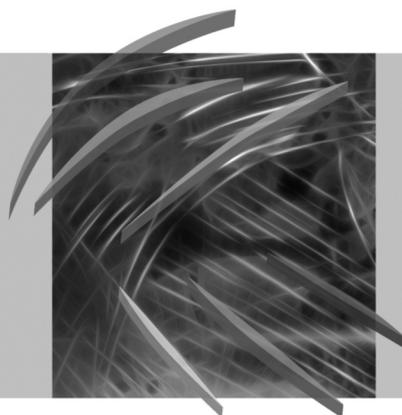


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VIRTUALIZATION OF THE IT SYSTEM IMPLEMENTATION PROCESS ON THE EXAMPLE OF PROTETIC4YOU*

Abstract: Virtualization of IT system implementation processes is now possible in small and micro companies. They are characterized by relative simplicity and marked recurrence of business processes. Popularity of such approach to implementation is largely due to the wide availability of IT solutions offering remote administration of authorized IT resources. Virtual form of implementation offers significant reduction of both cost and time, compared with traditional approach. The aim of this paper is to offer an insight into potential of virtualization of business processes through the evaluation of the IT system implementation process on the example of Protetic4You.

Keywords: virtualization, IT system, implementation process, small and micro companies.

1. Introduction

Companies competing on modern markets face increased dynamics of changes, fierce competition and the need of making fast decisions. To meet those challenges, it is necessary to make good use of the available Information Technology (IT) solutions. IT instruments open up new potential for company operation and are a driving force of transformation. By implementing modern technological solutions, companies re-organize their activities not only in the B&C context, but also in relation to other companies, through value-creation chain [Szpringer 2008]. The potential offered in this respect by the Internet and networking is widely and readily employed for optimization of business processes, namely the minimization of process cost and maximization of profit. Processes conducted via information and communications technologies (most notably, the Internet), due to the nature of the medium, are subject to potential virtualization. Through virtualization, both the entrepreneurs and their customers can profit from delocalization of business processes, i.e. freeing

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them up from the geographic constraints and focusing on customer needs and key competences of process supervisors [Kisperska-Moroń 2008].

The potential of virtualization can be readily deduced from the etymology of the term. Virtualization is a word derived from Latin *virtus*, *virtutis* standing for proficiency, efficiency, courage, fortitude and *virtualis* – effective [Brzozowski 2010]. The aim of this paper is to offer an insight into potential of virtualization of business processes through the evaluation of the IT system implementation process on the example of Protetic4You. Determinants and possibilities of virtualization of this process are analyzed. Definition of the virtualization of the system implementation process is presented, together with benefits implied by the use of this method. Deliberations presented in this paper refer to the practice of Protetic4You implementation, with main focus on the recent trend to virtualize the co-operation between the provider and the client and employ remote implementation procedures and processes based on large potential of modern IT solutions – a trend observed and not yet sufficiently addressed in professional literature.

2. Determinants of virtualization of the IT system implementation process

At present, straight majority of companies, especially large and medium-sized, employ consolidated application suites to service the main areas of their business activities, mainly in the sphere of accounting, personnel and wages, and sales [Waszczuk 2010]. Due to good saturation of IT solutions in this area, software providers seek to extend their offer to cover the sector of small and micro companies. This interest takes the form of adapting the IT solutions to the specificity and needs of this particular segment as well as development of trade-specific IT instruments, evident even on the part of the largest software providers. Moreover, IT providers offer a range of supplementary services (business consultancy, support in the acquisition of EU structural funds), and their applications, when properly implemented, warrant increased effectiveness of business processes. This trend is manifested in the increased interest of IT providers in commercialization of their knowledge and implementation expertise, by offering services that complement IT systems' functionality, such as best practices in organization of specialized business processes, process maps for trade-specific activities and supplying predefined sets of procedures for their IT systems. This range of services is particularly attractive for small companies seeking to improve their market standing by implementing IT solutions combined with extensive knowledge of best practices in their line of trade [Waszczuk 2010].

However, solutions tailored to the needs and requirements of small and micro companies, from the viewpoint of IT providers, offer significantly lower per-unit profit. Financial resources available to small and micro companies for IT system implementation (need analysis, product modification and configuration, training, as-

sistance, etc.) are decidedly sub-par compared to those of larger companies. Moreover, their business processes are of significantly lower complexity, coupled with trade-specific large-scale recurrence of procedures. IT systems addressed to this sector are definitely cheaper. Consequently, for optimization of business activities in this sector to be profitable, the IT providers need to minimize the cost and maximize the number of recipients. Cost minimization requires, on the one hand, standardization and simplification of the system functionality and, on the other, simplification and time-effectiveness of implementation procedures.

The search for cost-minimization of implementation procedures has led to the present market trend, observed in this sector. In general, the trend is manifested in virtualization of implementation procedures or their constituents. This approach allows for delocalization of implementation, regardless of geographic location of both parties – in practice, the whole implementation process can be accomplished remotely, with significant reduction of implementation time. In addition, the IT system provider can service a large group of clients in a relatively short time, and at marginal cost.

The virtualization of IT system implementation process can be defined as a remote realization of individual implementation procedures using modern telecommunications and IT solutions as well as the Internet potential (detailed analysis below). Thus, the need of personal contact between the IT provider and customer is effectively eliminated. The consultant, using a set of IT instruments and the Internet connection, communicates in real time with the customer. Both parties not only communicate with each other, but are also linked with the same physical machine, sharing the desktop view on their respective monitors and working hand in hand. It must be noted that this particular form of cooperation is made possible by the user-friendly, intuitive applications tailored to the requirements of virtual IT system implementation. Those instruments typically do not require specialized IT knowledge; the only requirement is the efficiency of communication via the Internet.

It should be noted that virtualization of IT system implementation processes is available and applicable mainly to small companies operating within a standard set of business activities or those that seek to modify their operation in accordance with best practices of the trade. IT systems dedicated to this sector are characterized by simple, straightforward functionality, intuitive and user-friendly interface and a range of predefined, typically trade-specific standard business processes. End users of such systems, for the majority of tasks, adapt their processes to the knowledge and expertise provided within the system, rather than vice versa. This is in clear opposition to the practice of system implementations in medium and large companies, where IT systems are often adapted to particular requirements of the user, resulting in costly modifications.

The interest in the virtualization of implementation processes on the part of small and micro companies stems from their need to minimize the cost involved. In this respect, both customers and system providers are motivated by similar aims. More-

over, the typically low cost of such projects allow the client to take the risk of virtualization and accept the lack of direct contact with the provider. Such constraints would be considered unacceptable in the case of large projects.

It must be noted that virtualization, among other things, is aimed at building the implementation process on the particular needs of the client. In addition, the client is an active participant of the process, taking part in realization of individual implementation tasks. Consequently, virtualization of IT system implementation processes obliges the provider to offer a suitable level of security and work comfort to the client. This should be reflected in proper organization of implementation tasks and – most of all – a reliable hot-line service offering fast and effective solutions for most of the client's problems and inquiries. In virtual context, this is a substitute for direct contact between clients and consultants.

It must also be remembered that virtualization of implementation processes for standard IT products dedicated to small and micro companies carries a large potential for development, since the procedures and methodologies developed in the course of system implementation may help streamline future implementation processes targeted to medium and large companies.

3. Potential for virtualization of IT system implementations

As already mentioned above, the owners of small and micro companies typically purchase trade-specific or highly standardized IT solutions. Such decisions result from the lack of funds to carry out pre-implementation analyses, offering detailed evaluation of organizational needs, information needs of individual user groups and elaborate design of business processes. In such cases, the implementation becomes a key stage in the system life-cycle. In the sector of small and micro companies, the awareness of the need to implement IT solutions is a first step in the implementation process. The identification of user needs is carried out from “within” the organization itself – typically through involving company employees and owners in the identification and evaluation of operational areas that may benefit from IT support.

The self-induced awareness typically leads the potential users to independent penetration of the market of trade-specific IT products. Users seek products that are not only adequate to their needs, but – most of all – products that place within the reasonable price range. After initial selection, the potential clients contact individual IT system developers or distributors. Nowadays, such contact is accomplished via predefined, interactive contact forms made available on IT providers' websites. This contact constitutes the first stage of remote client-provider communication. More often than not, the interactive forms include questions that offer initial verification of the client's expectations towards the system's functionality.

The classic approach to implementation process identifies the following sequence of activities [Kisielnicki 2008]:

- preparatory proceedings – involving analysis and preparing the way for the organization to adopt the system, preparation of the system itself and ensuring proper technical infrastructure for the future use of the system,
- testing the system – involving trial runs and elimination of errors,
- system exploitation.

In traditional approach, preparatory proceedings required frequent on-site visits, with consultants preparing specifications of user requirements in terms of system functionality [Kisielnicki, Sroka 2009]. In modern approach, the initial evaluation of user requirements is verified via specific questions included in the interactive contact form. Hence, the virtualization of this stage of the system implementation process, in the case of small and micro companies, may limit the number of direct contacts to only one pre-implementation meeting, to clarify user expectations and settle the financial conditions of the contract. In the case of small and micro-companies, preparing the organization for adopting the system is typically reduced to appointing the client representative to supervise the implementation procedures and remotely co-operate with the consultant representing the IT system provider.

Since the IT market at present offers a large number of IT solutions for remote automation of the installation process, the prospective user may chose to open the technical resources of the company to the IT provider and have the system installed remotely. The IT instruments also offer trial run assistance as well as verification of data structure and correctness of implemented algorithms. The functionality of selected IT instruments offering the virtualization of the system implementation process was presented in [Chomiak, Gryncewicz, Leszczyńska 2011].

One of the key stages of the IT system implementation is employee training. This area can also benefit from remote co-operation between a system provider and end user. Modern software is typically equipped with elaborate help modules and detailed user manuals with detailed presentation of the system functionality features. The increased focus on the user's self-improvement during standard system operation effectively reduces the time needed to familiarize the user with the system. The end users (employees) effectively take over parts of the implementation procedures but, at the same time, are made responsible for the progress [Frączkowski 2003, pp. 89–91]. By limiting or eliminating the number of training sessions supervised by IT provider, the company can largely reduce the cost of the system implementation.

Moreover, the virtualization of IT system implementation offers the prospect of remote assistance. Since the end user cannot benefit from direct contact with the IT consultant, the latter is often equipped with remote desktop instruments to better support the user during the initial trial runs and help eliminate errors and problems. The on-line consultants can also remotely address any errors found in data structure or business algorithms implemented in the system.

4. Practical implementation of Protetic4You software suite

The Protetic4You software suite, designed by 4-Tune IT company in Wrocław, is a comprehensive IT tool for prosthetic laboratories, offering support for the whole range of business processes in the profession: managing orders, registering individual production stages, as well as internal (employees) and external (dental surgeries) settlements, product shipment and potential iterative corrections of the product. Based on close co-operation with largest Polish providers of prosthetic services, dental surgeries and material suppliers, the system features updated best business practices in the profession. This allows for thorough analysis of business processes involved in prosthetic production. Models of business processes were incorporated in the early phase of system design, resulting in deployment of best practices in the core functionality of the system, to facilitate practical implementation of the software suite, due to standardization and time-saving, while maintaining the benefit of propagation of model solutions in the field. The software suite was designed with main focus on user-friendly and intuitive navigation and interface. The suite utilizes professional vocabulary and trade-specific naming, while the general look and feel of the interface is a product of intensive consultations with potential end users. At present, the suite is used in several dozen of prosthetic laboratories in Poland, and continuously updated with new functionality, based on users' opinions and suggestions [<http://www.protetic4you.4tune.pl/>].

It is worth noting that this particular approach to the system design results from the fact that the product has been designed to the needs and requirements of a narrow target group and tailored to the characteristics of the largely recurring nature of production and management processes. The competition in the field of prosthetics is based on the quality of the end product, and not the uniqueness of manufacturing and supplementary processes. Moreover, the end users (dental technicians) are increasingly more reliant on fast and efficient communication with business partners (dental surgeries and material suppliers) as well as top quality of service rendered to patients. The latter is often safeguarded by professional certificates of quality, with detailed description of techniques and materials utilized in the process of product manufacture. Manual production of such documentation is time-consuming; the software offers fast and efficient generation of all documentation – a large added value for the patients and the technicians.

The implementation of Protetic4You software suite is, to a large extent, a virtual process. At this stage of 4-Tune IT company development, individual contact with clients can be maintained only at specialized conferences and professional fairs. For a small company, customer acquisition is a process based on references from current users, virtual presentations and remote contacts. The implementation methodology utilized in Protetic4You is built around the idea of leading user (users) taking active part in the implementation process along with the 4-Tune IT consultant, participating

in software configuration and initial training. The Protetic4You software implementation process involves the following stages:

- preliminary consultation – specifying the needs,
- technical preparation,
- configuration of dictionaries (contractors and products),
- preparation of prosthetic models and standards,
- defining price lists,
- remote assistance,
- interface customization.

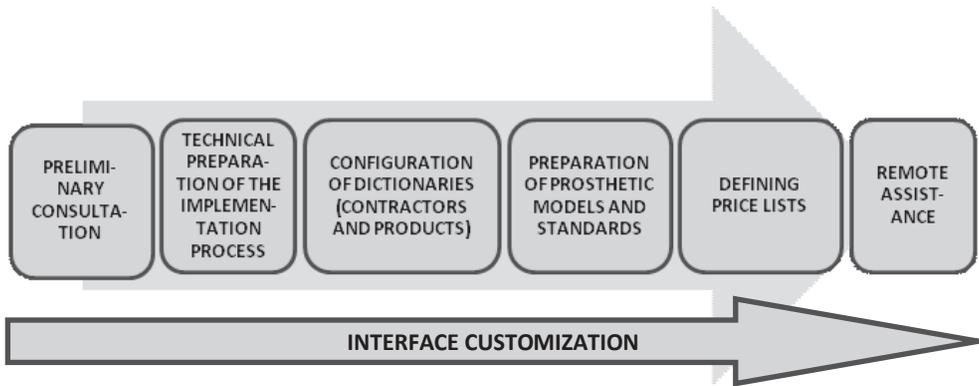


Figure 1. Diagram of Protetic4You software implementation process

The fundamental tools used by 4-Tune IT in implementation and subsequent servicing of the Protetic4You suite include: TeamViewer (TV) software and telephone and/or Skype communication software. TV is an instrument for virtual contacts with end users via the Internet. As advertised by TV supplier on their web page, *With TeamViewer you can remotely control any computer as if you were sitting right in front of it.* TeamViewer requires full installation and licensing rights only on the part of the supplying company, while customers can use TV in “run” mode, without prior installation of the software on their computers. The product is user-friendly, and as such, it seems an ideal solution for the Protetic4You implementation process, since it does not burden the end user with additional advanced IT knowledge (see: [<http://www.teamviewer.com>]).

The first stage of Protetic4You implementation is the **preliminary consultation**, focusing on identification of end user needs and requirements as well as suggestions for best practices in the profession. At this stage, the supplier evaluates the range of implementation, number of workstation licenses and networking/hardware requirements. The end user is also provided with detailed information on implementation methodology and subsequent stages of the process. The stage culminates with establishing the implementation schedule, i.e. details of subsequent remote sessions for

configuration of the software and training of the leading end-users. After concluding the preliminary consultation, the customer is often provided with a list of hardware purchases needed, since the implementation methodology also covers comprehensive servicing of the laboratory at implementation.

The next step is the **technical preparation of the implementation**. This stage is in part realized during the initial virtual presentation of the software suite, when potential customers get acquainted with the remote functionality and basic operations of the TV tool. If the customer has no suitable networking infrastructure for the purpose, 4-Tune IT provides the laboratory with hardware purchased and configured to the needs of the process. If suitable networking capabilities are available, the installation of necessary software components is done remotely. Technical preparation of the implementation process, apart from the installation of the Protetic4You suite, involves the following components:

- Net Framework 3.5 SP1 and 4.0,
- IIS (Internet Information Services),
- MS SQL Server 2008 R2 Express.

It is worth noting that in large prosthetic laboratories, technical preparation of the process may require on-site visits of the 4-Tune IT consultant, due to the necessary configuration of multi-user networking and hardware structure.

The actual work with software suite requires **defining basic dictionaries**: of contractors and products. In the case of contractor, this typically involves defining details of dental surgeries and dentists cooperating with the prosthetic lab. During training, end users are acquainted with detailed functionality of contractor and product sheets, which then need to be supplemented by end user to include new contractors and products.

The next stage of the process is **preparation of prosthetic models and standards**. This task involves definition of typical stages of manufacture process as used in the lab (for example, porcelain crown on metal is realized in two stages: preparation of metal form and porcelain baking) as well as specifying divisions responsible for each such stage, if applicable (in this case: Metals Division and Porcelain Division). This allows for automation of labor division at the initial stage of order placement. The models stored in the database may be further modified at will or used as templates for new models. This stage of the implementation process helps the end user get acquainted with the functionality of model definition, using templates, storing and modifying the models, etc. At this stage, only selected few models are prepared and stored in the database, with further additions and modifications done by end users during the regular utilization of the suite. In practice, this stage involves the input of current orders only, coupled with the definition of the applicable standards. All configured elements of the suite are stored on the applicable order sheet. At implementation, the end user is acquainted with basic functionality of the order sheet after prior definition of prosthetic standards. This stage may also involve defin-

ing the contractor (surgery), patient details, stages of prosthetic work and individual employers responsible for each stage of the order.

The next step is the **definition of price lists**. Price lists can be configured to cover internal settlements (employees) and external settlements (surgeries, dentists, or patients). Once defined, price lists are used to generate **test run settlement** of current orders, combined with functionality of the order sheets. Culmination of the stage takes the form of comparison between manual and automatic settlement of current orders – if the test results are positive, the end user may proceed with regular utilization of the software suite. In the initial period, settled individually and related to the implementation range, the prosthetic lab is under increased guidance of a 4-Tune IT consultant, remotely providing real-time assistance and solving potential problems found during regular utilization of the suite. After this period, a protocol for finalization of the implementation process is signed, and the provider enters the servicing mode.

It must be emphasized that on each consecutive stage of the implementation process, the 4-Tune IT consultant is actively involved in **customization of the interface** to the needs and requirements of the end user, and provides applicable knowledge of how to perform this task using the Administration panel tools of the suite.

5. Conclusions

Virtualization of business processes represents an effective use of information technologies, as one of the key determinants of success and a strategic resource of modern company. Information technologies open up new potential for operation and transform both means and methods of economic activities [Brzozowski 2010]. The use of virtualization potential in the process of IT system implementation offers ways for improving the operational capabilities of software providers and profitability of services addressed to small and micro companies. In this respect, the IT providers, despite certain financial restrictions of their potential customers, can offer efficient implementation of IT solutions which would prove unprofitable for both parties if they were to employ traditional implementation methodology based on direct contact and carried out on-site. Through remote accessibility, the customer can benefit from consultant services, and the IT provider can carry out the implementation at the lowest possible cost. Another benefit of virtualization lies in the fact that the consultants can fully focus on using their key competences to address and satisfy the needs of the customer. The advantages and disadvantages of implementation process virtualization are shown in Table 1.

Table 1. The advantages and disadvantages of the virtualization of implementation process

Advantages	Disadvantages
Lower costs of implementation process	Lack of direct contact with the provider
The simplification and time-effectiveness of implementation procedures	Applicable mainly to small companies operating within a standard set of business activities or those that seek to modify their operation in accordance with best practices of the trade
The delocalization of implementation and regardless of geographic location of both parties	Possible only for IT systems with: simple, straightforward functionality, intuitive and user-friendly interface and a range of predefined, typically trade-specific standard business processes
The client is an active participant of the process, taking part in realization of individual implementation tasks	

In the case of Protetic4You software suite, virtualization of the implementation process allows the provider, 4-Tune IT company, to offer their services at competitive prices on the whole territory of Poland. Using user-friendly software to support the virtual implementation process, such as TW, and considerable initial investment in proper adjustment of the suite to the standards of target profession, the provider can offer maximum comfort for their customers, who are more willing to accept the virtual form of implementation. Hence, virtualization of the process implies benefits for both parties of the contract, i.e., the software supplier and the end user, making it a very attractive solution in this type of services.

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- <http://www.teamviewer.com>.

WIRTUALIZACJA PROCESU WDROŻENIA NA PRZYKŁADZIE OPROGRAMOWANIA PROTETIC4YOU

Streszczenie: Wykorzystanie potencjału wirtualizacji w procesie wdrożenia SI pozwala na usprawnienie dotychczasowej działalności dostawców oprogramowania oraz zapewnienie rentowności działań w sektorze małych i mikroprzedsiębiorstw. W tym przypadku dostawcy SI, pomimo ograniczeń finansowych swoich odbiorców, są w stanie przeprowadzić sprawnie i efektywnie wdrożenie rozwiązań informatycznych, co przy zastosowaniu tradycyjnych metodyk wdrożeniowych opierających się na bezpośrednich kontaktach konsultant-klient oraz wykonywaniu prac w siedzibie klienta byłoby po prostu nieopłacalne dla obu stron. Celem niniejszego artykułu jest zaprezentowanie potencjału, jaki ma wirtualizacja procesu wdrożenia, na przykładzie oprogramowania Protetic4You.