td>-0.039055</td>
</tr>
<tr>
<td>On-line purchasing</td>
<td>0.248671*</td>
<td>3.776436</td>
<td>0.221360*</td>
</tr>
</tbody>
</table>

Chosen model statistics

<table>
<thead>
<tr>
<th></th>
<th>Average terror of regression</th>
<th>Residual sum</th>
<th>Value of probability function</th>
<th>Number of data equal 0</th>
<th>Number of data equal 1</th>
<th>Total number of data</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.468286</td>
<td>1308.735</td>
<td>-3756.091</td>
<td>2439</td>
<td>3584</td>
<td>6023</td>
</tr>
<tr>
<td></td>
<td>0.308948</td>
<td>569.6379</td>
<td>-1986.397</td>
<td>5353</td>
<td>670</td>
<td>6023</td>
</tr>
<tr>
<td></td>
<td>0.443005</td>
<td>1171.240</td>
<td>-3447.746</td>
<td>4254</td>
<td>1769</td>
<td>6023</td>
</tr>
</tbody>
</table>

Source: own calculations.
Table 1 shows the results of the estimation of the logit models. In order to get consistent estimates for $\beta$ in (1), it is necessary to eliminate the unobserved market-specific effects $u$ from the equation. The solution to this problem lies in specifying $F$ as the logistic cdf and writing the likelihood function based on the conditional distribution of the data, conditioned on a set of sufficient statistics for $u$. The technologies which are included in binary variables $x$ are listed below: $x_1 = 1$, if firm uses KMS, $x_2 = 1$, if firm uses ERP, $x_3 = 1$, if firm uses SCM, $x_4 = 1$, if firm uses e-learning, $x_5 = 1$, if firm uses CRM, $x_6 = 1$, if firm uses on-line sales, $x_7 = 1$, if firm uses on-line purchasing.

**Conclusions**

However, these empirical results should also not be overstated. The theoretical literature suggests that the effects of ICT are likely to vary significantly among firms, sectors and nations. ICT and e-business are current examples of technological change and economic development. Most likely, ICT will remain an important enabler for further economic development in the future: the ICT producing industry is still very innovative in developing new software and other services (e.g. communication services) for business; hardware is continuously becoming cheaper and more powerful (Moore's law still applies).

Thus, it can be expected that new IS and o will be developed in the future more and more faster. Consequently, ongoing action of public policy is mainly needed in two areas:
- Improving the framework conditions for innovation in general; 
this includes education, R&D and market regulation.

- Monitoring and analyzing technological developments,
this includes interoperability and IS development 
methodology like MDA (Model Driven Architecture) and 
SOA (Service Oriented Architecture).

References

structure in: Schmalensee, R. (ed.) Hand-book of O. North Holland, 
Amsterdam.
Journal of Industrial Organization. 14(6).
4. Borkowski B., Wojciechowski J., Woźniakowski M.(2005); 
Environment of e-services implementation In agri-food industry In 
Poland, Proc. of International Conference ITIB 2005, Petersburg 
5. Woźniakowski M. (2007), Modele wprowadzania technologii e- 
biznesowych w sektorze produkcji żywności w Polsce (in polish), 
SGGW grant, (not published yet)