VIRTUALIZATION AND VIDEO COMMUNICATION WITHIN ECONOMIC AND SOCIAL PROCESSES

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Abstract: The article aims to analyze innovative solutions in the areas of virtualization and video communication within economic and social processes. Some general trends in computer-mediated communication have been identified. Our findings that confirm these trends relate to telework and new challenges in supporting religious practices. We see trends emerging that create entirely new opportunities to boost the efficiency of decision making and management processes in organizations and to support all kinds of social processes.

Key words: computer mediated communication, videoconferencing, decision support

Introduction

We see trends emerging that create entirely new opportunities to boost the efficiency of decision making and management processes in organizations and to support all kinds of social processes. These opportunities will often concern the employer-employee relations and involve major changes based on a redefinition of the time and place of work as well as of job responsibilities (Netessine and Girotra, 2013). A lot of companies have already chosen to switch, partly or wholly, to telework. One such example is Automattic, Inc., the operator of the world-known platform WordPress.com which is now a completely distributed organization, whose all employees and partners work from their own locations, e.g. from home (Berkun, 2013). Another example comes from Plantronics, the maker of wireless headphones that leaves the place of work to the employees' own discretion. One more example, spectacular and familiar to almost everybody, is Google, where work time and work organization is up to the workforce (Thompson, 2013).

A globally observed trend is that today's knowledge workers are not, and do not need to be, tied to an office, but they can perform their duties at a place and time of their choice. Experts predict that, in just a few years, more than 1.3 billion people will be working under telework regimes worldwide (Johns and Gratton, 2013). By this token, they will be very consciously using telework support tools, such as e.g. video conferencing and virtualization. What makes these tools particularly suitable for such applications is that they can – unlike telephony or text-based messaging systems, including electronic ones (e-mail, chat, etc.) – retain nonverbal communication components. It should be expected that many business processes, whether involving decision making or task execution, will be increasingly often performed within virtual environments where information is conveyed through, or

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with the support of, computer networks and systems (Nowicki et al., 2013; Stanek et al., 2014).

It must be noted that the transposition of business processes, organizational management processes and social processes into virtual environments is not unique to the most developed economies. The ongoing digitalization, initiated several years ago and backed up with increasingly generous EU funding, has already placed Poland among countries where a number of interesting development and implementation projects are pursued. In the following chapters, five trends in communication area will be identified and two specific examples will be outlined, i.e. a virtual trade fair platform, and a selection of statistics on the use of video communication in Polish churches.

Trends in the computer-mediated communication area

Computer-mediated communication maintains the capability to build relationships between people.

Within a tradition that traces the origin of the word "communication" to the Latin language, the notion should be associated with conveying messages (*communicatio*) as well as, remarkably, with forming a community (*communio*) in the process, and as a result, of communication. Setting out from Cooley's idea that "… communication meant the mechanism through which human relations exist and develop – all the symbols of the mind, together with the means of conveying them through space and preserving them in time" (Cooley, 1909) and following the teachings of American philosophical pragmatism, one can perceive that the key mechanism through which social structures are formed is the ongoing re-definition and evolution of meaning attributed to symbols which occurs through interpersonal interactions. Communication involves an art of overcoming the deficiencies of communication channels used – the filters of language, culture, noise behind the window, the blind phone receiver, the interlocutor's unwillingness, fatigue or intellectual constraints. It is the criterion by which to judge our success or failure, and hence our pride or mortification. Despite the development of spoken language, which is seen by many as the highest form of communication, it should be observed that language cannot exist in a perfect void, and that mass communication still recognizes these original foundations and relies on them heavily.

A better insight into the growing capabilities of information and communication technologies as a communication channel is sought by interdisciplinary research focused on portals and computer-mediated communication (see Table 1).

Internet users are diverse and include: digital natives, digital immigrants, data and brain hackers, as well as brilliant computer programs of which people have lost control. Positive feedback loops and the snowball effect augment the dynamics of changes in new media and in users' mentality.

Table 3. Arguments for and against computer mediated communication (Stanek et al., 2014)

Against	For
Sproull and Kieser (1986): in the cyberspace, information on the social context (which is usually conveyed through non-verbal messages) is absent. The social presence theory insists that communication in the cyberspace is less personal and less intimate. Daft and Lengel's media richness theory states that, compared to face-to-face communication, cyber-communication increases uncertainty and ambiguity. Media should be benchmarked in terms of their speed, interactivity, or completeness, to determine the best medium for an individual or organization to communicate a message.	The social information processing (SIP) theory posits that the differences between computer-mediated communication and face-to-face communication are of quantitative nature, relating not so much to the ability of creating relations but to such aspects as transmission rate, disinhibition level, expression and interpretation of context, or substitutive habits. Research on human adaptation to living in a virtual environment indicates that the evolution of computer-mediated communication easily circumvents any barriers including the maladjustment of older generations, the lack of adequate technologies, the inability to fully exploit existing technologies, and information overload manifest in excess data delivered on any attempt to retrieve information.

Contemporary decision support system users, subject to the influence of mass media, undergo changes in mentality leading to the isolation of three groups: digital immigrants, digital natives, and data and brain hackers (cf. e.g. Prensky, 2001). An in-depth analysis of the underlying trends reveals the existence of a feedback loop illustrated in Figure 1 and a snowball effect augmenting the dynamics of mentality changes. Within an applicational context, the use of a firewall might prove to be an important enhancement to a DSS, allowing the user to avoid cognitive pitfalls and undesirable impacts from other users or from the environment at large.
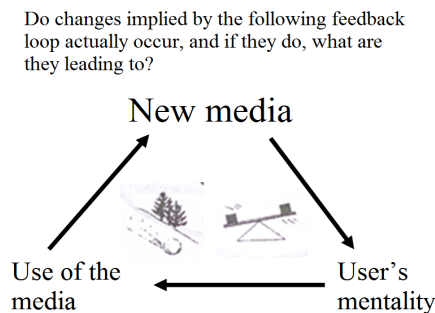

Do changes implied by the following feedback loop actually occur, and if they do, what are they leading to?

New media

Use of the media

User's mentality

Figure 1. The feedback loop enhancing the dynamics of changes in users' mentality
(Stanek et al., 2014)

There are a number of advanced programs, including representing a significant threat to cyberspace (such as Stuxnet, Zeus, Conficker, Morto). It is estimated that Cleverbot has passed the Turing test. Right artificial brains could regulate inter alia, identification of programs and govern the actions of organizations such as CERT (some countries such as South Korea and the United Kingdom have already begun preliminary work on legislation concerning the status and rights of robots).

Computer-Mediated Communication expands toward areas previously reserved for face-to-face communication.
This discussion brings us to a prediction once made by "Lick" Licklider, an IT visionary and the proponent of human-computer symbiosis, stating that men *will be able to communicate more effectively through a machine than face to face* (Licklider, 1968). More and more of us surrender to immersion, removing 100% of our skills and abilities into the virtual world. The arguments against human-machine dialog that were put forth not so long ago, pointing out that such dialog engages too much of our intellectual potential, are not valid any more. It is to be expected that decisions will be more and more commonly and efficiently made at a virtual world level, where consultation with stakeholders is performed through network based, computer-mediated/supported communication.

Stakeholders' collaboration could be supported with a social network and virtual reality.
Practical experience demonstrates that stakeholders, once they are correctly identified and organized, can make a significant contribution to an information system. Approaching the issue from a software architecture perspective, Rozanski and Woods (2005) claim that "if a system does not meet the needs of its stakeholders, it cannot be considered a success". In the DSS area, Adam and Pommerol (1998) utilized a specially designed tool – Organisation Analyser – to study decision maker networks. They concluded that "[…] the analysis of organizational networks will result in a better understanding of the decision process to be supported and of the criteria used by managers in their assessment of the decision situations they face." Social network analysis turns out to be an effective tool for initial scrutiny of extensive stakeholder networks. Notable potential for numerical and visual analysis is offered by a system called Pajak. A broader approach reveals the possibility to arrange and present the findings of social network analysis in GIS layers.

It is possible to combine object-oriented, agent-oriented, Web 2.0, and Web 3.0 modules into a coherent system.
The last hypothesis relates to the experience of developers indicating that the agent based approach or Web 3.0 can be less adequate for some types of tasks than previous methods (cf. e.g. Gawinecki et al., 2008).

A Process Virtualization Example: an International Trade Fair Operator

Systems where computer support is not addressed at just specific elements of management processes but encompasses all of the business processes in a company are perfectly exemplified by the virtual trade fair platform that has been developed at the request of Miedzynarodowe Targi Lodzkie (Lodz International Fairs) and incorporates advanced video technology. The system is effectively used by the trade operator to support selected exhibitions. It autonomously administers all of the processes involved in event organization, from exhibition area bookings, to customer service, to product display and active business promotion.

The platform's start page, displaying an existing structure, serves as a showcase and at the same time represents an alternative method for promoting a variety of events. It can work in an automatic mode, executing all of the inherent processes via built-in technologies.

Figure 2. The start page of the virtual fair website (based on VidCom.pl)

The reception desk is where each visit to the virtual platform begins. It is from this level that logged users can access each of the available areas via a menu displayed in the upper section of the screen. Further, it is possible to contact the organizers: there is a ticket office (booking enquiries), an information desk (sundry questions), a pressroom (information for the media), and many other facilities.

Figure 3. The virtual reception desk (based on VidCom.pl*)*

Among the key features of the virtual platform there is an option to have video conversations with event organizers, specifically with the reception staff. The platform also offers audio-video communication channels, a chat service, and a whiteboard area where documents, instructions or forms can be retrieved. In addition, wherever necessary, organizers, exhibitors and speakers can upload content for display or download by visitors to the virtual fair.

Through the foyer facility, one can navigate to any of the conference rooms or to the exhibition hall. On following a link, visitors are transferred to a location of their choice, which is signaled by an animated picture. Other available options include an internet café, a library, an archive, or a real-time surveillance camera view from a CCTV system.
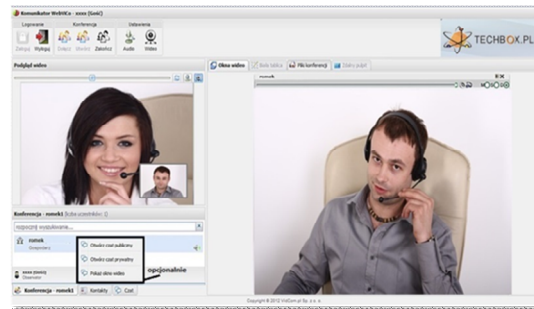

Figure 4. A visualization by the built-in video communicator software (based on VidCom.pl)

The exhibition hall view helps visitors find companies or products by indicating where specific exhibitions are located and giving them an option to get there at a single click.

Figure 5. A visualization of an exhibition hall (based on VidCom.pl)

Each exhibitor is allotted a customizable exhibition booth which can include a corporate profile and contact information alongside some downloadable content, and which, most importantly, enables live interaction between visitors and

company representatives – in either one-to-one (e.g. for personal talks) or one-to-many (e.g. for product demonstrations) mode.

Figure 6. A visualization of an exhibition booth (based on VidCom.pl)

The virtual fair is an innovative solution which combines a state-of-the-art content management system (CMS) with visualizations and video conferencing technology into an interactive online services platform. The platform makes use of animated transitions from the main building to the reception desk, from the reception desk to the foyer and the library, and from the foyer to the internet café, the exhibition hall and the conference rooms. Depending on the type of event and its mode of delivery (seminars, conferences, fairs, training courses, etc.), participation in a video conference may be passive – merely watching a real-time broadcast – or active (where a participant may speak at the moderator's permission).

Figure 7. A visualization of a conference hall (based on VidCom.pl)

Video Communication in Polish Churches

The use of virtual environments is not any longer limited to business organizations. Virtualization processes are increasingly often embraced by social, and even religious, organizations. A perfect example of a tool supporting religious practices is provided by video technologies implemented in websites run by Catholic churches in Poland. The first attempts to address the needs of Polish churches were made several years ago, and now the trend is clearly on the rise. Even those less

enthusiastic about the deployment of IT tools to support church activities will probably find it interesting to look at the highlights of a report (VidCom.pl) bringing statistics for five consecutive years, recently compiled and published by a Polish developer and vendor of video communication technology.

In response to growing interest in the application of modern technologies for evangelism purposes, a supplier has offered a solution that extends the functionality of a website with direct video communication channels. The system is very easy to use and implement, and has proved effective in reaching an even larger number of worshippers. It provides a simple way to launch such services as:

− live broadcasts from a church,
− video conferences connecting any given number of Church community members,
− a distance religious education system (Catechism lessons).

Video communication makes it possible to preach the Christian Gospel over distance, to offer live mass coverage, and to hold online Catechism lessons or spiritual retreats. This accounts for increased accessibility for the faithful whose experience of religious festivals or observance of religious practices is somehow impeded. Members of a parish who are unable to attend in person are thus given a valuable opportunity to participate in church events.

Figure 8. Visualizations of sample implementations (based on e-VideoMsza™)

The data span a five-year period beginning January 2009 and have been extracted directly from the data bases maintained by the technology provider.

Table 2. Usage statistics (based on e-VideoMsza™)

Number of attendants at e-VideoMass / church		2009	2010	2011	2012	2013
Annual average		7,743.0	15,570.1	14,156.4	19,340.0	46,701.7
Monthly average		645.3	1,297.5	1,179.7	1,611.7	3,891.8
Daily average		21.2	42.7	38.8	53.0	127.9
Average on selected holidays	Epiphany	120.3	244.0	261.3	335.7	808.6
	Easter	34.3	70.0	81.9	113.4	272.0
	Corpus Christi	114.4	230.2	209.3	284.0	688.2
	December 24-26	345.2	694.2	631.2	860.5	2,077.8

The data are broken down as follows:
− annual, monthly and daily averages (statistically, per church), indicating the number of people who used the technology in respective periods;
− user averages (statistically, per church) for selected holidays, corresponding to the number of worshippers who used the video communication tools on these days.
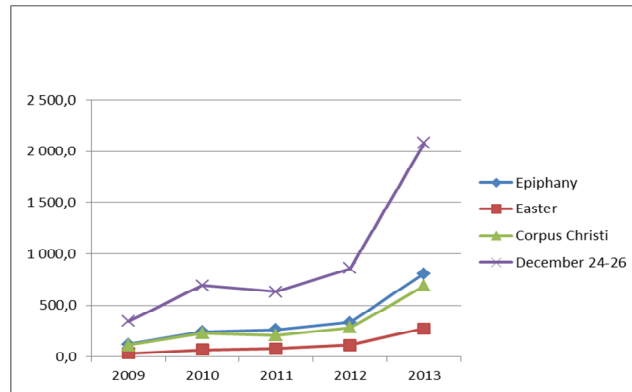

Figure 9. User average on selected holidays (based on e-VideoMsza[TM])

Conclusions

The findings discussed in this article, are indicative of the growing importance of computer mediated communication in accordance with the identified trends.

The case of the virtual fair platform clearly demonstrates that innovative technologies can not only bear on management processes but also create new possibilities. Far beyond being just an effective cost management measure, they offer new functionalities that are not available under traditional approaches. Changes affect all of the processes involved in a virtualization project: the technology not only supports the decision making alone, but it actually moves many elements of the business itself into a virtual environment.

The statistics presented in the paper, on the other hand, alongside the cases of specific implementations, show how innovative technologies can impact on the processes related to the activities of churches. It is evident that the technologies provide an effective method to increase outreach to worshippers who are prevented from personal participation in religious practices while at the same time offering functionality that is unavailable otherwise, i.e. under the traditional approach. It turns out that the deployment of IT can increase attendance at any single mass as well as the frequency of attendance at church services and the time spent attending in general. Most importantly, new opportunities have thus arisen for the inclusion of bed-ridden and handicapped individuals with movement disabilities as well as of those residing permanently (e.g. immigrants) or temporarily (e.g. transferred or traveling on business) abroad.

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WIRTUALIZACJA I KOMUNIKACJA WIDEO W PROCESACH GOSPODARCZYCH I SPOŁECZNYCH

Streszczenie: Artykuł ma na celu analizę innowacyjnych rozwiązań w zakresie wirtualizacji i wideo komunikacji w ramach procesów gospodarczych i społecznych Zidentyfikowano trendy, które tworzą nowe możliwości w zakresie zwiększenia efektywności podejmowania decyzji, zarządzania procesami w organizacji i obsłudze

różnego rodzaju procesów społecznych. Nasze badania, które potwierdzają te trendy odnoszą się do telepracy i nowych wyzwań w zakresie wspierania praktyk religijnych.
Słowa kluczowe: Technologie informacyjne w przedsiębiorczości, Wideokonferencje, Wspomaganie decyzji i procesów

視頻虛擬化和溝通過程中經濟社會發展

摘要：本文旨在分析在確定了是為增加決策過程的管理效率在組織和各類社會進程的運行創造了新的機遇的經濟和社會進程的發展趨勢的框架，虛擬化和視頻通信的創新解決方案。我們的研究，證實了這些趨勢涉及到遠程工作和促進宗教習俗新的挑戰。
關鍵字：信息技術創業，視頻會議，以及決策支持過程。