

What do you understand by the concept of technological convergence and what are its key trends?

1. How to Understand the Concept of Technological Convergence

Technological convergence is one of the most fundamental elements of convergence. Generally, it could refer to “a trend where some technologies having distinct functionalities evolve to technologies that overlap, i.e. multiple products come together to form one product, with the advantages of each initial component”¹. However, as one of the most comprehensive terms in Information and Communication Technologies (ICTs), technological convergence means far more than that. In this paper, we are going to explore its concept and key trends from different perspectives.

1.1 Technological Foundation

Both digitalisation and Internet Protocol (IP) technology are crucial technological foundation of technological convergence. Their synergy provides essential opportunities for convergence to take place at every level of ICT value chains. They not only provide the possibilities of creating and developing new unified IP-based services inside or across traditional industrial boundaries (e.g., VoIP^a, IPTV^b, etc.), but also make it possible to enable a common IP platform to support all the various services. Moreover, they greatly speed up the separation of different layers and therefore facilitate the transformation from a vertically-integrated structure to a horizontally-convergent structure.

1.2 Convergence along the Value Chain

One of the best ways to understand technological convergence is to explore it along the ICT value chains. As we will discuss, technological convergence has been taking place at every level of the value chains.

1.2.1 From a Vertically-Integrated to a Horizontally-Convergent Structure

Traditionally, service providers have used different types of networks to deliver different kinds of services, and end users typically use different terminals/devices to receive respective services. With the development of convergence, the traditional boundaries have been broken, and these closed, separately vertical structures are being changed into a converged horizontal structure, with services independent from networks and terminals/devices.

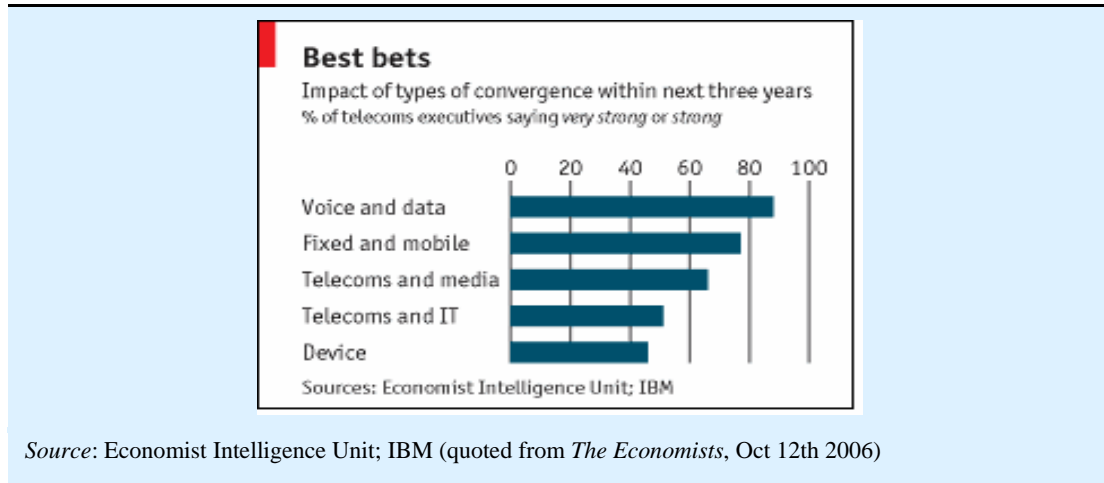
1.2.2 Technological Convergence at Content/Services Level

As we discussed above, on the foundation of digitalisation and IP technology, different services (fixed line, mobile, broadcast, etc.) and content (voice, data, video, etc.) will simply be different digital applications on a unified IP network. From this perspective, there are no essential differences between the services or the contents.

^a Voice over Internet Protocol.

^b Internet Protocol Television.

Technological convergence provides great opportunities to create and develop various customized and mobility services according to each individual's personal need. For example, according to a customer's requirement of the Quality of Service (QoS) and his/her budget, when the customer is at home, his/her "mobile" call might automatically go through the fixed line, and when he/she is outside, it could be switched seamlessly among all the wireless networks (e.g., Wi-Fi^c, WiMax^d, 3G, etc.) according to the optimal performance-price ratio.



1.2.3 Technological Convergence at Network Level

At the network level, instead of using different networks for different contents and services, an IP-based Next Generation Network (NGN) will most likely be used to control and transport all digitalized content and services. It will be able to provide various levels of end-to-end QoS, and customers can enjoy services of the same or even better quality than before.

Based on the same NGN core network, various access networks (e.g., cable, fibre, 3G, etc.) could have great interconnectivity and interoperability, supporting seamless roaming between each other with the same terminals. Moreover, with another style of "convergence" in the network – "common capabilities" (e.g., authentication, content repurposing, etc.), service providers could provide new convergent services faster and at lower cost².

1.2.4 Technological Convergence at Terminals/Devices Level

Technological convergence here means the functions integration of previously separate terminals/devices. With one convergent terminal/device (e.g., mobile, TV, gaming console, etc.), people can enjoy the services which could previously only be provided by several terminals/devices. Moreover, these convergent terminals/devices could have a good interoperability, i.e., the content/services provided by one terminal/device could be transmitted to other convergent terminals/devices as well. For instance, a movie being watched on a mobile could be easily transmitted to a TV to share with friends. Moreover,

^c Wireless Fidelity.

^d Worldwide Interoperability for Microwave Access.

convergent terminals/devices could have the ability to seamlessly roam between different access networks.

2. Key Trends of Technological Convergence

In the discussion above, we have explored the concept of technological convergence and its trends at different levels along the value chain. From another perspective, when we observe technological convergence as a whole, providing ubiquitous services by ubiquitous networks and devices will be the key trends in its development.

Ubiquitous services means always-on services at any time, any place by anyone using anything³. As Ray Ozzie, the chief software architect of Microsoft has said, “We’re in a new era – an era in which the internet is at the centre”⁴. With the development of Radio-frequency identification (RFID), sensor, smart thing, nanotechnology³ and IPv6, not only the current terminals/devices we are using (e.g., mobile, TV, etc.) but also anything else (e.g., consumer electronics, key, wallet, etc.) could be always connected to the Internet, which provides the always-on communication, interconnectivity and interoperability between humans, human and things and even between things themselves³.

As described in “The Internet of Things”, ubiquitous networks and devices imply that “the increasing ‘availability’ of processing power would be accompanied by its decreasing ‘visibility’”³. We can assume that one day, their existence might be forgotten by us because they have deeply penetrated into every part of our daily lives. As one of the most famous Chinese proverbs described in more than two thousand years ago: “The greatest form is out of sight and has no shape⁵”.

3. Conclusion

In this paper, we first examine the concept of technological convergence and its trends at each level of the ICT value chains. We then explore the key trends of technological convergence as a whole. Although there are still many issues which have not yet been properly solved (e.g., security, QoS, etc.), technological convergence has been playing an increasing important role in people’s everyday lives.

Reference

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