

Analysis of Technology-Driven Media Intelligence Process (Postprint)

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Abstract

This paper analyzes the critical aspects of recent developments in Internet technology, mobile communication technology, and smart terminal technology, and their impact on the media industry's structure, strategic transformation, and operational models. Based on the evolutionary patterns of technology, product, and industry life cycles, it offers recommendations for intelligent media development from the perspectives of media ecosystem construction, acquisition and merger development models, integration pathways between traditional and new media, and strategic transformation and management model reform.

Full Text

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Abstract: This paper analyzes the key recent developments in internet technology, mobile communication technology, and smart terminal technology, and their impacts on media industry layout, strategic transformation, and operational models. Based on the changing patterns of technology, product, and industry life cycles, the study proposes recommendations for intelligent media development from the perspectives of media ecosystem construction, acquisition and merger development models, pathways for traditional and new media convergence, and strategic transformation and management model reform.

Keywords: technology-driven; intelligent media; life cycle

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1.2 Current Status Analysis of Intelligent Media Development

Continuous technological advancement has driven the rise of the intelligent media era, profoundly impacting media content production, presentation, and dissemination. Content production has witnessed diversified exploration, particularly evident in the progressive scenarios of automated news, immersive interactive news, and sensor news [1]. Content presentation has become more diverse and cross-disciplinary, transitioning from two-dimensional to multi-dimensional and holographic formats. Supported by revolutionary VR/AR (virtual reality/augmented reality) technologies, journalists and audiences can experience on-site presence, becoming participants themselves and achieving cross-temporal news presentation. This makes interactions with readers more penetrating, personalized, and convincing [2]. In terms of content dissemination, social information collection, processing, and distribution have become fully intelligent, making personalized, scenario-based, and customized communication possible. Due to highly developed interactive communication and experience, a state of holographic communication can be achieved—fully restoring the process of social events and expressing the complete picture of news events [3]. Technological progress provides new pathways for media industry innovation while also imposing new demands on its development.

From the user's perspective, Hu Zhengrong defines intelligent media as being completely user-centered, with services based on user spatiotemporal contexts and scenarios [5]. Intelligent media is not simply about integrating rich content or understanding user needs through big data analysis, but rather achieving real-time intelligent matching between demand and supply in specific scenarios [6]. The emergence of intelligent media, especially trends in news production, is characterized by mechanization, intelligence, and distribution, primarily developing in five directions: personalized news, machine writing, sensor news, immersive news, and distributed news. Media content dissemination models have shifted from “singular” to “pluralistic,” employing multiple forms (Html5, interactive design, animation, 3D, etc.), multiple applications (WeChat, Weibo, APP clients, etc.), multiple terminals (television, mobile phones, tablets, watches, automobiles, VR, etc.), and multiple networks (digital television networks, internet, IPTV networks, etc.). Through the “Data+Story+Design” approach, content consumption has evolved from readable to visual, static to dynamic, and one-dimensional to multi-dimensional data presentation [7]. The ubiquitous acquisition of information by intelligent media has brought significant changes to users, including spatiotemporal extension, perpetual online information searching, media addiction, and changes in interpersonal communication styles [8].

1.1 Background of the Rise of the Intelligent Media Era

Technological progress forms the foundation driving intelligent media development. With the advancement of mobile communication technology and smart

terminal technology, the emergence of social media, and the continuous penetration of IoT, cloud computing, virtual/augmented reality, smart hardware, and big data technologies into the media industry [4], the evolution from web 1.0 to web 3.0 and from mobile cellular communications to 3G, 4G, and even 5G eras has catalyzed comprehensive evolution across media forms, content production, distribution channels, and user experiences. This has significantly expanded the media space previously dominated by humans, enabling the gradual development of intelligent media.

Competition between new media and traditional media serves as the driving force for intelligent media development. Supported by mobile internet and big data technologies, meeting users' personalized needs and customized demands has become possible, with various media forms continuously emerging. Intelligent media has become a crucial development direction for media institutions to achieve competitive advantage. The increasing internet-based intelligence of user behavior further propels media intelligence development. A new generation of internet users has become increasingly accustomed to searching for information, seeking entertainment, sharing information, and creating content on internet platforms [3].

2.1 Massive Data Provides Material Foundation for Media Intelligence

Internet development has laid the foundation for massive information generation. Internet applications have not only increased the volume of information but also diversified its types, while the emergence of smart mobile terminals enables real-time data generation. The more data available, the greater the utility for neural network technologies and machine learning capabilities in intelligent technologies, allowing for the development of more accurate algorithms. According to IDC's Digital Universe report, by 2020, annual data volume will reach 44 ZB (zettabytes), with a five-year compound annual growth rate of 141%.

The emergence of numerous social media platforms such as Twitter, Facebook, Weibo, and WeChat, the popularity of internet video networks like Hulu, iQiyi, LeTV, and Youku Tudou, and the launch of traditional media websites including Mango TV, CCTV.com, and Dragon TV, alongside established portals like Sina, NetEase, Tencent, AOL, and Yahoo, generate massive amounts of media data every moment. This vast data existence provides the foundation and possibility for media intelligence.

2.2 Improved Hardware Performance Provides Equipment Foundation for Media Intelligence

Computer CPU processing capabilities have continuously improved, reaching several GHz, while GPU capabilities for graphics processing have seen even greater advancement. GPUs and parallel architectures can train machine learning systems much faster than traditional CPU-based data center architectures.

By using graphics chips, networks can iterate more rapidly and achieve more accurate machine training in shorter timeframes. Simultaneously, reduced hardware costs ensure high cost-effectiveness [9]. The emergence of cloud services and cloud computing not only further reduces user costs in terms of hardware but also makes analysis and computation of larger-scale data possible, with improved speed and accuracy.

For media, video and images occupy an increasing proportion of processed objects, yet their retrieval presents greater challenges compared to text. These object types not only require substantial storage space but also involve greater difficulty in achieving precise retrieval. Therefore, hardware technology development provides the essential infrastructure for intelligent media development. Algorithms are tools for extracting patterns from data, and data provides the foundational material for algorithm refinement. Algorithms support system deep learning, thereby enhancing intelligence levels. For instance, open-source frameworks such as Berkeley's Caffe, Google's TensorFlow, and Torch have rapidly optimized and evolved. Netflix and Pandora both employ recommendation engines to determine what movies and songs to recommend to audiences, improving product targeting and dissemination effectiveness.

2.4 Development of Facial Recognition Technology Provides a Stepping Stone for Intelligent Media Upgrade

Google developed FaceNet and Facebook developed DeepFace to determine whether faces in photos perfectly match real faces. Apple acquired Emotient, whose technology determines emotional states by reading human facial expressions. Deep learning in artificial intelligence research has advanced computer vision, and these technologies have notably improved the quality of Apple's Siri, Amazon's Alexa, and Google's image recognition, demonstrating a promising future for enhanced intelligent media interactivity.

The in-depth development or value mining of intelligent technologies must possess the following resources: massive data, high-performance hardware, open algorithms, and continuously upgraded software. The media industry precisely possesses these advantages, providing a testing ground for intelligent technology innovation while intelligent technologies offer indispensable tools for the intelligent upgrading of the media industry.

3.1 Analysis of Technology Development History Related to Intelligent Media

Using time as the main analytical thread, this section selects key links in the development of internet technology, mobile communication technology, and smart terminal technology, as shown in Figure 1 [Figure 1: see original paper], to design a technology development path map for intelligent media and analyze how these technologies drive the media intelligence process. The development of internet technology and communication technology has exhibited both competi-

tive and mutually reinforcing relationships, showing an alternating development pattern along the temporal dimension. Before 2000, mobile communication technology remained in the 2G era, with analog phone performance continuously improving and wireless communication being the primary function. Media sectors did not yet perceive threats from these technologies, as they were preoccupied with the transition from analog to digital television.

From 2001 to 2006, digital mobile phone capabilities continuously improved, incorporating video and audio recording functions, quietly emerging as a new media carrier. Simultaneously, network technology advanced progressively, with continuously improving transmission speed and efficiency, advancing browser technology, and the successive launch of various internet websites, presenting another media terminal carrier before traditional media. As public attention gradually shifted from traditional television sets to mobile phones and PCs, some media organizations launched websites, though content generally consisted merely of duplicated television programs. Technology would bring revolutionary changes to traditional media operation models, integrating intelligence into every aspect from media planning and production to broadcasting and user feedback.

With the 2007 launch of the iPhone, the smartphone era began. Smartphones function like miniature television stations, capable of completing almost all major aspects of television station work except for quality production. Extremely low entry barriers led to explosive growth in self-media numbers. With Weibo launching in 2010 and WeChat in 2011, traditional media had to initiate the “two micros and one end” (Weibo, WeChat, and client app) new media transformation to address various challenges. However, constrained by traditional systems, the results were not ideal, especially when facing the 虎视眈眈 (aggressive posturing) of Google, BAT, and other internet companies regarding the media domain. On August 18, 2014, the central government’s “Guiding Opinions on Promoting the Integrated Development of Traditional and Emerging Media” formally required strategic transformation of the media industry at the policy level. Intelligent technology provides new pathways and selectable models for traditional media transformation.

3.3 Technology Development Causes Changes in Media Operation Models

Technology has driven revolutionary changes in traditional media operation models, integrating intelligence into every aspect from media planning, production, and broadcasting to user feedback. The entire process now interfaces with intelligent systems.

3.4 Technology Development Causes Strategic Transformation of Media Organizations

The development of technology has compelled media organizations to undergo strategic transformation. The emergence of smartphones and social media platforms has forced traditional media to adapt, while policy guidance has formalized the requirements for integration and transformation.

4.5 Management Model Reform is the Guarantee for Promoting Intelligent Media Development

Reforming the management model of the media industry according to intelligent media business processes, adjusting organizational structures, implementing refined management, and improving operational efficiency are essential steps. Recruiting and cultivating talent based on intelligent system requirements and establishing reasonable incentive systems and assessment mechanisms constitute the driving force ensuring media industry operation. In summary, technology development provides data materials, equipment infrastructure, and stepping stones for media intelligence. Only by making strategic choices and management model adjustments from a historical perspective and industrial height can media organizations promote their own healthy development and advance the media industry.

4. Technology Development Leads to Changes in the Media Field Pattern

The development of internet technology, mobile communication technology, and smart terminal technology provides the foundation for media convergence. Intense market competition has prompted telecommunications operators providing channels, media content producers, media terminal manufacturers, and network operators to both compete and cooperate within the media industry chain. Continuous mergers and acquisitions have caused tremendous changes in the media field pattern. Technology-driven transformation in the media industry and related industries has become an inevitable trend [1-4].

Technology development profoundly influences the media field, affecting media carriers, media production, and operation models, subsequently impacting media industry development strategies, corporate mergers, and industrial evolution. For media organizations, the ability to analyze and innovate in products, management, and strategy in real-time according to the life cycles of technology development and industry development is crucial for their own development.

4.1 Intelligent Media Ecosystem is the Platform for Intelligent Media Innovation

Intelligent technology provides the foundation for cross-platform innovation in media, integrating media content providers, distributors, advertisers, and users

onto a unified platform. Based on ecosystem operation mechanisms and platform management models, overall platform value maximization can be achieved. The formation of a healthy media ecosystem depends on both effective government policy guidance and efficient market resource allocation.

4.2 Acquisition and Merger are Important Forms of Media Ecosystem Reconstruction

New technologies develop so rapidly that even well-resourced corporations cannot master every direction of intelligent new technologies. Acquiring or merging with new companies that have been market-tested and achieved certain successes to obtain their technological advantages has become an important pathway for media organizations to master intelligent media new technologies. Cooperation among media content providers, channel operators, and network developers will increasingly adopt acquisition or merger models to achieve further integration of various media resources.

4.3 Integration with New Media is a Shortcut for Traditional Media Transformation

Due to systemic constraints and evaluation system guidance, traditional media focuses on dissemination effects and content quality, unable to invest substantial material and financial resources in new technology R&D. For new media, continuous growth is the survival principle, with value orientation requiring them to track and lead technology and market trends. Consequently, new media technologies are more likely to emerge in various enterprises. Integration with new media thus becomes a shortcut for traditional media to acquire new technologies.

4.4 Industry Technology Life Cycle is the Basis for Media Organizations to Formulate Strategy

The technology life cycle influences the product life cycle, which in turn influences the industry life cycle. The ability to objectively judge development stages of life cycles and make timely strategic adjustments becomes key to corporate success. Cases such as the transition from analog to digital television and from digital phones to smartphones have profoundly illustrated this point. Therefore, in the transition from digital television to smart television, the media industry must make objective judgments and wise choices.

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Note: Figure translations are in progress. See original paper for figures.

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