

Research of Security Architecture Construction for National Digital Compound Publishing System Project Based on Data-Driven Approaches

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ABSTRACT. This article describes the domestic and international status of digital publishing industry and digital publishing safety standards. And, we discussed the use of data-driven approach to the study of the security standards problems in National Digital Compound Publishing System Project(NDCPSP),through research and analysis of existing information security standards published by national and international organizations and business process of digital compound publishing system.

Keywords: Data-driven, Digital Publishing, Digital Compound Publishing, Security Standards, Engineering Security

1. Introduction. Digital publishing is a new form of publishing which makes use of digital technology to edit content and spread digital content product through Internet, whose main feature is digitalization of content producing, management process, product form and spread channel. Current form of digital publishing products mainly includes digital book, digital newspaper, digital journal, online original literature, online education publication, online map, digital music, online comics, online game, database publication, mobile phone publication (including MMS, polyphonic ringtone, mobile phone newspaper, mobile phone journal, mobile phone novel and mobile phone game), etc. Transmission route of digital publishing products mainly includes wired network, wireless communication network, satellite network, etc. Digital publishing started relatively late in China, but developed fast, which has formed new forms of operation including online book, online journal, etc.

Digital compound publishing system can produce both eBook for computer searching and browsing and standard meta-data supplying service for the whole society. Taking advantage of digital compound publishing system, publishers can transform every book published into digital form without extra expense, and realize multiple-channel release, multiple uses with only one-time production. The goal of National Digital Compound Publishing System Project (NDCPSP) is to realize spreading one type of information by multiple types of media, and complete information processing, publishing, and issuing in

one system. It is Chinese government's key project for promoting modern publishing industry in the new age, which is also one of technology innovation projects for press and publishing in Press and Publishing Industry's Twelfth Five-Year Development Plan.

In the world today, developed countries pay much attention to digital publishing industry, accelerate deep fusion of traditional publishing and digital publishing, and accelerate integration of multiple transmission median the process of promoting further development of publishing and media relying on high and new technology,. New media and new types of operation appeared successively, digital forms of production, transmission and consumption gradually becomes the mainstream. America and Japan are forerunners of digital publishing. It is estimated that with continue introduction of new platforms for business such as tablet PC, e-reader (e. g. US company Amazon's Kindle, Apple's iPhone series) etc., market space of digital publishing in America and Japan is possible to be expanded rapidly. And their positions as leaders of global digital publishing and wind vanes of new reading style will be consolidated. America's ownership of high-tech and its mature experience of market operation make its digital publishing industry be capable of integrating publishing with service, training and information, extending online education and online service business, and magnifying readers' demand infinitely in the field of education, science and technology and travel books. In contrast with property of American digital publishing as a service industry, Japan's digital publishing focus on comics, novel, photo album and fashion magazine according to market's demand, which makes comic books outstanding in Japanese digital publishing industry at present.

Digital publishing has rapidly developed in China since 1990s, with the rise of Internet in China, and with deeper and deeper mutual connection and affection between digital technology and publishing. Especially since the beginning of 21st century, news and publishing industry responses acuter to the development of digital technology, and includes corporation's technical updating into development strategy in time. Digital publishing enterprises keep track of new technology, research and develop new products. Different types of e-book reader, in-hand mobile terminal device continually appeared. Many traditional publishing enterprises think about their development path from a strategic level facing new challenge. Some of them integrate content and technology resource, release terminal products such as e-readers with their own brands, build content resource transmission platform, carry out cooperation in various aspects with telecom operators, and vigorously expand business such as mobile phone publishing. In past several years, traditional and digital publishing fused deeper and deeper, their business model is innovated continually, industrial chain is extended, management system and method are changed, a good development trend is showed, product form is enriched constantly, scale of industry is growing, degree of industry integration is deepened, consumer market is more and more mature, and environment of industrial policy is further optimized. But in the process of fusion and development of traditional and digital publishing, there are problems such as unclear development model, slow speed of digitization of traditional publishing enterprises, imperfect distribution mechanism, non-uniformed industrial stands, insufficient copyright protection, etc. This brings new challenge to fast, healthy and sustainable development of news and publishing industry to some extent.

National Administration of Press and Publication P. R. C. promulgated Electronic Publications Management Interim Provisions for Computer Information System Security Protection Regulations of P. R. C. in 1996. The provisions provided on business related to

electronic publications according to security requirements of computer information system. There is not specialized legislation about digital copyright protection in China. Copyright protection mainly comply with Copyright Law and Information Network Communication Right Protection Provisions carried out in 1996, lacking of standards, laws or regulations fully reflect publishing information and information system security of digital publishing system. Although, standards, laws and regulations about common information system security have been mature at home and abroad, and they also apply to digital compound publishing system, but digital compound publishing system has special security problems in contrast with other systems, a prominent one out of which is copyright problem. Study on digital works (publishing information) security is mostly limited on technology level, e. g. Information Hiding and Digital Watermark technology that developed rapidly in past ten years and are valuable on integrity protection, copyright protection and using track of digital works. But theory basis of the technologies are imperfect, they are difficult to apply to engineering practice, there are not related standards introduced at home and abroad, and their effect scope and engineering value are limited in spite of appearing of some practical patents and products.

Data-driven approaches can realize forecasting, estimation, scheduling, monitoring, diagnosis, decision-making, optimization and other expected functions by making use of online and offline data of controlled system. Here, we will use data-driven approach to study the safety standards in the NDCPSP. At the same time, because security problems exist generally in information projects, e. g. large-scale networks of banks and telecom companies also have potential security hazards and engineering risk, research of security architecture construction for digital compound publishing system project based on data-driven approaches is worth promoting to direct security engineering of other industries.

2. Research Idea and Methods. The general idea of this research is to survey existing information security standards published by national and international organizations and complete business process of digital compound publishing system, to establish security standard system for publishing information and information system, and to supply security requirement and security guideline for relevant achievements (e. g. product, labor, service), process (e. g. producing, designing, technique, workflow, management), behavior (e. g. human activity, action, procedure, method) and prerequisite (e. g. resource, equipment, staff and environment)in the process of digital compound publishing system projection this basis, taking a process consisted of nodes such as creation and gathering, editing and processing, storing and releasing, using and supervising of publishing information as a main line, relying on properties of information in each node (including existence form of information, operation or calculation which may be applied, flow direction of information, sender and receiver of information, etc.), taking security threat in each node faced by information and its properties as object of study.

Specifically, it includes the following steps. The first, research the complete business process of digital publishing .The second, Analysis the safety standards that required at each stage of digital publishing systems engineering ,including the physical security standard, engineering implementation security, system security ,the content security of digital publishing, and information transmission security, etc. The third, Access to domestic and international information security engineering standards. The fourth, Analysis of

existing standards, and reclassify the above-mentioned standard contents in accordance with different stages of the compound digital publishing systems engineering implementation. The fifth, sort all of the standard contents by a certain algorithm through computer software system, based on the frequency of each standard content be indexed by relevant standards and the production time of the standard. The sixth, build the demo of the digital publishing industry safety evaluation system, that provide theoretical guidance and technical support for the digital compound publishing types of systems engineering security.

Overall, the innovation of this research present in tow aspects. One is fully study security issues of publishing information and information system from the perspective of digital compound publishing system, propose security goal on engineering level, and produce engineering security guideline and security standard appropriate for publishing system. The other is that it adopts a research method based on data-driven approaches, in contrast with traditional research method of security knowledge architecture construction.

3. Main Contents. This subject 'main content is to research security problems of digital compound publishing system project taking advantage of data-driven approaches, to construct information security standards system consisted of basic standard, physical security standard, system security standard, application and engineering standard and management standard etc. for digital compound publishing system, and to construct security knowledge base for digital publishing industry. After decomposition, there are five main research contents are as follows. First, Survey and analysis of current situation of engineering security standards. Next, Disassembling and description of digital publishing process. Then, Research of process and property of publishing information; Building of knowledge base. After that, research and development of aided-building platform and resource construction. At last, Construction of information security engineering architecture.

4. Status of the Research. Early, we have completed the research and analysis on the digital publishing process. Generally, a complete digital publishing business processed includes content production, resource processing, content resource management, multi-channel delivery, use and supervision.

Among them, the content production process including two parts, content creation (e.g. acquisition and pipeline) and layout production. This process mainly considers the structure of content management, indexing and classification management, in order to provide content resources for resource management, rather than just for a paper book. Here, layout refers to the various layouts of content showing and delivering. The resource processing process mainly refers to the collection and processing of existing books, video and audio resources in the Press. For example of the historical book resources, the processing includes resources format conversion, indexing and annotation, as well as sections of chapters and knowledge entries etc. With these deep-processing, form the "granular" and "fragmental" digital content, and carry out the classification management to be able to provide personalized data services based on user requirements. The content resource management process refers to the classifying storage of resources that have been collected and processed,

which will contribute to achieve the storage management of resources in the Press. Generate the different forms of the product by making use of relevant tools ,as well as combined with the back-end distribution channels, in order to do multi-channel content delivery, and provide data sources to meet readers' personalized service .In the multi-channel delivery process , we publish data produced in the content resource management process ,through multiple channels and multiple product forms, e.g. network publishing, mobile publishing, on-demand publishing ,providing readers with digital content services. At last, before readers can make use of digital content services, they may need to pre-pay. The service provider should supervise the readers' use status.

We will face a variety of safety issues at each stage of the digital publishing systems engineering. First, in the preparation phase of the systems engineering we may face problems in the underlying security, organization guaranty security, qualification guaranty security, physical and environmental security etc., such as staff qualifications, service qualification, product safety, computer center field and computer room security. Secondly, in the implementation phase of the engineering, we may face problems in the engineering implementation security, project implementation security, risk management, security framework, security architecture, security model, information security technology, network security technology, server security technology. Third, in the system operation and maintenance phase will be likely to faced issues of system security, system management, system evaluation, such as system's backup and disaster recovery, business continuity management, emergency response management. Fourth, in the digital publishing process, there will also be involved in digital publishing content security, transmission security.

On the basis of the above work, through a survey of existing national and international engineering safety standards, total of 75 national standards and 51 international standards, we have reclassified relevant standard contents according to the security issues involved in different stages of digital publishing systems engineering. Before the reclassification, common information system security involves the underlying security, information security management, marking and identification techniques, physical security technology, entity management, password and technology, and security evaluation. After the reclassification ,it contains the underlying standards (including terms of safety, security architecture, security framework, security model, security technology, etc.), physical security standards (including physical environment and security, medium security, etc.) system safety standards (including hardware and software platform security, security protocols, etc.), application and engineering standards (including safety engineering and services, personnel qualifications, etc.) and management standards (including system Management, evaluation and Certification, etc.) , which is more suitable for digital compound publishing system. Also ,we have completed the Sort of all the standard contents by a certain algorithm through computer software system, based on the frequency of each standard content be indexed by relevant standards and the production time of the standard.

5. Achievements and Prospects. At present, the research has basically completed the construction of the Security Evaluation System Demo model for digital publication industry , implemented the exploration of ideas and methods in building of the digital compound publishing system safety engineering system, which is not only to provide theory and technology support for the safety of digital compound publishing systems

engineering , and provide methodological guidance for information systems security engineering standards in other industry . In the future, through more practices, we will continuously improve the method used in this research to build the security knowledge base platform for digital compound publishing system, accumulate safety knowledge, develop expert systems, and to explore the Knowledge-based new method of automatic inspection, amendment and improvement of standards.

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