

An Adoption Model for Unified Communication in Large Enterprises

[1] Muhammad Ehsan Rana, [2] Syed Mujahid Khalid Rashid

[1][2]School of Computing and Technology, Asia Pacific University of Technology and Innovation (APU)
Technology Park Malaysia (TPM), 57000 Bukit Jalil, Kuala Lumpur, Malaysia

[1]muhd_ehsanrana@apu.edu.my,[2]smkr91@hotmail.com

Article Info

Volume 83

Page Number: 340 - 348

Publication Issue:

March - April 2020

Abstract

Unified Communication is described as the process of integrating organisational operations and processes with multiple communication methods. It brings together various communications – voice, telephony, email, instant message, video conference etc. – used by enterprise workers. With the advancement of technology, the need to adapt change has become a necessity to stay current. It justifies the need to have a more contemporary and standard framework of unified communication for large enterprises in order to cater the needs of clients to have a single platform where consistent communication through the use of multiple devices may increase the work productivity significantly. This research intends to identify the issues that concern organizations from adopting unified communication systems and understanding the benefits and challenges that they may experience. As part of this research, a survey is conducted to analyse various aspects that have an impact in the adoption of unified communication in large enterprises. The collected data helped us to come up with a detailed analysis of the benefits and challenges in this regard. Moreover data is also gathered and analysed from enterprises who have implemented unified communication systems as part of their business process. In this research, different models and frameworks are examined to help organizations in adopting and implementing unified communication systems as a solution. At the end, specific guidelines are provided to assist in adopting unified communication solutions within an organization's existing business process.

Keywords: *Unified Communication and Collaboration (UCC), Unified Communication (UC), Enterprise Communication, Communication Methods, Instant Messaging, Unified Messaging.*

Article History

Article Received: 24 July 2019

Revised: 12 September 2019

Accepted: 15 February 2020

Publication: 12 March 2020

I. INTRODUCTION

Unified Communication can be described as a process through which all communication means, media and devices are integrated hence allowing users to send and receive messages or information to one another in contrast to their geographical location [1]. Unified Communication can also be understood as an integration of various communication devices which are crucial to individuals and employees with the goal of enhancing business productivity and efficiency in their fields of specialization [2]. The rapid and

evolving modern technology, coupled with the thirst for business ideas, has proved essential and indispensable by utilizing contemporary methods into unified communication. Hence enabling companies or organizations need to be effectively and efficiently more productive in this area. In addition to that, new and emerging technology trends has also allowed effective communication between colleagues in the same organization at different geographical areas. This can be evidenced by the flexible and favorable working domains which allow employee relocation in different parts of the world with easy access to communication.

In order to survive and excel in the current competitive market, organizations need to ensure that communication costs are effectively reduced. To execute this, research has been carried out regarding the necessary tools required to facilitate unified communication, hence help in maximizing revenue and the cost of raw materials.

II. UNIFIED COMMUNICATION: COMPONENTS, MODULES AND DEVICES

The implementation of the latest unified communication tools within the organization ensures that the information and the apps stay ubiquitously accessible. Having secure, reliable and productive communication tools at the disposal of organization’s staff is something every organization looks for to further enhance their business process.

A. Components of Unified Communication

Since the term “unified” takes its origin from unity, unified communication is therefore not a single piece of software but rather a combination of multiple components which interact together for a better end-user experience. In this section, researchers intend to list the major categories of those components. In an attempt to analyze and list the major categories, it should be noted that the components depend on the implementation strategy formulated from the given requirements.

1) Instant Messaging

Instant messaging is a text-based communication service that allows real-time and asynchronous communication through computers or mobile devices [3]. It has become comparatively very simple to communicate through asynchronous or real-time communication in which text messaging is used to communicate fast and effectively. This is therefore a key component in unified communication based solution. However mostly organizations or enterprise systems are unaware of its security problems and other potential implications, therefore it is recommended that instant messaging should be implemented with adequate security and privacy solutions in the unified communication model [3].

2) VoIP (Voice over IP)

Voice over IP (VoIP) can be understood as a category of communication which facilitates voice communication sessions that don’t use telephone networks but rather computer networks. However, the VoIP can be used to share information or communicate between people on a single network through the use of software and hardware. The VoIP is very vital in the implementation of various solutions of unified communication.

3) Unified Messaging (e-mail, voicemail, fax, video messaging, etc.)

Unified messaging is referred as the integration of various communications technologies into a single interface that are accessible from a variety of electronic and media devices. Examples include e-mail, voicemail, fax, video messaging, etc. [4].

B. Key Modules of Unified Communication

As specified, there are number of unified communication notions that need to be analyzed, for example communication infrastructure, communication security and management, telephony integration and unified messaging to be able to create a solid unified communication policy [5]. Unified communication system can be broken down by specifying a few key segments that includes the full version of unified communication. According to [6], these key points can be broken down into six modules. Table 1 provides a brief description and examples of these modules.

TABLE I: UNIFIED COMMUNICATION KEY COMPONENTS [6]

Key Modules	Details	Examples
IP Infrastructure	<ul style="list-style-type: none"> • IP-based telephony (VoIP) • Extensions of traditional telephony • VoIP over wireless LAN 	<ul style="list-style-type: none"> • VoIP phones • Softphones
Communication media	<ul style="list-style-type: none"> • Unified Messaging • Asynchronous 	<ul style="list-style-type: none"> • Softphone with video, email, instant

	and Synchronous media • Instant messaging	message and voice mail integration
Media/channel integration	• Rule-based call diversion • Follow-me feature • Preference group concept	• Single number reachability • Softphone with rule editor
Presence signaling	• Presence status • Automatic generation of signals on the device/media level • Individual signalling	• Cisco presence • AOL messenger • Skype
Collaboration	• Conferences • Ad-hoc application sharing • Group calendar • Shared file storage	• Meetingplace • Webex • Lotus Sametime
Contextualization	• Integration of unified communication functionality with business processes • Integration with enterprise and office software	• SAP integration • Office integration

- Other devices like Webcams, Headsets etc.

III. ANALYSIS AND DISCUSSION

Survey is conducted to gain firsthand information and feedback from the proponents of unified communication systems. A total of 20 respondents were included in the survey results. The respondents were selected to have some essential knowledge of ICT, therefore the methods of distributing the questionnaire were in line with the specialties of the respondents. For-example; Managers from the IT department were selected due to their prior knowledge of using the technological aspects of this research. Other respondents were chosen from the clients of different organizations with implemented unified communication models. In addition to the above, researchers also targeted groups of respondents from other organizations for-example; managers of various financial institutions and technology architects were chosen. This therefore provided more versatile audience with better understanding of the domain requirements.

From the test subjects, a significant majority (73%) was involved in some manner with technical job descriptions, while rest reported otherwise. Thereafter it was found that 55% of the test subjects believe that Senior IT managers are responsible for the implementation of unified communication models, and hence the researchers have identified a target group for the popularization of such models.

C. Devices used in Unified Communication

A unified communication model requires communication devices to be effectively and efficiently operated. In addition to that, the applied communication model should be able to support devices of a wide range supported by a wide geographical area. Key devices used in unified communication are listed below:

- Computers, Netbooks and Tablets
- Communications Gateways, Video Gateways, Voice Gateways
- Telephony Extensions, Cellular Phones, IP Phones

It has been concluded that the idea of unified communication adoption is popular amongst present corporate environments as 74% of the test subjects welcomed unified communication adoption, citing reasons such as improved response latency and increased productivity. The research has also identified that email is still the prevailing mode of communication amongst the companies of the test subjects where instant messaging achieved a mere 45%. Thereafter the data collected demonstrated a significant desire to implement unified communication, whilst employing wireless networks and mobile devices, in order to harness better productivity and low latency communications. However, a notable concern

amongst test subjects was the cost of implementing such systems, followed by integration and security, and hence these will be cited as the primary limitations to unified communication adoption. The research has also found a rather even spread amongst the companies regarding their current state of unified communication implementation. The test subjects also identified that CISCO is perceived as a market leader in unified communication technologies and furthermore, re-iterated the importance of vendors having adequate understanding of client needs.

The finding therefore suggest that the implemented framework should prove adequate for the development of a unified communication adoption model, where the 'compatibility with existing infrastructure' proponent, would help to address the biggest limitation to any adoption model, namely; cost.

As far as the challenges are concerned, first and foremost is the time constraint. Given the broadness of the study alongside its requirements, the time needed to conduct it isn't enough since it requires gathering of the required information in detail. The need to collect the enough information was one of the factors which were greatly affected due to the limited sample size from which the information was to be generated from. The need to advance towards unified communication in organizations comes with several costs to be incurred by organizations for-example; electricity costs, technical and financial costs. However, the results of the costs incurred can be productive as the staff and the employees of the organization can be able to share information through a unified manner hence adopting a model of unified communication.

As technology advances, there are security risks which are also designed to breach any secure communication channel. This means that information shared through a unified network connection can be hacked or leaked out hence it justifies the need of specialized security personnels to counter risks associated with the adoption of unified communication in an organization.

For the stakeholders, unified communication can assist to integrate with the current communication system. Unified communication also provides robust security features for the organisations' employees and stakeholders through securing their information while communicating instantly. It also provides simple solution management, for example the administrators can deploy and control a single solution in the enterprise. Therefore, an enterprises' IT requirements and the solutions it plans to implement will have to adopt the key best practices; for example, collaboration, presence, unified messaging, mobility, contact centre and integration with other businesses to ensure complete adoption of unified communication technology and a smooth transition. [7].

In consideration of IT implementation, it's critical to keep the end goal prioritized when preparing to launch a new or updated unified communication program. For example, the company's main objective is bridging the communication gap between remote workers, and by defining this before installing the software can propel the process forward and keep it on target through implementation.

Companies opt to choose which individual gets certain tools and authorization to company data, based on their job title and requirements. They can steer away from this habit when it comes to unified communication by realising that there isn't a single solution for everyone, regardless of shared role. True collaboration sparks when enterprises use the right, user-friendly technology at the appropriate time. Having a supportive and involved chief information officer in the organization can help to successfully execute and insure the transition of unified communication program goes smoothly. Unified communications would stand still without proper training at each stage of deployment. Web meetings are beneficial for large enterprises to demonstrate how to use the technology while also explaining how it'll positively impact the company-wide communication.

IV. PROPOSED ADOPTION MODEL: EXECUTION STRATEGY

In order for organizations to have the capacity of utilizing proposed unified communication model effectively, different stages are required in the general design of the model. The strategy shapes the basis from where different inquiries and exercises are determined as it ties the communication and incorporation technology to the organization's workers, processes and business goals. Various studies [8] - [17] were reviewed in shaping this model.

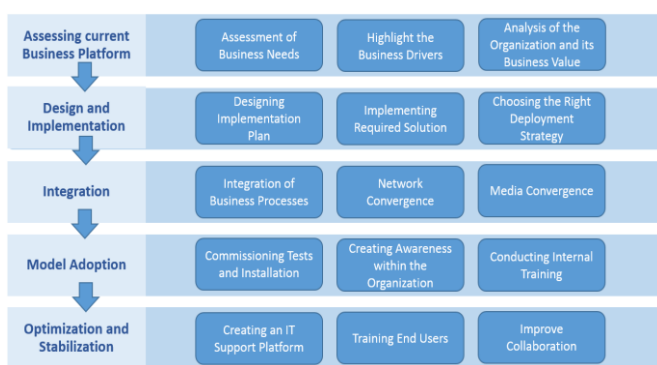


Figure 1: Unified Communication Model of Adoption

A. Assessing Current Business Platform

When assessing a business's platform, it is vital to gather information as to what is the organization currently doing and where it is, they intend to be. The following are some points that will help assist to gather some of the vital information to better understanding the organizations business and processes:

- **Assessment of Business Needs.** This is a planned way of learning to understand the current processes of the organization, their intended outcomes of their business and the understanding of the limitations that are holding back the organization from where they want to be. This is where an alternative way to alter the current processes in the organization can be devices and brought forward to be considered for adoption.

- **Highlight the Business Drivers.** Identifying the Business Drivers within in an organization is to look

for what pushes sales, generates cash flow, reduces costs, increases growth, motivates resources, attracts customers in terms of marketing strategy and researching the current political factors that can affect business. The intended goal to achieve is to lower costs, increasing customer satisfaction by having more up-close and personal communication with them, gathering user and customer requirements and fulfilling them which will then lead to increase in productivity and sales.

- **Analysis of the Organization and its Business Value** is intended to evaluate the current state of the organizations current system in place which is supporting and benefiting its business. This will help to identify what is helping the organization to generate and sustain its business and also show what they are lacking. A study on the strengths of the organization can help to further understand its business value to their customers which can help us to better understand how to customize the system to cater to this need and not allowing the end user satisfaction to be altered.

B. Design and Implementation

This is the stage where one is come up with a solution for an organization specifically focused on the organization's needs.

- **Designing Implementation Plan.** This is to come up with a breakdown of activities to take place in sequence, to highlight possible difficulties that may be faced, coming up with a timeline that requires one to achieve the planned-out objectives of the strategic plan. Planning sufficient allocation of resources for specific tasks and lastly coming up with an evaluation plan to quality assure of the task completed and system delivered.

- **Implementing Required Solution.** It is important to implement the specific required solution after having come up with an implementation plan that meets the requirements of the organization. This solution will be customised to best support in improving the organization processes, communication and productivity that will in turn increase the organizations sales and revenue.

- Choosing the Right Deployment Strategy is critical to the success of the integration of UC into an organization's daily business in terms of resource, budget and growth. One should take into consideration to choosing the correct methodology by best understanding the organizations key business drivers, the difficulties they face, the risks that they can and can't take, the complexity of adopting to the new system and meeting stakeholder requirements and needs.

C. Integration

Strategizing how an organization will be able to implement a new system for adoption while improving the process flow, productivity and generation of new business opportunity and increase of revenue.

- Integration of Business Processes. Business needs should be addressed by the applications deployed and a validation test needs to be conducted to evaluate the success of the application being deployed. This in turn ensures the quality assurance of the customer experience, the reliability of the application and the enabling of business processed through unified communication.

- Network Convergence is the assessment of low- and high-level infrastructure, the use of business cases as validation, identifying new technology and engineering, using them as solutions to be able to meet the requirements of the organization. The output is communication and network coverage and collaboration.

- Media Communication. This requires the identification of user application needs and ensuring the design and architecture delivered are of the best quality and strong in support. This in turn will benefit the productivity and ease of use for the users.

D. Model Adoption

This stage is intended to promote the system and its benefits. To train administrative staff to be able to maintain the system for the future and give users an insight of all the feature available that they stand to benefit from.

- Commissioning Tests and Installation in order to know whether the unified communication system introduced into the organization is benefiting its users and increasing the overall productivity of the organization is, by measuring the specific metrics with analytics. This includes gathering information on the users' behaviour, most popular tool being used and lest popular tools, real time data, tracking problems faced, return of investment analysis and capacity planning where one can determine whether the provided tools and applications are sufficient, or weather more needs to be purchased.

- Creating Awareness within the Organization. For the system to be used and accepted, it is needed that the users are told to use the new system by making them aware of the availability of the new system though email and implementation of processes. Users shall be told of what to expect from the system and how it will benefit them in their daily tasks. It shall also be mentioned that the users will be sent for training to further understand how they may incorporate the benefits of the new system in their daily tasks.

- Conducting Internal Training for administrative staff to familiarize themselves to the new system being implemented. This will allow the administrators to fully utilize the capabilities of the system in further enhancing their task and processes execution. Administrative staff then will be able to maintain the system and further educate the end user staff. This will also allow to iron out any further requirements needed to fully customize the system to the administrator and user needs.

E. Optimization and Stabilization

At this stage, it is intended to for the end user to be independent by fully understanding how to use the system and benefit from its features available. This stage also gives the developers to iron out any minor imperfections to make the system more stable.

- Creating an IT Support Platform. This is important platform to gain user acceptance and trust where users can rely on technical support when needed. This will maintain the user experience

and integrity and keep users satisfied with the new system implemented.

- Training the End Users of how to fully utilize the features available to them in the system for improving their daily tasks. This will also keep the users in the dark not knowing how to use the system properly to benefit them. With enough training to all the users, the system's full potential can be realized and appreciated.

- Improved Collaboration. The system benefits the users of the organization by enabling them to be connected to one another from any location at any time, being able to share information with one another speeding up decision making time will boost productivity levels and get tasks completed faster.

V. PROPOSED ADOPTION MODEL: JUSTIFICATION AND RECOMMENDATIONS

A. Justification

The proposed model can be justified through the integration of technology, people and processes with the intension of adopting a successful Model of unified Communication in the organisation. It should be understood that given the different limitations concerned with the adoption of proposed model of UCC, different organisations may incur different challenges given its industry. The researcher therefore indicates that the model can be justified in its ability to provide a conclusive solution for the organisation.

The proposed model for the adoption of UCC would highlight the strengths of UCC, namely the significant increase in productivity and reduction in communication latency, while providing a foundation for budget extrapolation, this would address the biggest limitation to wide UCC adoption, that is cost. The data collected provides strong qualitative information as to the current state of UCC adoption, thus the researchers have adopted the model to directly address the specified state. The proposed adoption model directly addresses the target customers' key focus areas in UCC adoption, as identified in the research data,

that is; the convergence, integration and collaboration of the people, processes and technology involved whilst reiterating the benefits of such systems, like responsivity, flexibility, and increased productivity.

B. Recommendations

- In order to successfully adopt and implement the unified communication model, large enterprises should organize teams from among its employees to maintain and control the technological operations of unified communications. This can be justified with the fact that teams yield more productivity better than individual work.

- The model of unified communication should be adopted and implemented by large enterprises in phases. From these deferent iterations, the enterprises should tackle one phase at a time given its predecessor and successor.

- Finally, large enterprises and vendors should collaborate at the start of the adoption and implementation of unified communication systems. This is because of the limitations and the different problems which may arise at the beginning or during the implementation phases of the unified communication model.

VI. VALIDATION OF THE PROPOSED ADOPTION MODEL

Finally, the proposed adoption model for unified communication in large enterprises is validated using expert review through two well-known IT Firms to gain feedback and further improvement suggestions. The expert review was used to gain insights weather the suggested model actually meets the expectations of industry needs and aspirations to actually consider the implementation within their organization. This is done to obtain a better understanding of the challenges and needs of real-life implementation within an existing organization's environment.

Both organizations found that the work presented to them was done in a systematic and clear manner by focusing on the customers' needs and requirements while providing a model which they

may use to compare with other available models in the market to best decide which would best cater to their needs.

Both organizations gave suggestions to the writer to consider. It is suggested that there need to be a benchmark product to follow from the current leading UCC solution providers such as Cisco, Avaya, Polycom etc. They also suggested to further better showcase the model, real life UC case studies should be shown as an example for better visualization on the benefits of the model when in action. It is also suggested that the researchers shall bear in mind that the model proposed should be able to easily incorporate new forms of communication devices, software, etc. to stay relevant and ahead of providing solutions to various industries and/or organizations alike.

Both organizations agreed that they are open to explore this model further as they see the benefits of synchronizing their globally located offices with one platform where they can exchange information easily with one another keeping on track and meeting their goals. It was specified that the proposed communication model for enterprise level actually fills in a gap in realizing the implementation of actual communication systems for industry. They also believed that by tying up with top industry players, it may help speed up the adoption of this model to be able to create the awareness throughout the industry.

Expert from a company commented that they had realized this issue earlier on and started to bridge the gap by taking basic steps in implementing VOIP tools, IP CCTV, Card Access, Active Directory, Team IM, Pulse HRMS system and cloud Storage amongst all their global offices. The other company however, mentioned that they did not have any UC in place and with the exposure from this, they have come to realize the benefits of the model presented to them.

CONCLUSION

Large enterprises should adopt an appropriate unified communication model based on their size and geographical spread given its benefits. These

enterprises should also rely on using their existing technologies, culture, business processes, operations and “use cases” which can formulate implementations to be done given the priority for each process. The proposed implementation guide gives a strategic and systematic methodology for adopting a unified communication system that synergies business communications, system applications and operational processes. Vendor evaluation considerations should be based on their commitment to innovative solutions and data security. With the implementation of this model, a much more tailored approach to implementation can be taken to fulfil specific requirements of various organizations to promote growth to their organization, increase their productivity, and have a higher standard of product or services delivered to their target markets respectively.

REFERENCES

- [1] Allery, B (2017). What is Unified Communications (UC)? [Online] 3CX. Available at: <https://www.3cx.com/pbx/unified-communications/> [Accessed 6 Jan 2019]
- [2] Andrews, C. (2001). Unified communication systems. *Crossroads*, 8(1), pp.13-17
- [3] M.E. Rana, Gong Wei, and P. Hoornaert. "An enterprise instant messaging (EIM) solution to cater issues associated with instant messaging (IM) in business." In *Research and Development (SCOReD), 2015 IEEE Student Conference on*, pp. 187-192. IEEE, 2015.
- [4] Bradley, T., & Shah, S. (2010). *Unified Communications for Dummies*. Hoboken, NJ: Wiley Publishing, Inc.
- [5] Scharf, S. (2009). *Getting Started on Unified Communications and Collaboration*. Chicago: British Telekom.
- [6] Riemer, K. (2009). Unified Communications. *Business and Information Systems Engineering*, 326-330.
- [7] Damcosoft.com. (2017). *Unified Communication Services / Unified Communications Solutions*. [online] Available at: <http://www.damcosoft.com/unified-communications.html> [Accessed 6 May 2017].
- [8] Boettner, P., Gupta, M., Wu, Y., & Andrew, A. (2009). *Towards Policy Driven*

- Self-Configuration of User-Centric Communication. *Proceedings of the ACM Southeast Conference*. Clemson, SC, USA.
- [9] Brophy, K., Chow, A., Hahn, M., Lejter, L., Robbins, D. and Schettino, J., Verizon Laboratories Inc., 2004. *Systems and methods for providing unified multimedia communication services*. U.S. Patent 6,782,412.
- [10] Dimension Data & Ovum. (2013). *Strategic, User-driven, and Managed: The Future of Unified Communications and Collaboration*. Ovum Inc.
- [11] Evans, D., 2004, October. An introduction to unified communications: challenges and opportunities. In *Aslib Proceedings* (Vol. 56, No. 5, pp. 308-314). Emerald Group Publishing Limited
- [12] Empirix Corporation. (2010). *Unified Communications: Assuring the Path to Optimized Business Processes*. Kansas: Empirix Corporation.
- [13] Elliot, Bern and Lock, Christopher. 3 January 2007. *A Framework for Unified Communications*. s.l.: Gartner, 3 January 2007. Research. G00145337.
- [14] Frost and Sullivan. (2011). *Unified Communication, Collaboration and Mobility Drive Headset adoption*. Singapore: Frost and Sullivan.
- [15] Gifford, W.S., Mowatt, P., Karcher, P. and Riggi, D., Telecommunications Premium Services, Inc., 2003. *Unified communication services via e-mail*. U.S. Patent 6,549,612.
- [16] Hydari, M. Z. (2008). *Unified Communications: Convergence of platforms and Strategies of two Software Vendors*. Massachusetts: Massachusetts Institute of Technology.
- [17] Riemer, K., Steinfield, C. and Vogel, D., 2009. eCollaboration: On the nature and emergence of communication and collaboration technologies. *Electronic Markets*, 19(4), p.181.