Promoting the Deep Integration of Technology and Content to Achieve High-Quality Development of Media Technology Work (Postprint)

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Abstract

Emerging technologies constitute indispensable drivers for the development of media convergence. In recent years, Xinhua News Agency has accorded significant priority to technological initiatives; pursuant to the directives of the Agency' s Party Leadership Group, the Technology Bureau has vigorously advanced the construction of a next-generation technological architecture centered on emerging technologies such as artificial intelligence and big data, while conducting comprehensive research on methodologies for fostering technology-content integration. This paper specifically examines the promotion of profound technology-content convergence through Xinhua' s practical experiences in deploying new technologies within journalistic contexts, identifying critical junctures in the technology-content integration process, and leveraging mainstream media advantages to enhance data services and intelligent services.

Full Text

Deepening Technology-Content Integration to Achieve High-Quality Development in Media Technology Operations

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Abstract: New technologies serve as an indispensable accelerator for media convergence. In recent years, Xinhua News Agency has attached great importance to technological development. Following the guidance of the Agency' s Party Leadership Group, the Technology Bureau has focused on building a new-generation technology system centered on artificial intelligence, big data, and other emerging technologies, while thoroughly studying how to promote the

integration of technology and content. This paper examines Xinhua' s practical efforts to advance deep technology-content integration, focusing on three key areas: implementing new technologies in news scenarios, identifying critical junctures in technology-content fusion, and leveraging mainstream media advantages to strengthen data services and intelligent capabilities.

Keywords: media convergence; Xinhua News Agency; big data; mainstream media algorithms; intelligentization

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Every technological revolution has brought corresponding transformation to the media industry.

1.1 Measuring Technology-Business Integration by Implementation in News Scenarios

Currently, "media convergence is a media revolution led by technological innovation" has become an industry consensus, with new technologies serving as an essential accelerator for media development. As a media technology professional, I am both a witness to and participant in this transformation. To seize opportunities for a new round of high-quality development as media convergence moves forward, we must further study how to promote technology-content integration and better realize the value of technological work.

The effectiveness of technology-business integration should be measured by its ability to empower news operations through new technologies—that is, by the successful implementation of new technologies in news scenarios. In practice, the focus is on embedding AI and other emerging technologies into every stage of the converged media production workflow: topic planning, assignment and collection, editing and processing, distribution and syndication, dissemination analysis, and business management.

On January 25, 2019, the Political Bureau of the CPC Central Committee held its twelfth collective study session on all-media era and media convergence development. General Secretary Xi Jinping pointed out that "media intelligence has entered a stage of rapid development" and emphasized the need to "explore the application of artificial intelligence in news collection, production, distribution, reception, and feedback, steer algorithms with mainstream value orientation, and comprehensively improve public opinion guidance capabilities."

In recent years, Xinhua News Agency has placed great emphasis on technological work. Under the guidance of the Agency' s Party Leadership Group, the Technology Bureau has vigorously promoted the construction of a new-generation technology system centered on AI, big data, and other emerging technologies. Since 2016, the "Xinhua All-Media Project" has digitized Xinhua' s all-media news collection and editing workflow, marking the transition from informatization to digitalization. Beginning in late 2017, the "Xinhua Intelligent Media

Project"launched intelligent news production construction, using a smart middle-platform-driven model to provide intelligent services covering every aspect of converged media production. This achieved Xinhua' s technology system transformation from digitalization to intelligentization. Particularly after General Secretary Xi Jinping' s "1 • 25" speech, Xinhua' s AI application development accelerated rapidly. To date, the Technology Bureau has developed over 80 intelligent tools and services across eight major categories—including voice intelligence, video analysis, image recognition, and natural language processing—building a smart middle platform for editorial business that served the entire agency more than 30 million times in 2021, continuously enhancing the efficiency and quality of news collection and editing.

These achievements would not have been possible without actively promoting technology-content integration, with two key lessons worth summarizing.

At Xinhua, the first intelligent technology introduced into the editorial workflow was speech recognition and synthesis, also one of the earliest mature AI technologies. Centered on intelligent voice technology, Xinhua built the "Yin Xun" intelligent voice platform, whose backend recognition and synthesis algorithms deploy privatized iFLYTEK models. The platform' s true innovation lies in its integrated capability to access various audio signals from television, telephone, computer, and mobile phone sources, rapidly converting speech to text for direct input into the editorial system. To achieve this, the Technology Bureau used 3D printing technology to create an integrated hardware-software device—the "Yin Xun Box" —for signal access and recognition, significantly improving editors' and journalists' efficiency in organizing various audio materials during news collection. This technology has also been granted a national invention patent.

Based on the "Yin Xun" platform, the Technology Bureau has developed over ten intelligent voice tools and services for editorial departments. Recently, using deep learning algorithms, it achieved the function of separating human voices from background audio, making news material reuse highly efficient and convenient. This feature received immediate praise from editors and journalists, who noted its superior performance compared to similar foreign commercial capabilities. Over the past three years, the Technology Bureau has collaborated with various editorial departments and domestic bureaus to produce over 50 converged media news products, including news games, H5 multimedia products, data short videos, data analysis products, and special report databases, with more than eight products achieving over 100 million visits.

1.2 Technology Actively Participating in Content Production

While improving production efficiency has traditionally been the focus of innovation, using new technologies to generate content represents a new strategic direction and a crucial component of technology-content integration, further demonstrating the evolution from technology and content "coexisting" to "merg-

ing."

In the 2021 World Heritage Convention coverage, the Technology Bureau collaborated with the audio-video editorial department to produce the H5 multimedia product *Walk, See World Heritage!*, which used AI technology to showcase multiple Chinese world heritage sites. The product applied the "First Order Motion Model" algorithm to bring ancient sculptures like Li Bai, Zhang Qian, and Terracotta Warriors to life, enabling them to speak and thus stimulating user interest. Published across Xinhua' s "two micro-platforms and one client," the product achieved over 150 million visits nationwide, creating a viral effect with netizens praising how "ancient civilization has been resurrected with one click" and commending its "immersive experience" and "interactive video quality." In 2021, the Technology Bureau applied the First Order Motion Model algorithm in multiple products including *Meeting Him Across Time and Space*, all achieving excellent results.

Additionally, the Technology Bureau has applied image style transfer algorithms to transform photographs into landscape paintings, oil paintings, sketches, and other artistic styles. Editorial departments have used these technologies to produce multiple Xinhua products such as *National Photo Album* and *Xinhua Vision*, all achieving positive results. The Technology Bureau has now formed five major categories of news product development capabilities.

Computer vision represents the largest component of the AI industry. In this area, the Technology Bureau has also developed a series of tools and services for intelligent image and video processing. Among them, multi-modal retrieval is a production tool that integrates multiple computer vision algorithms. Its development represents a successful case of technology-content fusion. At the end of 2020, Xinhua' s photography department sports group wanted to conduct a year-end color inventory of sports events. The challenge was quickly selecting suitable photos from massive annual archives. In response, the Technology Bureau independently developed a color recognition algorithm allowing users to conveniently select archive materials by choosing colors and proportions. AI has made editors' work of selecting editing elements during the processing stage effortless, with related products successfully published on Xinhua' s client. Subsequently, based on business needs, the multi-modal retrieval tool added search modes for expressions, composition, portraits, and other features, all significantly improving news material search and production efficiency.

In text intelligence processing, the Technology Bureau built Xinhua' s natural language processing platform and developed applications such as data visualization and intelligent proofreading. The independently developed "Jiaozhen" intelligent proofreading software, trained on Xinhua' s massive news data, employs six deep learning models including BERT and SLSTM to implement 23 algorithmic logics including location error correction and political phrase checking. "Jiaozhen" has become an effective assistant for preventing errors in the editing process, with third-party tests showing its detection accuracy in the news field rivals comparable commercial software.

2. Focusing on Key Aspects of Technology-Content Integration

In August 2018, General Secretary Xi Jinping emphasized at the National Conference on Propaganda and Ideological Work that to accomplish the mission of propaganda and ideological work under new circumstances, we must adhere to the correct political direction, work hard on fundamental and strategic tasks, focus on critical and crucial points, and improve work quality and standards. To excel in media convergence technology work, we must implement General Secretary Xi Jinping' s requirements.

2.1 Promoting Deep Integration of Technology and Business

First, we must adhere to the correct political direction, actively adapt to changes in the media environment, and continuously improve understanding and transform concepts.

As technology professionals in mainstream media, we must take the 重塑 (reshaping) of 思想观念 (ideological concepts) as our guide, truly changing from simply "adding the internet as a tool" to "deep integration." Building upon using internet thinking, user thinking, and data thinking to analyze and solve problems, we must continuously apply new technological thinking to promote technology-content fusion.

In the second half of 2020, upon learning that telecom operators would launch 5G messaging services, the Technology Bureau began closely tracking the technology. In December 2020, Xinhua became the first central media organization in China to issue 5G message news. Subsequently, based on 5G messaging' s new characteristics for news business, Xinhua proposed achieving "5G messaging-ization" of news production and developed the "Xinhua 5G News Intelligent Editing Platform." The new platform serves the entire collection, editing, and distribution workflow and is committed to building a secure UGC content publishing platform. It creates a 5G message collection, editing, publishing, and operation platform that enables one-stop distribution of Xinhua' s text, images, videos, and multimedia content directly to terminals, supporting message fallback and precise push to improve news reach. Leveraging Xinhua' s smart middle platform' s AI capabilities, it provides intelligent news services such as proofreading, image processing, usage statistics, and intelligent poetry generation in Chatbot form, adding fun news and "ask a journalist" services to enhance interactive experience. The platform establishes Xinhua' s informant news 线索 (clue) collection channels, enabling access to first-hand clue materials of various media types into the editorial environment as reporting materials for Xinhua journalists. Using 5G messaging' s characteristics of no installation required, real-name system, and strong interactivity, it achieves an integrated intelligent collection, editing, and distribution workflow, improving convenience and security for editors, journalists, and UGC users, and providing new channels for news production. This represents another upgrade of news production technol-

ogy following "digitalization" and "intelligentization," and is an attempt by the Technology Bureau to actively embrace new technologies and explore new paths. The new functionality not only improves editors' and journalists' mobile collection and editing efficiency but also expands the service boundaries of the news collection and editing system. In September 2021, the new platform project won the Industry Characteristics Award in the 5G Messaging Special Competition of the fourth "Blooming Cup" 5G Application Competition organized by the Ministry of Industry and Information Technology.

2.2 Continuous Iteration of Intelligence in Technology-Business Integration

Currently, better achieving editorial intelligence is the critical point of media convergence and the crucial aspect of technology-content integration. However, AI remains in the weak artificial intelligence stage, and AI applications are also "weak applications." Once AI fails to improve production efficiency, it will be abandoned by users. Therefore, continuous iteration, optimization, and upgrading of intelligence require persistent effort from technical personnel.

In early 2018, the Technology Bureau began developing portrait recognition technology, initially using SVM (Support Vector Machine)-based algorithms that caused collisions and misidentification when processing large numbers of portraits. After research, updating the recognition algorithm to ArcFace significantly improved accuracy, supporting over 100,000+ portraits and effectively avoiding previous issues. After solving the algorithm problem, the quality of portrait data annotation became the foundation for good recognition results. For this purpose, the Technology Bureau iteratively developed a news portrait database annotation platform, implementing an automated "unknown portrait" discovery mechanism and character data extraction technology based on natural language understanding, substantially improving the accuracy and scope of news figure recognition. Building upon portrait recognition, the Technology Bureau iteratively developed image recognition technologies including facial expression recognition, object recognition, and national flag and sensitive symbol recognition, providing effective support for other intelligent services. After the COVID-19 outbreak, the Technology Bureau faced challenges such as masked portrait recognition and profile portrait recognition, and technical personnel are currently collecting data and developing algorithmic solutions.

Continuous optimization of intelligent applications to achieve engineering implementation also requires persistent effort. In applying the First Order Motion Model to animate static images, the initial model had limitations: generated videos only worked for faces, adding other body parts caused distortion, and output resolution was low. To address body part distortion, we added facial recognition and proportional segmentation to ensure natural, smooth video generation, then embedded the generated video into the original image according to segmentation proportions, preserving both the result and the original image' s overall effect. For low-resolution output, we used intelligent super-resolution

algorithms to repair and process original images when their resolution was insufficient, and applied super-resolution processing to generated videos when high-resolution output was suboptimal, obtaining product-ready video effects. Through continuous optimization and process adjustments, comprehensively applying multiple intelligent algorithms has made batch production of similar news products possible. Currently, the Technology Bureau has applied the First Order Motion Model in seven products, making it the most widely used algorithm for content generation at Xinhua.

As intelligent applications continue to iterate, technology' s ability to empower business will continuously improve.

3. Leveraging Mainstream Media Advantages for High-Quality Technology Development

The 14th Five-Year Plan marks China' s journey toward its second centenary goal, with high-quality development as its theme. Not only has economic development entered a stage of high-quality development, but social, ecological, cultural, and national governance systems have all entered this stage. Similarly, the technology work supporting media convergence must achieve high-quality development. Currently, mainstream media faces severe challenges from the internet domain. How to occupy the main battlefield of public opinion and achieve high-quality development depends crucially on fully leveraging our own advantages.

3.1 Strengthening Data Advantages to Create Mainstream Media Algorithms

After OpenAI released the 100-billion-parameter GPT-3 large-scale pre-trained model in 2020, domestic and international enterprises and research institutions launched large-scale pre-trained models in 2021. These include the Beijing Academy of Artificial Intelligence' s 100-billion-parameter WuDao model (later upgraded to trillion-parameter scale), Alibaba' s M6 model, the Institute of Automation of the Chinese Academy of Sciences' 100-billion-parameter "Zidong Taichu" model, and Inspur' s 245.7-billion-parameter Yuan 1.0 model. In October, Microsoft and NVIDIA jointly released the over-500-billion-parameter Megatron-Turing language model. These massive models requiring hundreds or thousands of V100 GPUs for training are beyond the reach of most application institutions.

In terms of algorithms and computing power, we cannot compete with these internet giants. If not properly addressed, large models and massive computing power will become bottlenecks for mainstream media AI development. Through preliminary analysis and research, we identified that in the model training domain, mainstream media can leverage advantages in news data to create leading mainstream media algorithm models. The renowned AI scientist Andrew Ng has repeatedly stated that "better AI depends 20% on algorithms and 80% on high-

quality data." For instance, Xinhua possesses 23 million photographs, the largest news photo dataset in China, with most photos accompanied by corresponding captions. This forms an excellent cross-modal analysis training dataset. In June 2021, the Technology Bureau collaborated with the Beijing Academy of Artificial Intelligence to launch China' s first news domain pre-trained model based on Xinhua' s news data and the WuDao large model, making progress in modern ancient-style poetry generation. Subsequent research will explore cross-modal applications such as text-to-image generation and automatic image captioning.

Furthermore, according to Xinhua' s Big Data Center construction plan, cross-modal annotation work for text, images, videos, and other news materials has already begun. This initiative will further improve data quality and lay a solid foundation for mainstream media' s future development in big data and artificial intelligence.

3.2 Leveraging Integration Advantages to Better Empower News Business with Technology

To better achieve technology-content integration, the Technology Bureau provides embedded services to editorial departments based on the news production platform, responding to frontline needs in real time. Technical personnel directly participate in converged media product planning and subsequent operations, quickly identifying the intersection between news elements and technical platforms for propaganda themes, maximizing both news impact and technical value, thereby forming integration advantages.

In the 2021 Mid-Autumn Festival coverage, the Technology Bureau collaborated with the Domestic News Department to launch the creative interactive H5 product "*Moon Exploration Team*" *Embarks on a Mission!*, a news game product employing 3D modeling and intelligent rendering technology. The initial concept focused on delivering mooncakes to the jade rabbit in the lunar palace to create a festive atmosphere. However, journalists from the Domestic News Department who had participated in lunar exploration coverage suggested integrating the product with the year' s hot topic of "lunar soil collection," using the theme "Exploring the Moon, Asking the Heavens, Celebrating Reunion Together" and simulating the Chang' e-5 lunar soil collection mission to popularize China' s latest lunar exploration progress. While the technical means remained the same, the product' s contemporary relevance significantly improved. After release, the product achieved over 100 million visits and was selected as a top story by Xinhua' s Chief Editor' s Office.

Many internet companies provide online public opinion monitoring systems, but their effectiveness is often unsatisfactory. In the first half of 2021, the Technology Bureau collaborated with relevant departments to develop the "North America Radar" system, which uses self-developed algorithmic models for article weight calculation to discover overseas news clues and hotspots. According to editorial feedback, "North America Radar" is fast, comprehensive, and accurate,

enabling editors to grasp overseas news clues and hotspot developments anytime and anywhere, helping editorial departments improve overseas important information reporting efficiency by 50%. The system frequently identifies overseas clues overlooked by frontline correspondents and has become an indispensable duty tool for editors. The system' s excellent performance is inseparable from the deep involvement of senior editors, who summarized over ten categories of experience including "influential news figures on social media" and "theme classification criteria," participated in model training, and assisted technical personnel in continuously correcting results, thereby continuously improving the new system' s quality. Practice has proven that promoting deep technology-content integration advances high-quality media technology work.

As technology professionals in mainstream media, we must not only be witnesses and participants in this media transformation but also leaders and innovators, continuously advancing deep business-technology integration to provide strong support for mainstream media to firmly occupy the commanding heights of communication.

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