

Chapter 15

Digital Technology in the 21st Century

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ABSTRACT

Have digital technologies reached their full potential? It seems pretty clear that the answer is no. All aspects of digital technology continue to evolve as scientists make discoveries, managers incorporate these discoveries into their products and services, government agencies utilize new technologies to improve service provision and information management, and social scientists investigate the impact these new technologies may have on social interaction, the global economy, and society as a whole. This chapter describes recent developments in a range of digital technology areas including input devices, output methods, storage technology, process technology, and various applications including enhancement of the sensory rich environment enabled by digital technology, deep Web search, online language translation, improved security methods, automated payment systems, and interplanetary Internet. Impacts on broader societal institutions such as healthcare, government services, higher education, political campaigns, cybercrime law enforcement, and life at home are also identified. Digital technology trends and implications for digital product managers are discussed as well as directions for future research.

INTRODUCTION

Existing digital technology is capable of storing and processing vast amounts of data as well as enabling user-friendly interaction between machines and people, but there is still a lot of room for improvement. Digital technology is based

on electromagnetic storage and processing using billions of switches that can be set to one of two positions – on or off. This basic concept has been around since the development of the first electromagnetic computers prior to World War II and has enabled input, processing, output, storage, and telecommunications, and the development of numerous applications that support a wide range of human activities.

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In many of the previous chapters the focus has been on developments in digital technology, applications, business strategy, and related societal issues that have occurred in the past decade or two. The primary purpose for this chapter is to present and discuss technologies that are currently under development and will most likely be available in the early part of the 21st century. These new and potential technologies will enable new applications and also create opportunities and threats for existing digital product companies. They are also likely to impact our global society because they will enable new forms of computing, applications, sensory-rich machine/user interaction, and electronic communications.

This chapter is organized as follows. First, basic digital technologies available during the past few decades are presented to provide a baseline for identifying areas for improvement across the spectrum of present technological capabilities. In the main section for this chapter several examples of interesting new digital technologies are presented and discussed to identify some of the potential improvements in this area that may be adopted in the 21st century and provide opportunities for new digital products, digital services, and improved information search and communications.

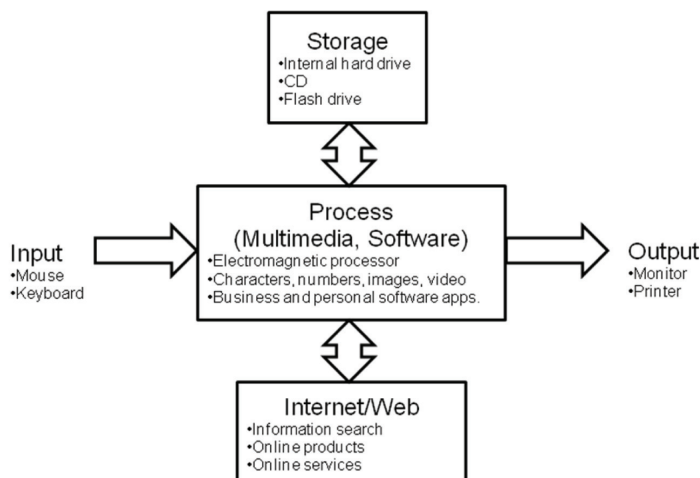
Next, impacts on broader societal institutions such as healthcare, government services, higher education, political campaigns, cybercrime law enforcement, and life at home are identified. The chapter concludes with a discussion of trends and directions for future research associated with new digital technologies and applications.

BACKGROUND

Most digital technologies fall into one of the following categories: input technology, process technology, output technology, storage technology, telecommunications technology, multimedia protocols, software applications, and Internet/Web protocols and applications. Figure 1 describes the relationship between these digital technologies and lists some common examples available at the end of the previous century.

Each of these examples is a big improvement over the earliest digital technologies available in the 1940s and 1950s (Turban & Volonino, 2010). Early input and storage methods involved punch cards and magnetic tapes. They were slow, took a lot of space, and only supported the simplest forms of sequential file processing. Early proces-

Figure 1. Common digital technologies in the late 20th century



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