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KNOWLEDGE MANAGEMENT: FACILITATING COMMUNICATIONS AND COLLABORATION WITHIN THE HEALTHCARE SUPPLY CHAIN

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ABSTRACT
A great deal of focus is being placed on supply chains to meet collaboration and communication demands of the global environment; the healthcare sector is particularly impacted by these pressures. Globalization-driven changes have considerably modified the healthcare sector, particularly with regard to the role played by information technology (IT) in support of medical education, training and patient care support programs. The research report looks at two technologies – Voice over Internet Protocol (VoIP) and web-based filmless radiology (teleradiology) oriented capabilities – to examine their contributions to collaboration and communication capabilities within the healthcare supply chain.
Keywords: VoIP, Healthcare, Patient support, Medical training, Teleradiology, Suppy chain

1. INTRODUCTION
Long studied as a key to gain competency and efficiency, organizations engaged in supporting industrial technologies are trying to strengthen their supply chains to overcome communications adequacies [9, 11]. These developments are driven by the needs of the supply chain members to communicate via internet based systems, thereby allowing them to share information, adjust demand projections – almost in real time – in response to demand changes [10, 8, 3]. This capability for updating the status of various integral factors, such as inventory levels, demand forecasts, HR development, partner relationships, customer relationship management, service loads, communications and IT, transportation and freight cost options has allowed the chains' members to gain visibility on the operations, improve turnover, reduce administrative costs, shorten planning cycles, improve customer service, reduce working capital and improve sales and revenues [5, 14].
In exchange, the members have had to adapt to 'global' systems and to agree to the sharing of once considered sensitive cost data and information, and to understand the information technologies (IT) to be deployed that would make all this possible. This concept has become recognized as "CPFR", i.e., collaboration, planning, forecasting and replenishment. By this concept, supply chain members are able to communicate and collaborate via the net system – in response to demand changes, thereby having capabilities for updating data by use of a common platform [12, 13].
This research work looks at certain areas in the global healthcare industry engaged in providing medical education and training in support of patient diagnostics, public health and research work. Driven by needs in these areas, the supporting technologies being looked at include voice over Internet Protocol (VoIP) and the web-based filmless radiology (teleradiology) – the latter based on the image distribution and integration of radiological images (PACS). Within the healthcare supply

chain, there are growing needs to facilitate professional medical training and to move radiological images across great distances in support of logistics, particularly in light of the services being demanded.

Global healthcare production relations require flexible supply chains with local centers providing full level communication supply and logistics services in a multi-tier supplier network. Presented in this report is a look at model solutions, a practical structure of a healthcare sector providing communications and logistics services networks that have been put into use with IT capabilities to cover such activities as training, education and patient diagnostic support. The collaboration, planning, forecasting and replenishment activities between the healthcare supply chain members offer coverage of the medical entity's capabilities.

1.1. Medical education and training

Medical professionals are finding it more and more difficult to continue to gain proficiency through continuing education due to time constraints. One learning institution in Tennessee USA, the Institute Quality Research and Education offers its medical education programs via the Internet using VoIP technology – once considered to be a crude model of communications used mostly between and amongst hi-tech workers seeking quick, direct but with no-frills circumstances. Now, users are able to participate in interactive educational programs from any site through connection to the Internet. The Institute also operates clinical conference sessions through the use of webcasts that allow world wide physicians access, using viewer slides, inter- and intra-communications, exchange of text messages, electronic whiteboards and class participant surveys. Providing a robust educational and training experience for participants, the Institute has received consistently accolades from participants [6]. With the application of voice over IP technology in medical education, as well as, to facilitate exchanges with pharmaceutical representatives and others in the medical fields, an appreciation can be had for this relatively new method of making continuing education more readily available and far-reaching.

Through the use of VoIP communications, these programs can use online slide presentations with interactive features – at the same time during teleconference. Completely changing online education, these technologies create classroom experiences while providing voice conversations between and amongst the participants, as well as, instant messaging capabilities. Whiteboards allow the extemporaneous presentation of sketches to allow the sharing of ideas. At the same time, on-line surveys can be used to evaluate and solicit inputs from participants about their understanding and opinions to further encourage robust communication and industry collaboration opportunities. For referential purposes, web safaris are promoted to further add to the learning experience. With the capability for instantaneous editing of documents and spreadsheets and for video sharing of instructor or student images, there is the effect of a unique and learning experience for participants, with participants in each class numbering from just a few to over 30, with good results [6].

1.2. IT Support to patient care, public health and research

Because of the need for current diagnostic imaging services, the private and governmental agency members within the healthcare industry supply chain are seeing the need for communication and collaboration purposes to move radiological images across different geographical and administrative boundaries to support patient care, research, public health and administrative activities [3]. Huge unmanageable amounts of medical images are being generated at phenomenal growth. For example, more radiological images are used for clinical trials of new therapeutics involving multiple medical centers. When an individual hospital is a part of a regional health system, there are interests in streamlining various services such as radiology across the various hospitals for the purpose of management of archives and governmental reporting requirements [7].

Patients also use medical services such as multiple hospitals; images and medical records must move from one facility to another with the patient. Many hospitals have developed capabilities with their own growing image archives, representing valuable data sources for research purposes. The introduction of teleradiology saw the establishment of large virtual radiological services covering many imaging centers located in large geographical areas [7]. Because images are being shared across various disciplines and for different purposes, there is the need for coordinating the image

sharing for patient care, research and administration [4]. IT is being developed to provide for controlled sharing and for distributed resources management.
To engage these tasks during the period 1980-90, the development of various filmless radiology-oriented enterprise technologies – such as PACS (Picture archiving and communications system), RIS (Radiology Information System), report generation systems, HIS (Healthcare Information System), IHE (Integrating the Healthcare Enterprise) and others, were developed to try to arrive at "radiology management systems". Efforts were focused on developing standards for communications, operating environments, infrastructure, databases, and various interfaces. As these standards mature, the question of workflow management within the radiology service has become the central issue within these systems [7].

2. FINDINGS OF IT AND TECHNOLOGIES IN SUPPORT OF THE HEALTHCARE SECTOR SUPPLY CHAIN

2.1 VoIP software

Experience over the past eight years with online education and training program have brought various observations, including that these internet educational sessions for only a learning experience can only supplement, but not replace the need for face-to-face meetings and classroom experiences for a degree program. With body language being bereft during the VoIP sessions – thereby preventing instructors the opportunity to observe participant attention and interests – instructors may conduct a yes or a no survey, oftentimes an ungainly process [6, 2]. It seems that not every instructor has ability to teach online, with some requiring face-to-face interaction.
With video images adding little in terms of improved interaction, these features require much bandwidth thereby lowering the quality of the online experience. With lowered broadband capabilities, the use of sophisticated graphics is severely limited and problematical. And yet after several of the sessions, the number of tech support complaints go down significantly [6, 9].
VoIP technology for webcasts and online training and education has proven valuable. There are greater opportunities for physicians to participate in industry based sessions for real time awareness of state of the art development briefings; with VOIP there would seem to exist some significant potential to change the way members within the supply chain communicate and collaborate within the globalized healthcare industry.

2.2 Filmless teleradiology – image management and grid computing

This acquisition of computing power can improve the overall efficiency while lowering the cost of the system. Because there are serious efforts to deal with biological threats in the US to develop national medical records for each patient, the data grid may allow management and the sharing of such data with some degree of reliability, privacy and security. And with medical images being part of the medical record, stored archives may have to be grid enabled. As with all new systems, there will be the need to for grid computing to operate within standardization processes. The grid may be an attractive new capability that will enable image management and sharing to become efficient and secure in the near future. This computing technology may facilitate communication, collaboration and sharing at higher efficiencies within the healthcare supply chain [7, 3].

3. CONCLUSIONS

This examination and review of implications for healthcare IT can be a useful and beneficial way to demonstrate the ways being developed to effectively manage and provide patient support services for the medical establishment and to facilitate communications and collaborations within the healthcare supply chain while gaining important progress in its services goals and objectives. Various IT approaches are increasing in number and importance; yet research shows that many healthcare organizations and practitioners are only slowly deploying them within their supply chains. Specifically, these IT applications may be useful processes in the service and support functions used in the healthcare supply chain. It may have applications in the providing of information on medical education, training, diagnostics, research processes and analyses, exchanges between service providers and customers – all for the benefit of the healthcare public [1].

In particular, the patient will be the most apt to benefit from the use of these IT processes within the supply chain. And while not a panacea to every specific difficulty that exists between the medical community and its suppliers, as well as, the patient/customer and governmental agencies, the results of the embrace of these technologies suggests that there are specific advantages to be gained by them. Medical and healthcare management planners who have not examined this supply chain tie-in involvement with the IT now being made available to them may be overlooking an opportunity to engage in more effective and rewarding healthcare programs. All members of these supply chains who need to collaborate and coordinate their activities will derive the greatest benefits from these IT programs.

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