Formulation and Application Practice of HTML5-Based Converged Media Technical Specification (Postprint)

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Abstract

Innovation in news media content is fundamental. HTML5 converged media news has achieved excellent dissemination effects in practice. This article addresses this topic by analyzing the current status of HTML5 converged media news in the mobile internet era. The study finds that standardization can facilitate the retrieval, republication, and sharing of HTML5 content, thereby enhancing its communicability. To this end, we collaborated with multiple institutions to investigate the current status and development of converged media technology, integrated the practical requirements of the news media industry, referenced the International Press Telecommunications Council (IPTC) JSON News Technology Specification ninjs, formulated a technical specification for HTML5-based converged media news, and officially released it on the National Group Standard Information Platform.

Full Text

Preamble

Development and Application of HTML5-Based Converged Media Technology Standards

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Abstract: Content innovation is fundamental to news media. HTML5-based converged media news has achieved excellent dissemination results in practice. This paper examines this phenomenon by analyzing the current state of HTML5 converged media news in the mobile internet era. The analysis reveals that

standardized specifications can make HTML5 content more easily searchable, reproducible, and shareable, thereby achieving better dissemination. To this end, multiple organizations collaborated to research the current state and development of converged media technology, integrated the practical needs of the news media industry, and referenced the International Press Telecommunications Council (IPTC) JSON news technology specification ninjs to develop the HTML5-Based Converged Media News Technical Specification, which was officially published on the National Group Standard Information Platform.

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2. Necessity of Standard Development

As traditional news media comprehensively advance their converged media strategies, the focus of news content creation across all media levels is shifting to the mobile internet domain. The mobile internet represents the primary market for HTML5 technology development. HTML5 is a language description method for building web content—the next-generation internet standard and a core internet technology. Before HTML5, multimedia content could only be provided through Flash. HTML5 offers a new framework and platform for next-generation web applications, including plugin-free video, image animation, local storage, and other sophisticated yet essential functions, standardizing these applications to enable web experiences similar to desktop applications. Its design purpose is to support multimedia on mobile devices.

Currently, poor mobile browser experiences and non-uniform web standards hinder mobile web development. HTML5 technology can effectively solve these two problems and drive overall advancement in mobile web development. Additionally, most mobile web kernels now adopt Web kernels, and as smart devices rapidly proliferate, applying HTML5 in Web kernels will play a significant role in enhancing web operation experiences. HTML5 will also transform video data transmission methods, making video playback smoother while enabling deeper integration between video and web pages, thereby facilitating broader applications of online live streaming.

Content innovation is fundamental to news media. Since mobile devices support far more HTML5 converged media formats and user interaction methods than PCs, HTML5' s characteristics and advantages provide unprecedented creative

space for content innovation, making it widely applicable in the news industry. However, practical applications reveal that the lack of unified standards leads to numerous issues, including incomplete news elements and suboptimal user experiences. The most critical problems are the inability to retrieve content and difficulties in sharing, which contradicts the essential nature of news requiring widespread dissemination and hinders the popularization and development of converged media news.

In the mobile internet era, interactive converged media content integrating text, images, graphics, audio, video, charts, virtual reality, and other media forms is becoming mainstream on mobile devices. Currently, media organizations employ various methods to produce HTML5 converged media news, but without unified specifications, they face issues such as incomplete news elements, non-retrievability, and sharing difficulties. Moreover, mobile smart devices feature numerous customized operating system versions and diverse screen resolutions, with browsers offering varying degrees of HTML5 support. These factors affect the rendering of interactive converged media content, producing inconsistent presentation effects that degrade user experience.

The absence of standards also prevents media organizations from accessing user behavior and data, hindering user conversion and big data analytics. There is no dedicated news metadata specification covering information such as producers, production personnel, news categories, keywords, etc., making content unsuitable for display across various phone models and complicating dissemination, preservation, circulation volume statistics, and retrieval, reproduction, and sharing of HTML5 content.

3. Standard Development Principles

The fundamental approach to standard development is to provide guiding recommendations for describing mobile interactive converged media news content through a series of parameter conventions based on the existing W3C HTML5 standard. To maintain compatibility and continuity in news content description, the specification references the IPTC' s JSON-based ninjs news standard for normative content description while making necessary extensions according to mobile converged media news characteristics.

Using JSON-based data structures to describe converged media news content offers significant advantages:

3.1 More Concise

JSON organizes data through key-value pairs rather than tag pairs and semantic definitions, enabling data transmission with fewer bytes—crucial for conserving bandwidth on mobile devices. Since this technical specification primarily targets the dissemination and management of HTML5-based converged media content on mobile devices, JSON can effectively reduce bandwidth consumption.

3.2 Faster

Parsing XML content often requires large parsing libraries and significant computation time, whereas JSON is supported by almost all mainstream languages without requiring additional parsing libraries. Since mobile devices are generally sensitive to computational load and power consumption, JSON offers higher operational efficiency and lower power consumption. For mobile converged media content, reducing additional parsing libraries also means loading fewer script resources, thereby decreasing user wait times, accelerating loading speed, and improving user experience.

3.3 More Intuitive

JSON organizes data in an easily human-readable string format and can be directly mapped to data structure objects supported by programming languages, enabling developers to conduct related software development more efficiently. Since HTML5 converged media news content is typically viewed on mobile devices, JSON' s concise syntax is practically significant for rapid viewing, debugging, interface integration, and device compatibility on relatively small mobile devices. To develop this standard more precisely, the project team carefully considered and extracted nine terms closely related to converged media, defining them for the first time.

4. Standard Development Process

The standard development process included opinion solicitation, scope establishment, task division, draft writing, consolidation, and finalization. Key milestones were as follows:

The process began with preparatory work and establishment of a standard development working group to conduct requirements analysis. During the requirements collection and analysis phase, drafting team members extensively investigated current domestic and international relevant standards and specifications while gathering various needs from the domestic news field. An initial draft of the standard development description was completed, followed by an opinion solicitation period for the description document and a division of responsibilities for standard content development.

The main body of the standard was drafted by multiple organizations, with contributors encompassing media experts, scholars, professors, computer technology specialists, and numerous frontline media workers, ensuring the standard' s development maintained both theoretical rigor and practical industry relevance. Each organization was responsible for a specific chapter to ensure textual coherence and avoid communication inefficiencies and content fragmentation issues arising from too many drafting units.

Each chapter was briefly described and illustrated by consensus, allowing drafting organizations to supplement missing content based on existing material to

ensure completeness. After the main body was drafted and consolidated into a discussion draft, it was submitted to all participating organizations for joint review, discussion, and improvement.

Following this approach, specific tasks were assigned for the development description, standard scope, overall converged media architecture, data formats and types, and other content, with all organizations collaborating to complete the draft standard. A consolidated draft was formed, followed by a revision period during which feedback was solicited from numerous news industry experts, scholars, and enterprise technical workers, resulting in large-scale additions and revisions to the standard text. After thorough discussion of the consolidated draft, the group standard was submitted for review and approval, and was officially published on the National Group Standard Information Platform.

5. Main Content of the Standard

During development, this standard referenced the following standards: GB/T 32400 Information Technology—Cloud Computing—Overview and Vocabulary, GB/T 25069 Information Security Technology—Terminology, DB/T 384.1-4 Image Information Management System Technical Specification, and News in JSON: IPTC JSON News. This standard specifies requirements for the architecture, data format and types, metadata, resource information, content data, and technical parameters of HTML5-based converged media news content. It applies to the production, editing, marking, and publishing of converged media news content that integrates multiple media forms (including text, images, graphics, audio, video, charts, web pages, forms, virtual reality, etc.) using HTML5 technology.

Complete converged media news content consists of three components: metadata, resource information, and content data. Metadata contains essential information describing basic content conditions and news elements, such as copyright information, content titles, and sharing information, providing necessary data for content review, retrieval, archiving, and statistics. Resource information includes descriptions of resources referenced in the content, such as images, videos, and audio. Content data describes the main news content body. To accommodate paginated converged media news content, content data describes each page' s content in a paginated manner. Page content is the main body of converged media news, with each page containing data information for various elements used within the page, describing aspects such as element type, position, size, filters, and behavior.

The main contents include: (1) An overall description of the HTML5 converged media news data architecture, clarifying its basic concepts and implementation principles. (2) Specification of the various components required in converged media news content, with detailed descriptions of specific data structures, interfaces, and parameters. (3) Extension of the IPTC' s JSON-based ninjs news data standard according to converged media content characteristics, maintain-

ing compatibility while supporting rich converged media rendering, interaction, and sharing. (4) Provision of news content examples conforming to the standard.

The standard applies to news media and various information institutions for converged media news production, editing, marking, and publishing. Its users include media editors, content operators or technical personnel, news content providers, and media application software developers and service providers. Its scope covers news websites, information portals, news agencies, radio, television, newspapers, online media, and other news organizations.

6. Application and Practice of the Standard in Converged Media Reporting

Currently, the HTML5 converged media production platforms of the standard development organizations have been widely applied in the media industry, including central media such as the Chinese Government Website, Xinhua News Agency, People' s Daily, China Daily, and China.com.cn, as well as over 90% of provincial-level media. Xinhua News Agency's New Media Center has integrated the HTML5 production system of the standard development organization, with Xinhua Net, Reference News, China Securities Journal, and many Xinhua local bureaus using its SaaS services.

Taking the National Two Sessions as an example, each convening of the Two Sessions showcases media organizations' capabilities, with HTML5 technology facilitating innovative reporting methods. HTML5 news refers specifically to complex news formats created using HTML5 technology, characterized by animation and interactivity. For media organizations, a creatively novel work with dissemination impact is crucial, and online interactive scenario applications using HTML5 undoubtedly represent a converged media reporting format that frequently goes viral online, featuring creative novelty and excellent dissemination effects.

HTML5-based converged media news differs from traditional single-format news (text-image, photo, or video) by integrating three or more media forms—including text, images, audio, video, panorama, animation, and interactivity—to better assist media in reporting news content and achieving innovation in news product formats. HTML5 applications in the media field are diverse: for instance, implementing cool voice-graphic reports where users swipe through title axes to listen to audio and read reports; combining with VR technology for panoramic presentation; or inviting users into expert interview groups through group chat plus video call formats to bridge the distance between experts and users.

The 2021 Two Sessions featured short duration, few video interview journalists, and limited exclusive news resources. One way to produce outstanding coverage was secondary packaging of original news materials, with converged media transformation being an important innovation direction. This approach

supports new media forms: audio, video, SVG, panorama, animation; new interaction methods: touch, location, photography, recording; and future emerging technologies: new technologies generally provide JavaScript APIs, such as various AI applications.

Two Sessions converged media reporting cases include: audio material visualization in the State Council Information Office's "Delegates Speak"; video visualization packaging and creative integration with other media forms in "Xinhua Two Sessions"; and long infographic formats such as "Pass a Message to the Premier" and "Shandong' s Beauty in Pictures." These HTML5-based converged media news products, through relevant applications of the HTML5-Based Converged Media News Technical Specification, have become more conveniently searchable, reproducible, and shareable, better achieving widespread dissemination of Two Sessions converged media news, expanding the influence of Two Sessions coverage, and greatly enriching reporting formats.

7. Problems Solved by the Standard and Its Significance

This standard solves the problems of incomplete converged media news elements, non-retrievability, and sharing difficulties. The standard' s development is significant for the popularization and development of mobile interactive converged media news, as it helps regulate the entire lifecycle of relevant news content, improves the specification of news elements for HTML5 converged media news, facilitates user experience enhancement, and enables convenient data capture and analysis by media organizations and information systems. As demonstrated by the applications and practices in the aforementioned reporting cases, this standard provides a reference basis for traditional media' s transformation to converged media, effectively reducing costs, improving efficiency and user experience, and accelerating transformation.

In summary, through the exposition of the HTML5-Based Converged Media News Technical Specification development process and analysis of its application in converged media reporting, we conclude that this standard can comprehensively improve the design, production, and publication of HTML5 converged media products, solve the problems of incomplete news elements, non-retrievability, and sharing difficulties, and through standard application, accelerate the vigorous development of HTML5-based converged media news to meet news industry needs and promote deep integration between traditional and new media.

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