

OpenCourseWare

Theory of Information and Communication

Sara Martínez Cardama

Lisandra Otero Borges

6.1 Digital Media



Media: From Analog to Digital

Digital media have their roots in the analog world. The history of media reflects an evolution that mirrors humanity's cultural, technological, and social advancements. From the earliest forms of visual communication, such as cave paintings, messages evolved through physical media like papyrus and parchment, culminating in the development of paper in China. These media facilitated the dissemination of information and knowledge, though in a limited and labor-intensive manner. However, the true turning point came with Johannes Gutenberg's invention of the movable-type printing press in 1440. This innovation revolutionized communication by enabling the mass production of written texts, with the first major printed work being the renowned *Gutenberg Bible* in 1455.

From this point, according to Badanes (2014), access to information expanded immensely, laying the groundwork for modern media. The printing press represented the most profound disruption in Western intellectual history. Its ability to produce texts in large quantities broke the Catholic Church's monopoly on written communication, allowing ideas to circulate beyond ecclesiastical control. This process fostered the growth of critical thinking, challenging religious dogma and paving the way for the Protestant Reformation, the Enlightenment, and other intellectual movements that would transform Europe.

The development of the printing press was not an isolated event but a response to a growing demand for written communication driven by various factors. Commerce, with its need to record transactions and agreements, required a more efficient system than manual writing. Cultural transmission, with the necessity to preserve and disseminate knowledge, also benefited from the printing press. It not only revolutionized book production but also laid the foundations for the development of media as we know it today.

Periodic press, a direct product of the printing press, emerged in the second half of the 16th century with weekly informational publications in major European capitals, already conceived as commodities. However, according to Thompson, the origin of modern newspapers can be traced to the first two decades of the 17th century, when weekly publications began to appear with a certain level of reliability. Daily newspapers, in contrast, would not emerge until the 18th century (Badanes, 2014).

Other analog technologies that, like the printing press, marked milestones include the telegraph in the 19th century. The telegraph revolutionized communication by separating the act of communicating from the physical transportation of messages for the first time. This innovative technology enabled the near-instantaneous transmission of information across great distances, transforming social, political, and economic organization. Its impact was particularly notable in areas such as warfare, financial information, and diplomacy, fundamentally altering the management of public and private affairs (Fang, 1997).

Photography, which emerged in the 19th century, established itself as a fundamental medium of communication by allowing the precise and permanent capture and reproduction of visual reality. Early cameras, like the daguerreotype, operated with a dark box and a lens that let light project an image inside. To capture the image, metal plates coated with light-sensitive chemicals were used, requiring long exposure times. The image was then developed through a chemical process that permanently fixed it to the plate.

This transformed documentation, art, and collective memory, profoundly impacting how visual information is created, shared, and consumed (Fang, 1997). By offering an objective representation of the world, photography opened new possibilities for documenting historical events and exploring nature. Moreover, like the printing press, it democratized access to visual information, enabling a wider audience to view images previously reserved for elites.

According to Simonson et al. (2019), this mass access fostered the formation of a common and universal visual culture in which people, regardless of origin, could share the same images and visual experiences. Beyond documenting reality, photography also evolved as a powerful narrative and artistic tool, capable of capturing emotions and telling stories, enriching society's cultural and expressive landscape.

Radio, which emerged in the early 20th century, stands out as a key technology that democratized access to information and entertainment. Its ability to transmit sound wirelessly to a mass audience transformed how people received information, entertained themselves, and connected with the world (Badanes, 2014). In its early days, radio operated by transmitting radio waves generated by a transmitter, which were sent through the air and received by radios. These waves carried audio signals via amplitude modulation (AM), which receivers converted into audible sounds. Initially, radio systems transmitted Morse code signals, but they quickly evolved to allow the transmission of voice and music.

A clear example of the impact of radio and the telegraph was the failed coup against Mikhail Gorbachev in 1991, when communist leaders attempted to reverse his liberal reforms. Despite being under house arrest, Gorbachev received external information through shortwave radio stations such as the BBC and Radio Free Europe. Meanwhile, Boris Yeltsin used Voice of America to organize resistance and mobilize the public, illustrating how access to information through these technologies challenged authoritarian control in an era of global communication (Fang, 1997).

Cinema and television, though both emerged in the 20th century, followed distinct but complementary paths in the evolution of media. Television, unlike other technologies, was widely anticipated, and society's eagerness for its arrival reflected a desire for new ways to access information and entertainment. However, its development was delayed by World War II, setting it apart from other media, such as radio, which were accelerated by the conflict (Logan, 2001).

Once television was established, its adoption was rapid and transformative, quickly integrating into daily life and becoming the focal point of the home, displacing other objects that previously occupied that spot. By the 1960s, television had solidified its role as a mass medium, with a significant influence on social habits, politics, and popular culture (Fang, 1997). Its ability to transmit images and sound in real-time made it a powerful tool for shaping public opinion and playing a key role in shaping historical and social events.

According to Logan (2001), cinema emerged as a mass medium during the third information revolution, in a context of increasing urbanization and the demand for new forms of entertainment and communication. The film industry rapidly developed with production and distribution structures that turned cinema into a lucrative business, though this growth also limited access for the working classes due to rising ticket prices. Additionally, cinema spurred constant technical and artistic innovation: from special effects and surround sound to digital animation and virtual reality. These technologies expanded narrative and visual possibilities, providing filmmakers with tools to communicate ideas in more creative and impactful ways.

ARPANET, created by the U.S. Department of Defense's Advanced Research Projects Agency (ARPA) in the late 1960s, emerged as the first packet-switching data transmission system, laying the foundation for the internet. Conceived during the Cold War to connect universities and research centers, its design ensured that information would persist even if some nodes failed, though it never had a direct military application (Badanes, 2014). By the 1970s, ARPANET began transitioning to commercial use, fuelled by online services like CompuServe in 1979, which facilitated public access and marked the beginning of the commercial internet.

The 1990s marked another milestone in the evolution of digital media with the birth of the World Wide Web, conceived in 1989 by Tim Berners-Lee, a British scientist at CERN, the Swiss particle physics research center. Berners-Lee created the web to facilitate information exchange among CERN researchers, but its impact was far broader: the web allowed the creation of websites and information portals, democratizing content publishing and offering unprecedented access to information. The arrival of the web in the early 90s transformed the media landscape, giving rise to new media forms and prompting traditional media to adapt to the digital environment.

The evolution of the web in the early 2000s toward Web 2.0 ushered in an era of interaction and collaboration, characterized by dynamic, interactive sites where users could create and share content, and the rise of social networks like Facebook, Twitter, and YouTube that transformed online communication. According to López-García,

Silva-Rodríguez, and Vázquez-Herrero (2023), during this period, user-generated content became the core of the web, driving new business models like online advertising and the sharing economy. Today, in the context of Web 3.0, a more decentralized ecosystem is emerging, where technologies like blockchain and AI give users greater control over their data and digital experiences. Additionally, concepts like the metaverse offer immersive virtual spaces, expanding the scope of social interaction and communication, signaling the direction toward an increasingly personalized internet controlled by its users.

Definitions and Features of Digital Media

According to Potter (2013), digital media refers to mass communication platforms that, although adapted to the digital age, retain certain core elements of traditional mass media. They are managed by complex organizations that produce and distribute messages on a large scale through standardized practices, enabling them to reach broad audiences simultaneously and publicly. Additionally, digital media take advantage of technological channels that extend the availability of messages across time and space, reaching a heterogeneous and considerable audience. The messages transmitted are seen as cultural products, charged with diverse symbolic meanings, aiming to both inform and influence culture. Furthermore, the senders employ active strategies for promotion and conditioning to retain and attract their audience, adapting to the fragmentation and convergence that characterize digital communication.

Potter (2013) defines digital media based on several intrinsic characteristics that distinguish them from mass media:

1. **The Sender:** In mass media, the sender is a complex organization with a formal structure that includes defined roles and responsibilities. This structure allows for the large-scale production and distribution of messages. Additionally, these organizations use standardized practices, ensuring coherence and efficiency in the creation and dissemination of content.
2. **The Channel:** Communication channels have a temporal reach that allows for simultaneous access to audiences in short periods. These messages are publicly accessible, meaning they are available to anyone without restrictions. The technology behind these channels extends messages across time and space, making them accessible from any location and at any time.
3. **The Audience:** The audience of mass media is relatively large, and its size makes individual interaction with the sender impractical. Moreover, the audience is heterogeneous, comprising diverse demographic, social, cultural, and ideological characteristics, which poses a challenge for senders in creating relevant content.
4. **The Message:** Messages in mass media are cultural products, meaning they are symbolic expressions that reflect and shape aspects of society's culture. These messages carry symbolic complexity, with multiple meanings that can vary depending on the social and personal context of each audience member.
5. **Sender's Strategy and Audience Experience:** Senders actively promote their content to attract a large audience, using marketing and communication strategies. They also seek to condition the audience through repeated exposure, creating engaging content and fostering consumption habits that generate audience loyalty.

Calvo, López-García, Aguar-Torres, J (2024), the define following characteristics can also be highlighted:

Immediacy: Digital media can disseminate information in real-time, unlike traditional media, particularly print journalism, which publishes at a slower pace. This rapidity has profoundly changed editorial routines, demanding greater agility and flexibility from journalists.

Hypertextuality: Digital media allows users to navigate between various contents and sources through hyperlinks, breaking away from the linearity of traditional media and offering greater freedom to explore information. Hypertextuality facilitates contextualization by enabling users to access original sources, additional data, and multiple perspectives on the same topic.

Interactivity: Digital media enable users to actively participate in communication by generating content, commenting, sharing information, and, in some cases, influencing the media agenda. This creates a direct dialogue between the medium and the audience, transforming the traditional one-way relationship between sender and receiver.

Multimedia: Digital media integrate various formats such as text, images, audio, and video, enriching the user experience and allowing a more attractive and comprehensive presentation of information. This multimedia capability also ensures content adapts to various devices and platforms, such as computers and mobile phones.

Convergence: Convergence refers to the fusion of different media and technologies into a single platform or device. Digital media has driven the integration of print, radio, television, and the internet, creating a complex, interconnected media ecosystem. This convergence has expanded the reach of traditional media, allowing them to distribute content across multiple channels.

Adaptation and Evolution: Digital media stand out for their ability to quickly adapt to new technologies and trends. Those that fail to innovate risk becoming obsolete and losing their audience. Constant adaptation is essential in an ever-changing media environment, with the emergence of new platforms, tools, and modes of information consumption.

In this context, hypertextuality is a crucial feature. According to Arias-Robles and García-Avilés (2016), hypertextuality is a fundamental yet debated and complex concept in digital media. Its essence lies in the ability to interconnect content through links, breaking away from the linear structure of traditional media and allowing users to access different sources and interpretations of information freely and flexibly. Hypertextuality enables deeper, more contextualized navigation, but its definition continues to evolve in response to new technologies and challenges in digital media.

Alonso-del-Barrio (2021) expands the concept of hypertextuality, suggesting that it is not limited exclusively to digital environments but constitutes a non-linear form of thinking that connects prior ideas and experiences, inherent to the process of learning and understanding. From this perspective, reading a text and integrating it with prior knowledge already represents a type of hypertextuality. Furthermore, in the context of touchscreens, the act of tapping for additional information is comparable to traditional hypertext, as it allows for non-linear access to new content. In native applications, this idea is expressed through layouts that facilitate navigation between blocks of content, allowing users to dive deeper without changing platforms. Alonso-del-Barrio presents hypertextuality as a broad and adaptable resource, expressed both in technology and in mental processes.

Hypertextuality can be defined as a structure of interconnected content through links, activated by the user, that allows for the exploration of information in a multilinear fashion within a digital environment. This concept involves a dynamic construction in which links act as the core connecting words, images, and other multimedia elements. The user's interaction is essential to activate and navigate these contents, which unfold in digital interfaces and promote a non-linear and flexible navigation experience (Arias-Robles & García-Avilés, 2016).

Convergence is another key characteristic that must be addressed from three perspectives: technological, economic, and content-related. These three perspectives are closely interconnected.

Technological Perspective:

Digitization: Technological convergence is based on the digitization of all media content. This process allows different types of media, such as text, audio, video, and images, to be transmitted and accessed through a single platform or device (Vukanovic, 2016).

Platform and Device Integration: Technological convergence has led to the creation of devices and platforms that combine functions and services that were previously separated. An example is smartphones, which allow access to the internet, television, radio, and calls all on one device (Vukanovic, 2016).

Disruption of Traditional Media: The digital age has disrupted traditional media by breaking down barriers between different forms of communication. Technological convergence has led to new forms of content production, distribution, and consumption, challenging traditional media models (Alonso-del-Barrio, 2021).

Economic Perspective:

Concentration of Media Ownership: Economic convergence refers to the trend of media companies merging and acquiring other companies to control multiple distribution platforms. This concentration aims to maximize the use of content and increase profits (Anim, 2013).

New Business Models: Convergence has driven the search for new business models in the media industry. The need to adapt to changing media consumption and the emergence of new technologies has led to experimentation with different monetization strategies (Karmasin, M., Diehl, S., & Koinig, I., 2016).

Competition and Divergence: While convergence drives concentration, it also generates competition and divergence in the market. The emergence of new players and the diversification of services and platforms intensify the competition for audience attention (Vukanovic, 2016).

Content Perspective:

Content Flow: Content convergence refers to the ability to distribute the same content across multiple platforms. An example is the distribution of news across websites, mobile apps, and social media (Ghellal, S. et al., 2016).

Transmedia Narratives: Convergence has encouraged the creation of transmedia narratives, where a story expands across different platforms and formats, enriching the user experience. Each platform adds a unique element to the overall narrative (Lugmayr & Dal Zotto, 2016).

User Experience: Content convergence focuses on creating engaging and meaningful experiences for the user. Integrating different formats and enabling interaction with content are key elements in creating these experiences (Lugmayr & Dal Zotto, 2016).

Classification of Media

According to Cebrián (2009), digital media can be classified into three categories within the context of the internet: matricial cybermedia, native cybermedia, and social cybermedia. Each of these types represents a distinct way of interaction and information distribution, adapting to the unique characteristics of the digital age and transforming traditional communication forms. This classification helps understand how media have evolved in response to digital technologies, offering new forms of participation and access to information.

Matricial cybermedia are communication media that originated in traditional formats such as print, radio, and television, and later adapted to the digital environment. Although they maintain connections to traditional media, these cybermedia have evolved to fully leverage the unique characteristics of the internet, offering new, more interactive, and dynamic forms of communication (Cebrián, 2008). Examples of this type of media include cybernewspapers, which are digital versions of printed newspapers, cyberradio, which are radio stations that broadcast their programming online, and cybertelevision, which are television channels distributing content on digital platforms. It is important to emphasize that they do not simply replicate their traditional formats but integrate innovations that transform the media consumption experience.

Native digital media, or native cybermedia, are those that emerged directly on the internet, without any antecedents in traditional media such as print, radio, or television. Although they initially reflected a strong influence of traditional

media, over time they have developed their own characteristics through a process of hybridization (Cebrián, 2008). Examples that could be included in this category are blogs, platforms where users publish content and foster debates; P2P networks, which facilitate file sharing among users; and Web 2.0, which includes social networks like Facebook, YouTube, and MySpace, where interaction and collaboration are promoted. These cybermedia, alongside matricial and social cybermedia, are transforming communication by incorporating interactivity as a central element, allowing users to be active participants in creating and sharing information.

Social cybermedia represent a significant advancement in networked communication, characterized by allowing direct interaction between members of civil society without traditional intermediaries. This exchange of information occurs independently of the companies controlling traditional media and matricial cybermedia. Unlike the latter, social cybermedia stand out for promoting direct dialogue and exchange between individuals, fostering independence from traditional media power structures. Furthermore, social cybermedia, along with matricial and native cybermedia, are transforming communication by making interactivity a central element, where users not only consume content but also actively participate in its creation and distribution.

Current Trends in Digital Media

One of the main current trends in digital media is the growing integration of Artificial Intelligence (AI), which is revolutionizing communication by analyzing large volumes of data to personalize content and marketing strategies. An innovative aspect is the emergence of virtual influencers, who offer brands a more controlled and stable narrative in the digital environment. According to de-Lima-Santos and Ceron, W. (2021), AI applications in the news industry focus on three subfields: machine learning, computer vision, and planning, scheduling, and optimization. However, they emphasize that AI should be viewed as a complementary tool, not a replacement, for journalists. This approach allows tasks to be performed more efficiently, but it preserves the need for fundamental journalistic skills, such as editorial judgment and ethical research.

In this context, the specialized platform for managing social media and digital media, Hootsuite, has identified key trends projected for 2025, highlighting how the interaction between brands, content, and audiences will evolve in the digital environment. These trends cover areas such as:

1. Growth of AI, which is transforming social media management by automating tasks such as content creation and data analysis. This includes tools to enhance creativity, optimize campaigns, and generate insights from interactions and mentions.
2. Social SEO: Social platforms are becoming alternative search engines. Users are increasingly searching for educational and entertaining content within social networks rather than turning to Google, which implies the need to optimize posts to improve discoverability.
3. Advanced social listening: The ability to track and analyze mentions of brands or specific topics allows companies to identify trends, manage brand perception, and respond quickly to public relations issues.
4. Strategic use of platforms: There is a focus on selecting the most relevant platforms for the target audience rather than trying to cover them all. Some brands are even reducing their presence on specific networks to focus on those that generate the greatest return.
5. Rise of "edutainment" content: Content that combines education and entertainment is gaining popularity, making posts both useful and engaging.
6. Adapting to the algorithm: With constantly changing algorithms, it is essential to understand how they work to ensure content reaches the desired audience. This includes keeping content relevant and up-to-date.

The convergence of streaming platforms, social networks, and video games is redefining the consumer experience in the media and entertainment sector, according to Deloitte (2024). This trend reflects a shift toward integrated ecosystems where users can enjoy diverse multimedia content in a single environment. For example, streaming platforms like Netflix are exploring strategies to include interactive elements inspired by video games, while social networks like TikTok are incorporating advanced editing tools that emulate professional software, attracting content creators of all ages.

This convergence generates new expectations among consumers, who demand immersive experiences, cross-platform accessibility, and personalized content. For businesses, this phenomenon requires a reevaluation of their strategies, prioritizing technological integration, innovation in storytelling, and leveraging data to anticipate audience preferences. In this regard, Deloitte (2024) highlights that this landscape is a driving force for investment in technologies such as artificial intelligence, augmented reality, and platforms in the metaverse, transforming not only consumption but also the ways content is created and distributed.