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'Communications & Collaboration Technologies' as Strategic Imperative for Enterprises! Part I: Findings and Implications from Longitudinal Analysis and Systematic Review

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ABSTRACT
With an aim to increase productivity and satisfaction, CIOs across the globe are scaling up their investments in advanced communications & collaboration technologies. The need to communicate with customers and employees irrespective of time and place is further driving the development of disruptive communications & collaboration technologies. The evolution of new and affordable communications & collaboration solutions such as IP PBX and web conferencing has led to a decline in the adoption of traditional audio and video conferencing solutions. Enterprises are opting for flexible solutions that also offer additional features at lower prices compared to traditional conferencing solutions.

***Keywords*:** Business Value, BYOD, Enterprises, Enterprise Mobility, Hosted Virtual Desktop (HVD), IT Services, QoS, SMEs, Unified Communications, VoIP

I. INTRODUCTION

Unified Communications (UC), as the name suggests, comprises a unified set of tools and technologies that automates and amalgamates communications between humans and devices in a common environment. Earlier, enterprises used to have only on-premise communications & collaboration solutions from a handful of vendors such as Cisco, Avaya, and Polycom; however, organizations now have more options with respect to technology, mode of installation, and the vendor to be selected. While conventional Unified Communications (UC) tools were previously not affordable to small and medium-sized enterprises (SMEs), in present scenario, Unified Communications (UC) vendors are now coming up with alternative solutions such as cloud-based UC, WebRTC and various others to cater the growing demand for these technologies amongst SMEs. Web conferencing is another segment in the communications & collaboration industry which is growing strongly. The major cause behind this adoption is the cost and productivity advantages of this solution over other conferencing technologies. The evolution of concepts such as context-aware computing & collaboration and bring-your-own-device (BYOD) is also driving the growth of UC technologies, and is compelling vendors to come up with innovative solutions that can fulfill the growing requirement of organizations to connect with their customers and clients anywhere and anytime [1].

The below mentioned Table (1) and Fig (1) illustrates the number of Medium-sized enterprises responded for ICT survey.

Table 1: Medium-sized enterprises ICT survey data geographic breakdown

Countries	Count
Germany	79
UK	74
US	72
Russia	65
Italy	61
China	59
India	57
Spain	52
Brazil	51
France	44
Canada	44
Germany	79
Others	496

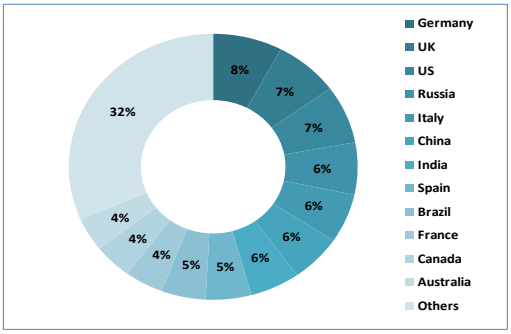

Fig.1. Medium-sized enterprises' ICT survey data geographic breakdown

ENTERPRISES TAKEOUTS

Enterprises: need to adopt various UC solutions including IP telephony, Hosted IP PBX, presence, IP Centrex, Conferencing solutions to reduce their communications barriers.

The below mentioned Fig (2) shows the overall ICT budget change pattern of medium-sized enterprises (flat, growth or shrink) from FY 2013-14 to FY 2014-15.

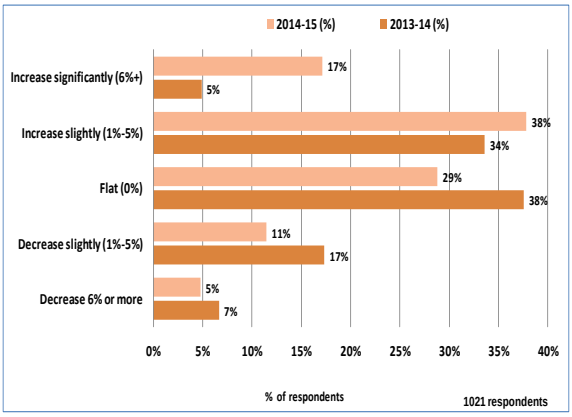

Fig.2. ICT budget change (growth or shrink) from 2013-14 to 2014-15

IT departments: need to devise a robust IT security and deployment strategy to avoid the pitfalls of adopting cloud based UC solutions.

Employees: need to be trained to better understand pros and cons of the advanced solutions.

II. SUPPORTING ARGUMENTS

1.1 BENEFITS OF USING VIDEO CONFERENCING

The number of people looking for remote working arrangement is increasing, with technology addressing their requirements. Video conferencing and telecommuting are making it possible to have real-time interactions between co-workers, clients, and partners. Telecommuting in the US, and quite a few places elsewhere in the world, is growing, and video conference solutions are addressing this significant trend. Telecommuting professionals tend to benefit from video conferencing solutions in several ways [2].

First, it facilitates enhanced communication; for instance, by engaging in face-to-face communication, professionals can precisely judge the situation, and then offer appropriate enterprise solutions and thereby make the most of the interaction.

Second, several people who opt for telecommuting feel isolated from the team; video conferencing helps bridge this gap and allows them to be an active and integral part of the whole team. As video conferencing allows real-time conversation, it helps in streamlining corporate processes. Moreover, video conferencing can be scheduled at times that is convenient for the parties involved, which is essential for professionals that live in different time zones [3].

1.2 COMPELLING BENEFITS OF HOSTED TELEPHONY

Technological advancements in telephony and robust internet network have made cloud-based or hosted IP telephony a compelling case. It is generally believed that hosted telephony is expensive than the ones based on the premises; however, it is not so when all costs are taken into account. For instance, with an on-premise system, firms have to bear the upfront capital costs and pay for maintenance and software updates.

Enterprises also have to pay extra for round-the-clock support for on-premise system. However, with a hosted service, all these costs can be bundled into monthly charges. Further, with a hosted system, all that a firm needs at each location is an internet connection with enough bandwidth to handle the peak call volume. Firms do not have to bother about having dedicated phone lines or payment of expensive monthly rental fees. If enterprises have multiple locations, then an on-premise system is not suitable because PABX needs to be installed at every office for a range of functions (such as call forwarding, group hunt, etc.) [4]. However, with a hosted system, every extension at every location can get access to the whole range of functions. Although the benefits of hosted IP PABX are varied, on-premises phone systems have been around for a long time, but they are expected to grow increasingly irrelevant.

1.3 BENEFITS OFFERED BY VOICE OVER INTERNET PROTOCOL (VOIP) TO SMALL AND MEDIUM-SIZED BUSINESSES

Today, the survival of a business largely depends on the capability to reach across to its clients across different time zones through effective and consistent channels. As the mobile technology advances, and the world becomes more connected, communicating with potential partners in real-time becomes increasingly important. Even small businesses now need to reach across to their customers located far away. However, in order to satisfy their customers, small and medium-sized businesses will have to spend time and money, and overhead costs can be a big burden. Therefore, many firms are willing to experiment, and adopt the newer, disruptive technologies in order to offsets costly employee movements. One such option is voice over internet protocol (VoIP), which allows people to connect in a similar way as with landline or cellular phone. However, VoIP allows users to connect

through existing internet network instead of a phone service. Though the technology is still developing, it offers significant benefits [5]. As VoIP operates over a company's existing broadband connection, it is much cheaper than what cellular companies charge. In addition, the cheaper international calls which can be made via VoIP, also allow businesses to cut costs significantly. For small and medium businesses looking to reduce overhead and unnecessary costs, VoIP is a worthwhile system to look into.

1.4 KEY FACTORS FOR SUCCESSFUL IMPLEMENTATION OF VOIP

Voice-over-Internet Protocol (VoIP) has the potential to improve on existing phone technology and reduce phone costs to a great extent. Yet, many SMBs are wary of the technology. However, with the right tools and knowledge, VoIP can be implemented in a manner that is both effective and reliable. By considering a few key factors, organizations will be able to implement VoIP successfully. First, it is important to install a second internet connection so that there is a continuity for voice and data services in case the primary internet goes down (it is also essential that both the connections are from different companies). Second, firms need to cautiously choose their Session Initiation Protocol (SIP) provider. VoIP relies on SIP trunk, which can lead to dramatic cost savings on voice communications: there are several low-end SIP providers who use least-cost routing (LCR) technology, wherein the provider routes the VoIP calls in the cheapest possible way. Third, there is a need to implement quality-of-service (QoS) on network. QoS prioritizes certain sets of data traffic and allows high priority packets of information to reach the destination. As VoIP calls are data packets by nature, without QoS, the calls may sound jittery. Failure to implement an effective QoS on an internal network leads to bad user experience [6].

The below mentioned Table (2) and Fig (3) illustrates the number of Medium-sized enterprises responded for ICT survey across the industry verticals. The respondent size for manufacturing counts for 101, similarly respondent size for healthcare counts for 87.

Table 2: Medium-sized enterprises' ICT survey data industry breakdown

Industry	Count
Manufacturing	101
Telco/service provider	93
Energy	90
Healthcare	87
Government	84
Financial markets	81
Retail	75
Insurance	72
Retail banking	71
Utilities	70
Pharmaceuticals	67
Education	64
Media	56

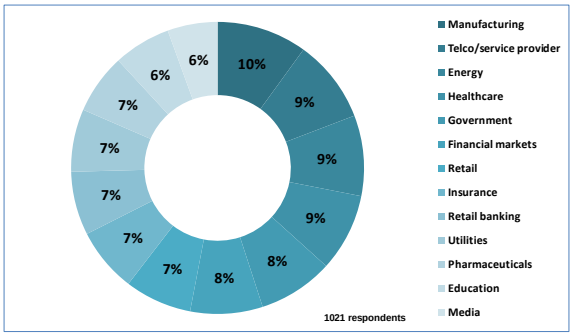

Fig.3. Medium-sized enterprises' ICT survey data industry breakdown

III. KEY ACTIONS BEFORE THE ADOPTION OF COMMUNICATIONS & COLLABORATION TECHNOLOGIES

1.0 THINGS TO CONSIDER WHEN MAKING VOIP TRANSITION

Small and medium-sized businesses intending to make a big impact are beginning to consider implementing voice over internet protocol (VoIP). This platform enables firms to communicate with their clients across the world without spending much on international rates. Though this system provides a great solution for businesses willing to take the next step, there is still a level of uncertainty surrounding the technology. Before firms make a transition, businesses ought to be aware of several aspects. VoIP can come in form of a mobile app and the quality can differ from provider to provider; however, the best VoIP systems have clear connections. VoIP platforms need to be easily transferrable or scalable. In order to ensure this, it is important to avoid systems requiring ethernet ports or complicated wiring, as these are difficult to install. As the world is shifts towards mobility, it will be ideal to opt for VoIP lines based around apps and computer interfaces [7]. Given the immense need to communicate with clients around the world, cell phones and land lines may not be the right choice always; VoIP, however, can be of help in this regard.

2.0 VOIP A GOOD SOLUTION, BUT PITFALLS MUST BE AVOIDED

Several firms are intending to shift to a cloud based or VoIP telephone system. While VoIP can be an ideal solution, firms need to avoid the pitfalls. Therefore, firms ought to ask potential suppliers some key questions. Firms first have to check whether a supplier is part of the Telecoms

Ombudsman scheme. Being part of the scheme, indicates that the supplier is confident enough to accept independent binding arbitration. It is also essential to check if the systems are built on larger carrier grade platforms such as Cisco HCS. This will help prevent difficulties in case a supplier goes out of business or if the firm wishes to change the supplier. It is also crucial to ensure that the switch is hosted in a region that complies with the local data protection act. Companies also need to find out who issues the numbers: if suppliers have to source them from other operators, it can have an impact on porting in the future [8]. Furthermore, in order to access the level of success of the supplier, firms must check the number of users a supplier has. In short, VOIP can be an ideal solution, but as with any major investment, firms will have to ask the right questions before making an investment in the technology.

3.0 WAYS TO GET THE BEST POSSIBLE INFORMATION ABOUT VOIP SERVICE

Before making a final choice on business VoIP services, it is essential for firms to learn all that is possible about the technology. Online research can help them in this regard by providing detailed comparisons between service providers. Businesses can make use of third party review websites that highlight these services or gather detailed information through major search engines. This is essential, as service providers only highlight the information that is favorable to them. In addition, good service providers usually tend to have their contact information listed in public places; firms, therefore, also need to use directories and yellow pages in order to get details of prospective service providers. Meetings with prospective service providers will help them see what type of company they are looking at [10]. The bottom line is that firms need to ask questions and the company executives must be able to provide answers.

IV. RECOMMENDATIONS FOR ENTERPRISES TO HARNESS COMMUNICATIONS & COLLABORATION TECHNOLOGIES

1.0 VIDEO CONFERENCING ENABLES SMOOTH BUSINESS OPERATIONS

"Communication is an integral part of any business. Leaders have to communicate with managers frequently to ensure that directions and goals are understood by everyone. However, with businesses spanning across several locations, keeping communication flowing is easier said than made."

Even though business leaders contact their employees through phone to relay messages, many of them consider that such a verbal communication is not enough – they prefer to have visibility of facial expressions and other non -verbal clues. According to a study by the Cellular Telecommunications Industry Association (CTIA), more and more firms are opting to go wireless [11].

- About 55% of businesses in the US encourage employees to bring their own device (BYOD) to work, while 70% of these businesses also invest in mobile solutions.
- Another research shows that about 58% of US adults own a smartphone, and 21% of them are using it to join video calls or on chat. Video conferencing can help firms get people virtually in one place at the same time.

The below mentioned Fig (4) illustrates the adoption trends of the communications and collaboration technologies (Unified Communication, Web/ Video Conferencing, IP-PBX, IP-contact centers) among medium-sized enterprises in FY 2014. The fig also shows next two year adoption pattern of these technologies respectively.

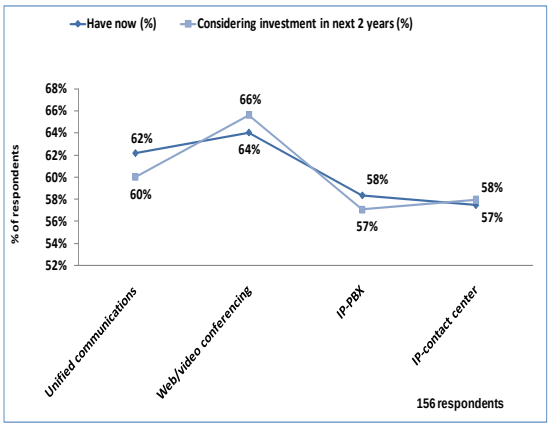

Fig.4. Communications and collaboration technologies adoption trends among medium-sized enterprises in FY 2014.

2.0 TIPS FOR SMOOTH MIGRATION OF PHONE SERVICE TO CLOUD COMPUTING

"It may be time for firms to re-examine their options for communications technology as moving to the cloud is becoming imminent."

When a company is moving to a new location or is growing quickly, it is ideal to move the phone service to the cloud [12].

1. Enterprises can save potentially thousands of dollars by eliminating the need for a traditional on-site PBX system by deploying cloud phone service.
2. An onsite PBX system can become cumbersome and expensive to maintain when a customer's business grows and new employees join. In contrast, cloud-based service provides direct control through a user-friendly web interface,

and changes can be made easily, quickly, and f ree of cost

3. Remote employees working out of the office can receive or make calls as if they were in the of f ice.
4. It is easy to keep staff connected across state or even country lines with phone service in the cloud. However, this can be difficult with traditional telecom. Before moving a customer's service to the cloud, firms need to develop a long -term strategy, and choose vendors accordingly.

The overall impact of cloud-based phone service on bandwidth is fairly minimal, but firms still have to be sure that the internet service is sufficient to handle the additional bandwidth required for voice traffic. The below mentioned Table (3) and Fig (5) reveals Medium-sized enterprises' overall ICT budget allocations to the categories such as hardware, software, IT services, telecommunications and consulting in the FY 2014 and FY 2015 (how did enterprises spend their overall ICT budget in FY 2014? How will this change in 2015?) . The survey result shows that medium-sized enterprises allocated 26% and 22% of their overall ICT budget to hardware and software respectively in FY 2014, whereas for the FY 2015 medium-sized enterprises allocated 27% of their overall ICT budget to hardware segment while it remains the same for software segment in the FY 2015.

Table 3: Medium-sized enterprises' (external) ICT budget allocation, 2014 and 2015

Category	2014	2015
Hardware	26%	27%
Software	22%	22%
Services	17%	16%
Communications	15%	15%
Consulting	12%	12%
Other	8%	8%

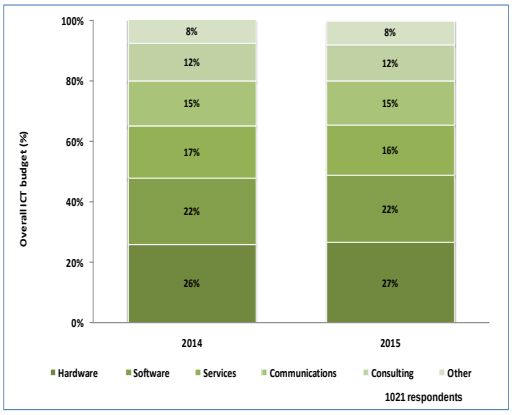

Fig.5. Medium-sized enterprises' ICT budget change from 2014 to 2015

3.0 TIPS FOR ENTERPRISES EMBRACING VOIP

"VoIP system provides several advantages in the modern day business landscape. However, small and medium-sized businesses who take the plunge should look into necessary practices as many of these are accidentally skipped by technical teams."

Location reporting is one of the most commonly overlooked aspects of VoIP installation.

- Location reporting has the potential to ruin a budget, but can also have legal repercussions. As VoIP uses internet servers, it will be difficult to identify location during emergency. However, by deploying emergency responder applications and public -switched telephone networks, problems can be solved [13].
- Right from voicemail servers to accounting software, there are several aspects of classic phone systems, which need to be car ried through a VoIP switch. Therefore, a thorough research before making the official switch to VoIP is essential [14].
- In addition, employees need to be trained to better understand the new technology. As most of the employees like to stick to what they know, they need to be given ample time to discover the pros and cons of the new system. This is essential; more so for cell phone VoIP [15].

V. ISSUES AND CHALLENGES

"Striking a balance between benefits of communications & collaboration technologies and privacy issue essential."

"A vast amount of data is being floated around the world due to the ubiquitous data-driven technology."

Every interaction within the digital realm, be it on smartphone, computer, through credit card transactions, is collected, stored, accessed and analyzed in real-time, with accuracy. Though communications & collaboration technologies provide many benefits, customers feel they are being constantly monitored. Therefore, it is important to strike a balance between the benefits of communications & collaboration technologies and the privacy concerns of customers.

There is the underlying issue of privacy when it comes to communications & collaboration technologies. People are uneasy about giving personal information as it could lead to unmonitored distribution of the information to advertisers, government, and other organizations [16-18].

The below mentioned Table (4) and Fig (6) illustrates various factors influencing medium-sized enterprises' decision to choose an IT provider in FY 2014. Various factors such as geographical reach,

contract flexibility, financing options payment terms, expertise in industry and many others have been rated by respondents on a scale of one to four and shown below.

Table 4: Factors influencing Medium-sized enterprises' decision to choose an IT provider

Factors	Average rating (On a scale of one to four)
Geographical reach	2.7
Financing options/payment terms	2.7
Contract flexibility	2.8
Breadth of solution offerings	3.0
Price	3.0
Financial stability	3.0
Expertise in your industry	3.0
Specific functionality expertise/depth	3.0
Leading-edge technology	3.1

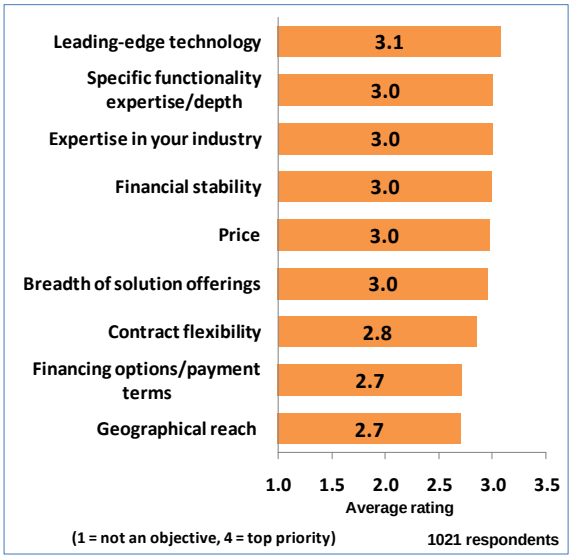

Fig.6. Factors influencing Medium-sized enterprises' decision to chose an IT provider

VI. CONCLUSIONS AND FUTURE RESEARCH

"Communications and collaboration technologies can be winning imperative for enterprises."

In summary, the proposed paper analyzes the development related to communications and collaboration technologies and adoption of these technologies in large, small and medium-sized enterprises. The paper represents a holistic view about the benefits and challenges associated within application of communications and collaboration technologies across all sizes of enterprises. Moreover, in future, more attention would be made towards developing cross-platform interoperability of communications and collaboration technologies in such a manner that a new version could inherit the functionalities of its previous version. This development is also expected to facilitate SMEs and large enterprises to gain maximum leverage of communications and collaboration technologies in their business operations.

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