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The Connotation, Services, and Construction Path of Smart Libraries in the Context of Smart Society Development (Postprint)

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Abstract

[Purpose/Significance] As a new development goal for innovative nation-building, the “smart society” imposes novel requirements on library development, and smart libraries, as a new-generation library paradigm, are conducive to promoting the construction of smart society. [Method/Process] Grounded in the developmental context of smart society, this paper examines smart libraries across three dimensions: connotation, service, and construction pathway. [Results/Conclusion] First, it proposes a “four-four-one-one-three-three” connotation structural framework for smart libraries, a smart library service concept model, and a conceptual model for smart library development; second, it systematically articulates the principles and guidelines governing smart library construction; finally, it puts forward recommendations for smart library development from the perspectives of new technology adoption, resource construction, service expansion, and librarian team development.

Full Text

Smart Library Connotation, Services, and Construction Path Under the Background of Smart Society Development

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Abstract: [Purpose/Significance] As one of the new development goals for an innovation-oriented country, “smart society” has put forward new requirements for library development. As a new generation of library form, smart library is conducive to promoting the construction of smart society. [Method/Process] Based on the development background of smart society, this paper discusses smart library from three aspects: connotation, service, and construction path. [Result/Conclusion] Firstly, it proposes the “four-four-one-one-three-three” connotation structure system of smart library, the service concept model of smart library, and the conceptual model of smart library construction. Secondly, it sorts out the construction principles and guidelines of smart library. Finally, it puts forward suggestions for smart library construction from the aspects of new technology application, resource construction and service expansion, and librarian team building.

Keywords: smart society; smart library; smart service; smart craftsman spirit

1. Introduction

The development of smart society has become a global focus, and all industries in China are rapidly developing toward the direction of smart society. The concept of “smart society” was first proposed by President Xi Jinping in the report of the 19th National Congress of the Communist Party of China, representing one of the new development goals for China to accelerate the building of an innovation-oriented country. As a new type of social form, smart society benefits from the new round of scientific, technological, and industrial revolutions in digital technology, network technology, and intelligent technology. Its fundamental attributes and characteristics—highly perceptive, interconnected, highly digitalized and computable, highly transparent, and highly intelligent—have brought greater convenience to human life and production. As a multi-dimensional complex system integrating humanistic space, physical space, and information space, the development of smart society requires active cooperation and joint advancement from all aspects. As an information-intensive industry, libraries are an important component of this complex system and must pursue improvements in service quality and connotation, transforming toward smart libraries and smart services in high-quality social development to enhance their high-quality services and core competitiveness in serving society and users, thereby creating new value and achievements.

A search in the CNKI database using the search expression “subject = smart library OR smart service OR smart librarian,” limited to the discipline of “library and information science and digital libraries” and core journals, yielded 208 relevant documents (as of September 13, 2018, with the earliest publication dating from 2001 and showing an increasing trend year by year). Overall, research on smart libraries mainly includes the following aspects: concepts and characteristics of smart libraries, application of information technology in smart libraries,

smart library service models and implementation paths, architecture and construction of smart libraries, and smart librarians. Representative authors in smart library research and practice include Wang Shiwei, Shao Bo, Yang Xinya, Chu Jingli, Li Yuhai, Xia Lixin, Dong Xiaoxia, and Wu En. Based on current research, the authors believe that smart library exploration and practice need to uphold the “smart craftsman spirit” while pursuing current and future high technologies and integrating them into their own systems, demonstrating distinctive services different from traditional libraries—namely, allowing users to experience deep perception, ubiquitous interconnection, and intelligent management and services. Through various perception technologies and new intelligent processing technologies, libraries can better understand readers’ needs to 胜任 future reader services in intelligent environments. The following sections will mainly focus on sorting out and researching the connotation, smart services, and construction of smart libraries.

2. Smart Library Connotation System and Service Concept

2.1 Smart Library Connotation System Since the emergence of the smart library concept, related research in China has gradually formed a trend. With the continuous development of intelligent technology, Western developed countries have devoted themselves to exploring and researching smart libraries. In 2003, scholars from the University of Oulu Library in Finland proposed that smart library is a location-aware mobile library built on the basis of a new generation of information technology representative of the new technological revolution, which can be perceived without spatial restrictions. Domestic library scholars generally believe that the concept of smart library emerged around 2000. Since IBM proposed the “Smart Earth” concept in 2008, with the Internet of Things as the new round of technical support, the construction and research of “smart” initiatives such as smart cities and smart campuses have continuously developed, and domestic library scholars’ research on smart libraries has also mushroomed. Regarding the concept of smart library, scholars have defined it from various perspectives including system operation, element composition, perceptual computing, and architectural space. In terms of library transformation and reform, “smart library is the core connotation of digital libraries, third-generation libraries, and new library development, the main driving force for future library development, and the highest form and dominant model of future libraries.” Libraries can achieve comprehensive and three-dimensional perception using new technologies, such as perceiving user location, perceiving user behavior, mining and accurately evaluating users’ potential needs, thereby providing more targeted services, improving service quality, and enhancing user satisfaction and recognition of smart services.

Under the background of smart society construction, people have higher pursuits and expectations for future social development, with basic goals including eliminating information and data gaps, breaking the status quo of imbalance and insufficiency, and achieving inclusive and equal development. Based on the

above basic concepts of smart society and current research on smart libraries, the authors have established the smart library connotation structure system shown in Table 1 , which can be abbreviated as the “four-four-one-one-three-three” structure system—four backgrounds, four foundations, one root, one core, three keys, and three purposes. The construction and development of smart libraries under the smart society construction background need to be supported by information resources and intellectual resources, using information technology for efficient and scientific information processing and processing, improving library service levels, enhancing library operation and management efficiency, and providing more sufficient, extensive, and balanced services to society and the public through broad and convenient channels, making the entire library like a wise person and allowing the public to feel its high-quality services. Smart library is not a complete negation of existing library forms but a comprehensive upgrade and development of existing library forms based on the continuous development of supporting elements such as technology, personnel, and space. At the same time, smart library is not a fixed concept; it continues to expand and develop with the development of information technology and other factors.

Table 1 Smart Library Connotation Structure System

Dimension	Content
Four Backgrounds	Threats to library development from multiple sources Increasing public demand for cultural information services New requirements for libraries from social smart development Rapid development of global knowledge economy and information technology
Four Foundations	Increasingly universal perception technology Interconnected information networks Continuous integration of information resources Universal development of knowledge management

Dimension	Content
One Root	People-oriented, supported by modern information technology, gathering human knowledge and wisdom, making “things” more intelligent, achieving mutual existence, interaction, complementarity, and mutual promotion between people and things, making information and knowledge services more optimized, efficient, and universal
One Core	Fully utilizing information technology, giving full play to human initiative, maximizing the use of information and knowledge resources to provide users with optimal services
Three Keys	From a social perspective: increase support for smart library construction in terms of funding and policy, and promote cooperative operation and management across the library service field From a user perspective: improve their ability to acquire and utilize information and knowledge From a library perspective: make products and services more precise and efficient
Three Purposes	From a social perspective: achieve high-quality public cultural services From a library perspective: achieve sustainable service capacity in the library industry From a user perspective: achieve excellence in both hard knowledge and soft capabilities

Dimension	Content
Library Development Forms	Pressure Library + Opportunity Library → Perceptive Library + Interconnected Library + Smart Library → Wisdom-Gathering Library + Intelligent Library → Collective-Intelligence Library + Efficient Library → Quality Library + First-Class Library

2.2 Smart Library Service Concept In recent years, the education and library and information science communities have launched research on smart concepts and smart services, bringing smart library service research into academic vision. After experiencing information management, data management, knowledge service, and other management service models, information science is entering a new era of smart management services, reflecting on and exploring how to integrate new technologies and human wisdom to create deeper-level smart effects different from traditional and digital services through innovation. “Smart service” is a new service concept proposed by libraries to adapt to constantly updated information technology and social environments. Regarding the concept of smart service, different scholars have different elaborations. For example, Liang Guangde, from the perspective of knowledge service, believes that smart service is value-added products and services formed under the action of creative wisdom based on knowledge service, focusing on the benefits brought to users by the provided knowledge services and products. Huang Youfei, from the perspective of user ability cultivation, believes that smart service is the advanced stage of knowledge service, centered on the user’s wisdom generation process of “transforming knowledge into wisdom,” emphasizing the cultivation of users’ ability to absorb, apply, and innovate knowledge, and inspiring users to “transform knowledge into wisdom.” Chu Jingli and Xia Lixin, from the perspective of smart library element composition, believe that smart service is based on user needs, applying intelligent technology and other information technologies to the entire library business process, integrating library space, resources, librarian wisdom, and various intelligent systems to provide services in the process of users acquiring knowledge and cultivating abilities.

Smart library construction under the background of smart society is different from library construction under the background of smart city. Smart society is proposed based on the concept of an innovation-oriented country, committed to providing innovative resources, environments, spaces, and education to promote innovative national and social culture construction. It focuses on integrated development of urban and rural areas and all aspects of society, emphasizes unified top-down planning and bottom-up collaborative development, and strives to meet the public’s daily smart needs through the application of intelligent technology. Synthesizing the above characteristics of smart society and aca-

demographic research on library smart services, the author analyzes the connotation of smart service. First, it should be clear that library smart services under the background of smart society construction are not a complete negation of existing library services but an upgrade and transformation of library services supported by new intelligent technologies and talents. Existing service types, content, and means will only continue to expand, increase, and update, but the basic service philosophy will not change. Second, smart society development emphasizes collaboration, and smart library services must also implement the concept of collaborative development by establishing library service alliances and networks to provide broader services. Third, the basic components of social systems are people and things. As part of the social system, libraries are created by people according to their own cultural value orientations and needs. Therefore, from the perspective of social systems, smart libraries are also composed of people and things. Finally, user cognition and needs in different environments usually have certain differences and hierarchies. Under the background of smart society construction, the public's requirements for library smart services also vary. Therefore, synthesizing the above smart society development concepts, library system composition, user demand differences, and current technical environment, smart library services are upgraded and transformed to build the smart library service concept model shown in Figure 1 [Figure 1: see original paper]. The smart library service concept should be services provided through the interaction of human wisdom and object intelligence based on user needs.

Smart libraries typically include user layer, infrastructure layer, technology support layer, and application service layer. Science and technology increasingly embodies the user-centered core concept in its own evolution and development. In the smart library service concept model, user needs are the starting point and end point of library smart services. Libraries under smart society construction are oriented toward all members of the public, with different users having different levels of needs and putting forward diversified requirements for library services. Overall, current user needs can be divided into three types: general services, deep-level knowledge services, and innovative services. General services include static space and facility services and information services that users can obtain through self-service inquiry and retrieval without librarian intervention. Deep-level knowledge services are information processing services based on information retrieval, some of which can be realized through library-related technologies and some through librarians' professional service capabilities, including intelligence analysis services, subject services, and think tank services. The purpose of innovative services is to better improve users' learning and innovation abilities and cultivate their ability to innovate knowledge, typically including innovative spaces, resources, and personnel services. Libraries can create a good innovation environment and embed high-level librarians into user environments to provide such services.

The biggest challenge for smart libraries is conceptual. Wisdom is a phenomenon and attribute of library survival and development. Wisdom originates from information, knowledge, and intelligence. People favor wisdom because it can

innovate service capabilities. “Wisdom” is essentially a philosophical concept containing flexibility, representing insight into things and the ability to apply them. Smart libraries attract users to the library or use network and mobile services to obtain knowledge experiences through knowledge services and smart services. The connotation of library smart services has three aspects: First, intelligent library smart service is essentially a kind of technical wisdom of the library. It is an application of technology and intelligence in the library field, manifested as the informatization and digitalization of library document resources and the library service network laid out accordingly, providing library smart services to readers in a “connect everything, everywhere” model. Therefore, it is called a smart library, a library smart service built on library technology and library intelligence. Smart libraries have three major characteristics: interconnected library; efficient library; convenient library. Smart libraries provide smart services to users based on cloud computing technology and smart equipment in the IoT environment. Second, knowledge-based library smart service is essentially a kind of academic wisdom of the library. According to literature records, the library and information science field in China began research and practice on knowledge service in 2009, conducting comprehensive and multi-angle explorations on the concept connotation, inherent requirements, characteristic processes, social foundation, technical support, knowledge innovation, and service models of library knowledge service. Currently, viewpoints represented by Ren Jun (“knowledge economy-oriented type”) and Zhang Xiaolin (“core competence competition type”) have formed. Finally, conceptual library smart service is essentially a kind of humanistic wisdom of the library. In fact, library smart service embodies librarians’ professional spirit and values of serving users, dedication, loyalty, and initiative. The author believes that library wisdom can be demonstrated in librarians’ scientific research, professional awareness, service innovation, and professional spirit. If applied to reader service work, it can be called a wisdom service of libraries in the new era.

3. Smart Library Construction Path

Although some practices have begun in China regarding smart library construction, they are still immature and basically remain at the theoretical stage. Academic research on smart library construction mainly proceeds from two levels: macro planning and vision, and micro approaches and measures. Macro planning and vision mainly focus on top-level design, standards and norms, architecture systems, construction models, and business and service planning of smart libraries. Micro approaches and measures mainly focus on element composition, technology application, librarian team building, library management, and user ability cultivation. In the construction process of smart libraries, the domestic practice community can be roughly divided into two models: the first model is the new generation library comprehensive service system represented by Nanjing University and Chongqing University; the second model is the perception and interconnection service space represented by Shenzhen Yantian District Library. However, overall, current research and practice are still carried out from

the perspective of single library development, with few studies placing smart library construction within smart society or other larger systems. This paper intends to explore the construction path of smart libraries under the background of smart society from three aspects: construction principles, guidelines, and concept models.

3.1 Smart Library Construction Principles Smart library construction and development must be completed under the guidance of scientific principles and through step-by-step strategies of overall planning and gradual progress.

(1) System Analysis Principle and Smart Library Construction. System analysis focuses on macro-level guidance, with the basic idea of treating the object as an integrated system. Under this principle, various elements are interrelated and interact with each other, jointly forming an organic whole with specific functions. The smart library system is composed of elements such as resources, services, technology, librarians, and users. Its construction and management cannot be separated from the guidance of system science theory and methods. It is necessary to sort out the relationship between overall planning and various parts, and fundamentally clarify its target functions, element associations, structural layout, and development dynamics. According to system theory, combined with current and future business and service layouts of libraries, the service composition of smart libraries and the associations between them can be refined through layer-by-layer decomposition. This is the main logical thinking of smart library construction based on system analysis principles.

(2) Spatial Analysis Principle and Smart Library Construction. Spatial analysis principles focus on planning at the specific practice level, with the basic idea of dividing the object into different spatial layers for comprehensive layout, with correlations between layers. Smart library systems based on spatial analysis principles can generally be abstracted into physical layer, social layer, and virtual layer. The physical layer refers to the library's physical space and supporting physical entities. Through the construction of intelligent library buildings, it can promote the automation, perception, networking, and intelligence of library entities to achieve intelligent operation of physical entities, standardization, precision, and intelligence of library management, and optimize user experience. The social layer includes librarians and smart users among the public. Librarians and smart users are the main participants and beneficiaries of smart libraries and also the basic elements of smart library construction. Therefore, efforts should be made to strengthen the construction of smart librarian teams, enhance librarian capabilities, expand the smart service population, and make smart library services benefit the public. The virtual layer includes smart infrastructure and smart applications. Infrastructure includes information and communication infrastructure, information and knowledge resources, and library operation management centers. Smart applications are important interfaces connecting users with smart libraries and are the key to library smart service output.

(3) Smart Library Construction Based on “System-Space” Hybrid Approach. The “system-space” hybrid approach combines system analysis principles and spatial analysis principles. These two principles represent different perspectives and are not mutually opposed. In most cases, smart library construction requires the simultaneous use of both principles, with specific planning and implementation needing to be used in combination according to actual conditions. For example, in the smart library construction process, the library can first be divided into different layers based on spatial analysis principles, and then system analysis principles can be applied to determine the relevant elements within each layer and their composition and connections to achieve the functions of each layer.

(4) Technology-Led Smart Library Construction. The formation and development of smart libraries cannot be separated from technological transformation. Only when users touch tangible intelligent services provided by objects will they feel they have entered a smart library. Intelligent services based on the Internet and user self-service are the main content of smart library construction. The deepening of smart library service content, service methods, service concepts, and services cannot be separated from technology. It is necessary to conduct in-depth analysis and application of existing technologies that are expected to be used for smart library services, including robotics technology, visualization technology, and virtual reality technology.

3.2 Smart Library Construction Guidelines Due to historical reasons and natural conditions, there are many differences and imbalances in regional and local development in China. Therefore, in the smart library construction process, elements and conditions vary greatly among regions, areas, and libraries. Different smart library systems should be built according to the following guidelines, taking into account their characteristic advantages and prominent problems in development. At the same time, in the process of self-construction, collaborative service systems should be established with libraries in other regions and areas to achieve co-construction and sharing, compensating for respective disadvantages and deficiencies.

(1) Fully Consider the Status Quo and Needs of Regional Society and Libraries. Different regions, areas, and libraries should consider the status quo of historical and cultural traditions, regional population size, economic conditions, resource conditions, and informatization development levels in the smart library construction process, learning from each other’s strengths and giving full play to their respective characteristic advantages. For example, Southwest China is a key region for biodiversity in China, with more urgent needs for the protection and utilization of animal and plant resources compared to other regions, and more institutions and disciplines closely related to biodiversity research are also distributed in this region. Therefore, in the smart library construction process, special attention should be paid to its characteristic resources and needs, and efforts to build resources in this field should be increased.

(2) Must Demonstrate the People-Oriented and User-Centered Service Principle. The goal of developing smart society is to improve the quality of public life, including material and spiritual life. The construction of smart libraries under the background of smart society must adhere to the people-oriented principle. Wu Jianzhong once emphasized that contemporary library construction should be based on “people” as the foundation. The growing needs of users are the direct factors for the transformation and upgrading of library smart services. Under the background of smart society, users’ growing cultural reading and knowledge needs present characteristics of multi-level, professionalism, diversity, and dynamics. Libraries must meet users’ high-level needs for a better cultural life through technological transformation and high-quality service model innovation. In addition, libraries show continuous innovation and development according to changing user needs in the evolution of service focus. Considering the geometric growth of data generated during library smart service processes, including user knowledge acquisition behavior and storage of multi-dimensional heterogeneous resources, libraries need to adhere to a user-centered approach, face pressure from the external environment, optimize mobile intelligent terminals and management, strengthen data cleaning, and build heterogeneous data conversion and storage mechanisms to provide personalized and intelligent precise services, thereby winning social and user recognition and realizing their own value.

(3) Implement the Principle of “Being Good at Using the Internet to Carry Out Work” and Using Information Technology as Emphasized in the 19th National Congress, with Infrastructure Priority. In the smart library construction process, infrastructure construction is the foundation for the formation and development of all other elements. Building smart libraries must emphasize the supporting role of smart infrastructure in smart library system construction and prioritize the construction of smart infrastructure. At the same time, smart libraries are built on the basis of a new generation of information technology representative of the new technological revolution, such as the Internet of Things and mobile Internet technology, including augmented reality technology and ambient perception computing technology. First, reconsider smart library resource construction, adhere to a user-centered approach, and achieve a high-quality transformation from extensive to refined resource construction, from quantity-focused to quality-focused. Second, strengthen the application of intelligent technology in library spaces, increase the layout of intelligent facilities and tools such as RFID, embedded artificial intelligence, “3D” creation, interactive “virtual objects” for knowledge visualization, intelligent robots, and intelligent bookshelves, combined with innovative space construction. Third, give full play to the functional role of soft facilities, applying mobile visual search technology, big data, and cloud computing to the construction of smart library information sharing platforms and resource databases. Finally, achieve comprehensive Internet coverage, integrate a series of new technologies such as the Internet of Things with library business, and establish a ubiquitous information network system.

(4) Must Follow the Principle of Dynamic Change and Sustainable Development. Dynamic change and sustainable development include two levels of meaning: First, smart library is a continuously developing library form that needs to adapt to constantly changing user service needs and the ever-changing technological and social environment, continuously introducing new technologies and concepts for innovative development. Second, various elements of the smart library system are in motion and development, and these constituent elements are both interconnected and mutually restrictive. Smart library system construction must follow the inherent laws of dynamic development. Under the background of smart society development, the status quo and improvement of public basic quality, the status quo and improvement of smart infrastructure construction, etc., will all form realistic constraints on library services and put forward higher requirements, while the status quo of library construction and services will also impose corresponding constraints and demands on the public. Therefore, in the constraints and demands among various elements of smart libraries, their construction content and development stages interact and change dynamically.

3.3 Smart Library Construction Concept Model Under the background of smart society construction, it is necessary to fully implement the development concepts of innovation, coordination, green, openness, and sharing, making all social components including smart government, smart business, smart industry, and smart cultural services become smart, allowing the public to spend less effort, time, and other costs in all processes of seeking and enjoying services, making the entire process of seeking services more efficient. Therefore, as an important component providing cultural services in the smart society construction process, smart libraries must first obey the vision and overall planning of smart society construction, comply with the construction and development concepts of smart society, and maintain consistency in standards and norms with other components in the smart society construction process during data and system construction. Second, consensus must be formed within the library industry and alliances, making full use of technologies such as “Internet,” “Internet of Things,” and “blockchain” to achieve interconnection, co-construction, and sharing among libraries, building an open and collaborative large ecosystem. Third, in a single smart library system, various elements must also be coordinated to establish a sustainable development small ecosystem that is perceivable, interconnected, and unimpeded with high-quality and high-efficiency services. Finally, the decentralized smart system and smart service concept model shown in Figure 2 [Figure 2: see original paper] is formed.

4. Suggestions for Smart Library Construction

Looking at the latest developments in global smart library construction, smart society development has brought new opportunities and challenges for library transformation and upgrading. Future smart libraries should be driven by high-quality development and new technologies, integrating and reconstructing the

main elements of “human wisdom” and “object intelligence,” and advancing from aspects such as new technology application, resource construction, service expansion, and librarian team building.

4.1 Continuously Strengthen the Application of New Technologies in Libraries

The emergence of the smart library concept originates from the generation of new technologies such as big data, artificial intelligence, and the Internet of Things. Supporting technology is the driving force for library innovation and smart services. From library 1.0 to library 4.0, each transformation and reform of libraries originates from and will continue to rely on technology development. In recent years, many countries and regions have begun to adopt RFID systems dedicated to smart services. For example, some libraries in North America first proposed using RFID for borrowing and returning books. In China, quite a few university libraries have built RFID intelligent collection management systems to varying degrees. From the current perspective of smart connection represented by RFID, new achievements have been made in applications across various industries. Taking the practice of Nanjing University Smart Library as an example, Nanjing University Library chose RFID technology to achieve upgrades from the first to the third generation of robots. The third-generation robot is particularly noteworthy as an intelligent robot based on RFID technology for automatic book inventory and shelving, intelligent 3D navigation for book shelving, and intelligent inventory of library books. It is worth mentioning that Nanjing University’s intelligent robot has a book miss-reading rate controlled at 1%, positioning accuracy reaching 97%, can inventory 10,000 books in one hour, and achieves extremely high service efficiency. Libraries using intelligent technology not only make smart services more efficient but also free frontline librarians from tedious work to engage in deep-level high-quality services, improving work efficiency, saving labor costs, and winning the favor of countless libraries. Taipei Public Library adopted RFID technology in 2010, taking an important step toward unattended smart library construction with the assistance of electronic gates and self-service borrowing machines. Under the background of smart society development, smart libraries, as important components of communities, cities, and towns, have a long way to go in construction and development, requiring gradual and continuous deepening.

4.2 Deeply Integrate the Concept of Collaborative Cooperation into Resource Construction and Service Processes

Smart society development emphasizes stimulating the creativity and development vitality of the whole society, striving to achieve higher quality, more efficient, fairer, and more sustainable development. This is the call of the times and a new mission for library and information science. Regional and developmental imbalances have always been important challenges facing Chinese society. As important cultural service institutions and information bridges, libraries also face such problems, and single library services cannot meet local users’ needs. Therefore, smart libraries under the background of smart society development should implement

the concept of collaborative cooperation throughout the entire process of resource construction and services, innovating the “library +” development model. Establish service alliances with different libraries, cooperate with public cultural institutions such as museums and archives, and other types of information service entities such as bookstores and database vendors to enrich information resource construction and expand service content. At the same time, users can be treated as important intellectual resources and incorporated as important potential resources into the library construction system. Regional alliance mobile libraries can also be established to connect a “book society” through “books,” transforming national reading from “solo enjoyment” to “shared enjoyment” and enhancing users’ sense of sharing experience and gain. A typical example is the “concept store” in the London Borough of Hamlets in the UK, which cooperates with other community-related functional entities to form a community cultural facility integrating libraries, information, and training, playing an exploratory and demonstrative role in cultivating and shaping third-generation libraries and providing useful enlightenment. Currently, most library smart services are one-way services, with online and offline services disconnected. Online services provide literature search, resource recommendation, document borrowing, and other services to users through WeChat public service platforms and APP applications. Offline services mainly refer to users coming to the library for self-service borrowing, maker space exchanges, and participating in reading activities. Smart society development requires library smart services to form an organic whole between online and offline, integrating offline face-to-face services with the Internet to form a fusion smart service mechanism of physical space services and virtual space services, thereby building smart ubiquitous services and improving service quality and ubiquitous service contribution.

4.3 Build a Librarian Team with “Smart Craftsman Spirit” “Craftsman spirit” first appeared in Premier Li Keqiang’s 2016 Government Work Report. This spirit emphasizes the meticulous, personalized, and precise concept, which has important reference and guiding significance for library services. Under the background of smart society development, “smart craftsman spirit” should become the guide for libraries to move toward a new generation of smart libraries and further enhance library service quality and cultural soft power. Ian Johnson believes that librarians are the soul of libraries, and no one but smart librarians can create smart libraries. The existence of librarians makes up for the craftsman spirit missing in pure technology. Therefore, smart libraries put forward more professional and higher requirements for librarians, advocating that librarians adopt a three-dimensional learning model of “reading screens when busy—professional reading when free—lifelong study.” They must not only be proficient in library science, computer science, and other professional knowledge but also master data mining technology and big data management technology, conduct value-added development of knowledge, directly support users’ knowledge innovation, and provide users with “smart products” and “knowledge 精品.” Smart librarians must have keen insight into information, accurate judgment,

and discrimination ability, be able to precisely locate, organize, understand, evaluate, and create information based on searching, retrieval, analysis, and utilization of information, and must possess scientific data literacy, able to use data science technology to carry out “smart services” and provide in-depth intelligence research “knowledge 精品” through data analysis. This requires libraries to change concepts, innovate and promote “smart craftsman spirit,” take library human resources construction as an important entry point, start from the service end, and painstakingly build a librarian team with “smart craftsman spirit,” integrating the concept of meticulous carving into every service detail process, with innovation, efficiency, dedication, and initiative as the values and direction of smart services, abandoning the original “large and comprehensive” service concept, fulfilling the craftsman mission centered on public users and pursuing excellence, expanding new service forms that are personalized, efficient, intelligent, precise, and convenient, enabling both real and virtual users to experience librarians’ “smart craftsman spirit” in every detail.

However, in the current environment, there is still a considerable gap between smart library services and the needs of society and the public. For this reason, future smart library construction needs to seize the momentum. On the one hand, it should be good at pursuing changes based on the times and user needs, taking the formulation of industry standards by authoritative institutions in the library and information field and strengthening the overall planning guidance for high-quality development of smart libraries as the starting point, with the main purpose of promoting human wisdom activities. On the other hand, library smart services should be good at using the Internet to carry out cooperation, good at borrowing boats to go to sea—using existing platforms, borrowing valuable social resources, and borrowing external human resources—to promote the deep integration of needs and smart services through multi-dimensional cooperation models, meeting users’ growing diverse, high-level, and high-quality cultural life needs, and using the power of cooperation and wisdom to push the high-quality development of libraries to a new realm. It is worth emphasizing that smart libraries must focus on people-oriented principles and cannot pursue “technology supremacy” and deviate from the core driving force of people. Humans are the main body implementing smart services. Ignoring human roles makes smart libraries mere talk on paper or superficial. In view of this, future smart libraries should fully integrate and reconstruct library elements, service bases, technology, librarian capabilities, resources, and space, transforming from mainly relying on space and hardware investment to mainly relying on scientific and technological progress, new librarians, and users’ wisdom quality and other core elements, cultivating librarians’ ability to master new technologies. Only in this way can we create a knowledge sharing system and high-quality service space that gathers public wisdom, undertake the new mission of wisdom dissemination, enhance users’ recognition and dependence on smart services, and contribute due strength to the development of smart society.

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

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