

# Mobile computing technology impact on mobile telephony



**ASSIGN  
BUSTER**

## **1. Introduction**

Traditional mobile telephony is associated predominantly with first and second generation (1G and 2G) communication networks. These technologies enabled voice to be transmitted through radio and digital channels. It is widely known that the only function of the earliest mobile phones were to provide a two-way communication through the voice channel (Zheng and Ni, 2006: 82), where the parties could simultaneously speak and hear each other. Nevertheless, the traditional understanding of mobile telephony has undergone considerable changes recently. Contemporary mobile operators already use third and fourth generation (3G and 4G) communication networks (Talukdar, 2010: 38) and these new generations of mobile phones support such functions as video calling, mobile TV, MMS, high-speed internet access and complex mobile applications and this breakthrough was possible due to the fast development of mobile computing technologies (Talukdar, 2010: 38; Heckmann, 2005: 20). The literature review is aimed at a critical discussion of the impacts produced by mobile computing on traditional mobile telephony.

## **2. Theories on Mobile Computing and Its Influence**

In accordance with Mastorakis (2009: 479), mobile computing may be defined as a form of interaction between a human and a computer implying that a computer device may be easily transported by the user. The researcher states that the key mobile computing devices are laptops, palmtops, smartphones and ordinary mobile phones (Mastorakis, 2009: 479). This section of literature review critically discusses the main theories on the development of mobile computing and its influence on the mobile telephony.

## **2. 1. Aspect Models of Mobile Computing**

It is argued by Boronowsky et al. (2006: 11) that mobile computing can be viewed through the prism of the three-aspect model. The researchers have built a theoretical framework, which identifies three main aspects of mobile computing, namely mobile communication, mobile software and mobile hardware. The first aspect, mobile communication, means that mobile computing is impossible without particular data protocols, properties of communication, data format and the data transfer technologies (Boronowsky et al., 2006: 11). The second aspect, mobile software, implies that special mobile applications are necessary for mobile computing. Finally, the mobile hardware aspect emphasises that the mobile computing development requires innovation in mobile devices and components (Boronowsky et al., 2006: 11).

It may be critically remarked that the three-aspect model provides a theoretical grounding to the impact of mobile computing technologies on traditional mobile telephony: correspondingly, the influence is also three-aspect. Firstly, technological progress in mobile computing has led to the development of mobile communication and more specifically data protocols, methods of data transfer and types of communication networks have changed (Grant and Meadows, 2006: 173). Secondly, the development of mobile hardware has led to technological innovations of mobile phones and smartphones as they acquired new functions such as internet access, Bluetooth, mobile cameras, accelerometer, etc. Thirdly, technological progress in mobile software stimulated the development of mobile phone applications (Business Link, 2010: 1).

An alternative aspect model of mobile computing was formulated by Heckmann (2005: 20). The researcher argues that “ since the interaction with intelligent environments supposes that the user can move around, results from the research area of mobile computing can be integrated into the situated interaction within ubiquitous computing” (Heckmann (2005: 20)). The model is two-aspect and Heckmann (2005: 20) identifies device-related and human-related aspects of mobile computing. This model is different from the framework provided by Boronowsky et al. (2006: 11) where the latter singled out software and hardware aspects. Heckmann (2005: 20) includes the hardware and software aspects into the device category and it can be assumed that the model offered by Heckmann (2005: 20) is less detailed. Nevertheless, it emphasises the importance of human-related aspects.

In accordance with Heckmann (2005: 20), the impact of mobile computing on traditional mobile telephony has two dimensions. Both devices and users have undergone changes during the process of technological development (Dawson, 2005: 63), however, the human-related aspect is less relevant for this research project since it is focused on the changes in mobile hardware and software.

## **2. 2. Level Models of Mobile Computing**

Level models of mobile computing reveal hierarchical structure (Goggin and Hjorth, 2008: 47). Kumkum (2010: 3) formulated the three-level model of mobile computing. The researcher differentiated between such levels as macro mobility, micro mobility and ad hoc mobility. Macro mobility is associated with the growth of the global communication network and positive environmental influences. For instance, it is impossible to forecast <https://assignbuster.com/mobile-computing-technology-impact-on-mobile-telephony/>

substantial technological advances in mobile hardware and software if communication networks are local and small (Kumkum, 2010: 3). Micro mobility is associated with the mobility characteristics of a particular device and it is argued that this level is subjected to the macro mobility level. In other words, there is no need to stimulate micro mobility if macro mobility is limited. Furthermore, mobile devices should not be small in size if there are only local communication networks. Kumkum (2010: 3) argues that ad-hoc mobility is situational mobility which refers to every particular act of information sharing.

The three-level model can be critically evaluated only with the reference to the discussed question. The mobile telephony network is global, which means that the macro mobility level is not limited to only local communication frameworks (Mastorakis, 2009: 479). In turn, micro mobility is not limited either as typical mobile phones and smartphones can be used with mobile operator networks all over the world. According to the model, this stimulates further growth of mobile computing technologies in mobile telephony. Furthermore, unlimited macro mobility has led to greater micro mobility. Mobile phones would be useless if they were very large and heavy and vice versa, if mobile phones were large and heavy, macro mobility would be limited (Kotulic and Clark, 2004: 597). The strength of the model is that it explains the relationship between mobile computing and mobile telephony. However, one of the weaknesses is that the ad-hoc mobility level is not given enough attention by Kumkum (2010: 3). It can be argued that ad-hoc mobility implies conditions in which data transfer occurs (Mastorakis, 2009: 479).

Alternatively, Umar (2006: 29) argues that mobile computing has always been implemented in commercial projects. Hence, the development of mobile computing and its influence are determined by the relationships between consumers and businesses. For this reason, the scholar differentiates between three levels of mobile computing, namely customer level, B2C [business to customer] and B2B [business to business] (Umar, 2006: 29). Nevertheless, it may be critically remarked that the three-level model has excessive focus on commercial relations between the users and sellers of mobile computing technologies (Srivastava and Teo, 2009: 267).

### 2. 3. Result Models of Mobile Computing

Kaschek (2008: 135) gave theoretical grounding to the process migration model of mobile computing. It is suggested that this theory can be presented as a result model since it emphasises particular benefits and effects of the technology. Kaschek (2008: 135) argues that process migration is one of the key benefits of mobile computing, where process migration means that mobile devices can 'share' processes within a communication network. It does not matter if this network is wireless or wired, indeed, mobile computing is useless without the migration of processes. Kumkum (2010: 3) agrees that "it enables movement of the programming environment and application to desired location" (Kumkum, 2010: 3). Furthermore, it is summarised that "the resulting flexibility and reliability are important and necessary" (Kumkum, 2010: 3).

The influence of advanced mobile technologies may be seen in the fact that mobile devices are now able to share a greater number of processes. For instance, the earliest mobile phones were able to send and receive data only

in the voice format. Technological progress in mobile computing has enabled the sharing of data in different formats such as pictures, video signals, multimedia files, audio files, etc. (Goggin and Hjorth, 2008: 115). It is also reported that new technologies of voice sharing have appeared. For example, there is Voice over Internet Protocol (VoIP) technology, which allows mobile devices to send voice via the internet instead of the traditional telephone channel. This technology is widely implemented in contemporary mobile phones and smartphones and can be viewed as another influence of mobile computing on traditional telephony (Talukdar, 2010: 38).

Nevertheless, not all theorists are ready to admit the positive influence and results of mobile computing. Upadhyaya (2005: 173) argues that the development of mobile computing has led to considerable security problems. Free access public networks do not guarantee that the personal information of a user will be protected. Furthermore, mobile phones and smartphones have weaker software and hardware resistance to viruses and other malware (Business Link, 2010: 1). Bernardo and Bogliolo (2005: 241) are convinced that the development of mobile computing technologies has led to the increased power consumption of mobile devices. The point is that contemporary mobile applications and large-size screens of smartphones require more power. As a result, consumers are not able to use their devices for a long period of time. In addition, the size of the battery has also increased, which can be considered a serious limitation to the micro mobility of devices (Kotulic and Clark, 2004: 597).

Another negative result of mobile computing are the potential health

hazards. It is argued by Cerin and Li (2007: 247) that the development of <https://assignbuster.com/mobile-computing-technology-impact-on-mobile-telephony/>

mobile computing has led to serious health risks. For instance, the number of car accidents with the drivers using mobile devices has increased recently (Cerin and Li, 2007: 247). It may be argued that all these negative influences and limitations have changed the mobile telephony. Mobile computing has made mobile devices multi-functional and 'smart'. However, at the same time it has come with side effects.

### **3. Hardware and Software Strategies of Nokia and Apple**

As it is suggested by the given theories, the traditional mobile telephony has been always influenced by innovations and advances in mobile computing technologies. For instance, it is reported by Bradley (2011: 1) that Nokia, one of the largest communication companies, entered a strategic alliance with Microsoft. This decision should be understood as a software strategy of the Finnish company. In the near future, Nokia's smartphones will support the Windows Phone 7 operating system. It is argued that "for Nokia to bet on Microsoft's new phone platform is an incredible vote of confidence but it is also a natural partnership given the various points of synergies" (Bradley, 2011: 1). Windows Phone 7 is a completely new level of mobile computing and this mobile operating system is a powerful platform for individuals and businesses. Furthermore, the software strategy is also aimed at strengthening Nokia's competitive advantage against Apple (Bradley, 2011: 1).

It is expected that the adoption of the Windows Phone 7 OS by Nokia's smartphones will enable the use of more advanced applications.

Furthermore, Nokia will continue a building software base for its touchscreen technologies and the new operating system allows for more efficient human-  
<https://assignbuster.com/mobile-computing-technology-impact-on-mobile-telephony/>



device interaction. Finally, Nokia's users will be able to use Microsoft Office applications directly from their phone (TechNet Magazine, 2011: 1). The software strategy of Nokia is consistent with the three-aspect model formulated by Boronowsky et al. (2006: 11). The level model by Umar (2006: 29) can be also applied to this strategy and Nokia used this strategic decision to introduce changes in customer and business levels.

In accordance with the Mac Daily News (2007: 1), " Apple's practice of producing equivalent consumer and professional applications suggests they may pursue professional versions of iWeb or iTunes" (Mac Daily News, 2007: 1). The company's software strategy is to develop creative applications, which will be demanded in the market. Regardless of the fact that there are equivalents produced by competitors, Apple is not afraid of providing an alternative. At the same time, the company has always remained highly innovative. For instance, the company developed the multi-touch ecosystem, which influenced human-device interaction to a considerable degree (Info World, 2009: 1).

Apple's hardware strategy has always revealed that mobile telephony is influenced by advances in mobile computing technology. For example, iPad 2, the second generation of Apple's tablet computer, was launched in March 2011. Regardless of the fact that sales of the iPad 1 were still successful, the company introduced a new device (Mobile Computing Today, 2011: 1). It should be specified that iPad contains a 3G module, which enables it to be used for mobile telephony. In addition, the device provides rich possibilities of using various applications, internet and accelerometer. The only

significant difference with the iPad 2 is that the second generation device  
<https://assignbuster.com/mobile-computing-technology-impact-on-mobile-telephony/>

acquired back and front cameras and this provides greater possibilities for video calling (Word Cast, 2011: 1). As it may be understood, the iPad is an example of a multi-format device. It is a mobile tablet computer, which provides rich multimedia and communication possibilities.

#### **4. Empirical Evidence**

Herzog et al. (2007: 495) pursued an empirical investigation, which was aimed at the identification of the relationship between mobile computing advances and the development of mobile telephony. The researcher conducted a case study of Germany and its telecommunication industry. Herzog et al. (2007: 495) obtained secondary data from the Mobile Research Centre in Bremen. It is concluded that the recent innovations in mobile computing have a multi-aspect effect on mobile telephony. The scholars argue that the main aspects of the effects are the development of hardware and software (Herzog et al., 2007: 495). For instance, it is reported that Siemens made serious attempts to increase battery capacity in mobile devices. Furthermore, all mobile phone producers constantly upgrade software so that mobile devices could support new applications.

One of the main advantages of the case study conducted by Herzog et al. (2007: 495) is that the researchers identified and measured the influence of mobile computing on traditional mobile telephony. The findings may be compared with the three aspect model formulated by Boronowsky et al. (2006: 11). Herzog et al. (2007: 495) analysed only two of the three aspects: hardware and software, however, the researcher failed to consider the aspect of mobile communication. Another limitation may be seen in the fact that the results of case studies can hardly be generalised.

<https://assignbuster.com/mobile-computing-technology-impact-on-mobile-telephony/>

Fjellheim et al. (2005: 75) pursued a different empirical investigation aimed at the analysis of limitations associated with mobile computing. The researchers argue that “ mobility raises new issues such as more dynamic context, limited computing resources, and frequent disconnections” (Fjellheim et al., 2005: 75). Regardless of the fact that mobile technologies are transportable and convenient to use, they have important limitations and weaknesses. According to the scholars, the most important limitations are energy consuming software, low battery capacity and security problems. Fjellheim et al. (2005: 75) argue that mobile computing technologies do not solve the problems of mobile telephony but simply add new ones. The findings of the researchers can be compared with the arguments provided by Upadhyaya (2005: 173) and Bernardo and Bogliolo (2005: 241). One of the key weaknesses of the study is that Fjellheim et al. (2005: 75) are excessively pessimistic about the development of mobile computing.

## **5. Summary**

It may be summarised that the key theories on mobile computing and its development are aspect, level and result models. Aspect models identify such dimensions of mobile computing as mobile communication, mobile software and mobile hardware. From this standpoint, the impact of mobile computing on traditional mobile telephony has three dimensions. Level models single out such levels as macro mobility, micro mobility and ad-hoc mobility and this theory implies that micro mobility is always limited by the degree of macro mobility. In the case of mobile telephony, this limitation is reduced to a minimum. Finally, the result models suggest that the influence of mobile computing may be both positive and negative: positive influence

was seen in the process migration; negative influence is associated with security problems and power consumption. Nokia and Apple were found to have different software and hardware strategies and Nokia relies on strategic alliances to gain new mobile computing technologies, whereas Apple conducts a strategy of innovation and product differentiation.

## References

Bernardo, M. and Bogliolo, A. (2005) Formal methods for mobile computing: 5th International School on Formal Methods for the Design of Computer, New York: Springer.

Boronowsky, M., Herzog, O., Knackfuss, P. and, Lawo, M. (2006) 'Wearable computing - an approach or living labs' 3rd International Forum on Applied Wearable Computing, Berlin: VDE Verlag.

Bradley, T. (2011) 'Analysis: Nokia-Microsoft deal is a win for Apple', [online] Available at: <http://www.macworld.com.au/news/analysis-nokia-microsoft-deal-is-a-win-for-apple-24333/> [Accessed 22 April 2011].

Business Link (2010) 'Information security best practice', [online] Available at: <http://www.businesslink.gov.uk/bdotg/action/detail?itemId=1075406928&type=RESOURCES> [Accessed on 7 December 2010].

Cerin, C. and Li, K. (2007) Advances in grid and pervasive computing: second international conference, New York: Springer.

Dawson, R. (2005) Developing knowledge-based client relationships: the future of professional services, 2nd ed., New York: Elsevier, p. 63.

Fjellheim, T., Milliner, S. and Dumas, M. (2005) 'Middleware support for mobile applications', International Journal of Pervasive Computing and Communications, Vol. 1, Issue 2, pp. 75-88.

Goggin, G. and Hjorth, L. (2008) *Mobile technologies: from telecommunications to media*, London: Taylor & Francis.

Grant, A. and Meadows, J. (2006) *Communication technology update*, New York: Focal Press.

Heckmann, D. (2005) *Ubiquitous user modelling*, New York: IOS Press.

Herzog, O., Boronowsky, M., Ruge, I., Glotzbach, U. and Lawo, M. (2007) 'The future of mobile computing: R&D activities in the state of Bremen', *Internet Research*, Vol. 17, Issue 5, pp. 495-504.

Info World (2009) 'Apple's iPhone software strategy moves me', [online] Available at: <http://www.infoworld.com/t/platforms/apples-iphone-software-strategy-moves-me-646> [Accessed 22 April 2011].

Kaschek, R. (2008) *Information Systems and E-Business Technologies: 2nd International United Information Systems Conference*, New York: Springer.

Kotulic, A. and Clark, J. (2004) 'Why there aren't more information security research studies,' *Information & Management*, Vol. 41, pp. 597-607.

Kumkum, G. (2010) *Mobile Computing: Theory and Practice*, Delhi: Pearson Education India.

Mac Daily News (2007) 'Where might Apple go next in their software strategy?', [online] Available at: [http://macdailynews.com/2006/07/24/where\\_might\\_apple\\_go\\_next\\_in\\_their\\_software\\_strategy/](http://macdailynews.com/2006/07/24/where_might_apple_go_next_in_their_software_strategy/) [Accessed 22 April 2011].

Mastorakis, N. (2009) *Proceedings of the European Computing Conference*, New York: Springer.

Mobile Computing Today (2011) 'iPad 2 launches in the UK', [online] Available at: <http://www.mobilecomputingtoday.co.uk/news/article/ipad-2-launches-in-uk> [Accessed 22 April 2011].  
<https://assignbuster.com/mobile-computing-technology-impact-on-mobile-telephony/>

Srivastava, S. and Teo, T. (2009) ' E-Government, E-Business, and National Economic Performance', Communications of AIS, Vol. 26, pp. 267-286.

Talukdar, A. (2010) Mobile Computing, 2E, New York: Tata McGraw-Hill Education.

TechNet Magazine (2011) ' Windows Phone 7: Enterprises Go with Windows Phone 7', [online] Available at: <http://www.macworld.com>.

[au/news/analysis-nokia-microsoft-deal-is-a-win-for-apple-24333/](http://www.macworld.com/au/news/analysis-nokia-microsoft-deal-is-a-win-for-apple-24333/) [Accessed 22 April 2011].

Umar, A. (2006) Mobile Computing and Wireless Communications, 2nd ed., New York: NGE Solutions.

Upadhyaya, S. (2005) Mobile computing: implementing pervasive information and communications technologies, 2nd ed., New York: Springer.

Word Cast (2011) ' Apple iPad 2 Announced: Pushing Mobile Tablet Computing Further', [online] Available at: <http://wordcastnet.com/2011/apple-ipad-2-announced-pushing-mobile-tablet-computing-further/> [Accessed 22 April 2011].

Zheng, P. and Ni, L. (2006) Smart phone and next generation mobile computing, New York: Morgan Kaufmann.