

Discussion on the Construction of Public Security Data Management Capability Maturity Model

Qianqian He and Lin Jiang

Chongqing Medical and Pharmaceutical College, Chongqing, China

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Abstract: At present, in the research process of security data management capability maturity model, the research work of data management process is mainly completed. At the same time, it is necessary to fully grasp the research status and application of the public security data management capability maturity model, analyze the characteristics of the maturity model, and construct the public security data management capability maturity model according to the specific types of public security data. We can use the capability maturity model to effectively evaluate various problems in the process of public security data management, which is of great help to improve the public security data management capability.

1 INTRODUCTION

As a new interdisciplinary subject, public security data management involves a lot of contents in the research process. The main purpose is to explore the specific needs of public security governance activities in information space in physical space and social space, and to analyze the laws and characteristics of public security data. We should use the knowledge of data science and public security to fuse the data problems in public security governance activities, pay attention to the management of public security data itself, and dig deep into the application value of data in public security governance. Effective data management generally requires long-term management planning, and at the same time, it is necessary to use corresponding management activities at appropriate nodes to carry out collaboration among personnel, institutions, resources and key events. In this management process, the data management model is an important bridge connecting management strategy and management practice, and plays a fundamental role. Based on the related research contents in the field of scientific data management and government data management, the related models of data management have been put forward, and the data management infrastructure model and data management capability maturity model have been formed. These typical models can play a visual role in the application process, clarify the complex process of data

management, and decompose the data management process into different stages. They can identify and explain the roles of participants, responsibilities of management activities, processes, important events and other key elements in different stages. Through effective data management activities, the corresponding model can also be optimized.

2 RESEARCH SIGNIFICANCE OF PUBLIC SECURITY DATA MANAGEMENT CAPABILITY MATURITY MODEL

Under the background of continuous social development and change, the public security situation is becoming more and more complicated, and traditional security accidents are characterized by frequent occurrences and non-traditional security threats, which will seriously affect social stability and the level of economic development. From data production to data analysis, it is necessary to carry out data analysis and collation based on the demand of security public decision. We should realize that this process has the characteristics of long-term and complexity, and the level of public security data management can be improved through reliable data information. In the process of developing and managing public security data, it is necessary to strengthen government regulation and guidance, and

fully tap the application value behind public security data.

In 2015, China has put forward an action plan to promote the development of big data, and different provinces and cities in China are also carrying out big data management according to the corresponding plan. In the concrete work, we need to sort out the public data and strengthen the data quality management and research work. Building a unified data management platform can improve the efficiency of data sharing and play a certain role in ensuring the comprehensive utilization rate of public data. We need to pay attention to the scientific and reasonable public security data management mechanism according to the specific regional characteristics in the process of public security data management. Because of the different economic bases in different regions, there are some differences in the cognition of public security data management. At present, China has not formed a unified path and goal for the development of public security data management, nor has it scientifically evaluated the level of public security management, which leads to the inability of relevant departments to optimize and adjust relevant mechanisms according to the situation of public security data management, and to a certain extent, affects the formulation and implementation effect of data management plans and solutions. In this research process, we mainly analyze the capability maturity model, and discuss the specific application value of the capability maturity model in the process of public security data management. Structured data management plays a prominent role in determining the evaluation method of public security data management capability, which can provide clear management capability improvement goals and directions for government departments and related institutions(Ye 2015).

3 CHARACTERISTICS OF CAPABILITY MATURITY MODEL

When building the capability maturity model of public security data management, it is necessary to fully grasp the characteristics of the capability maturity model. The primary function of capability maturity model is to evaluate the management capability in the process of software development. After the capability maturity model is put forward, its basic structure remains unchanged (Figure 1), which mainly includes key process areas, specific

objectives, specific practices, common objective, common practice, common features and capability levels (Xiong 2020). Among them, the key process area is the problem that must be solved when realizing the management goal. The original capability maturity model consists of 22 key process areas, and specific objectives and practices refer to specific objectives and practices in a key process area. Common objectives and common practices can be applied in several key process areas. Each key process area is organized according to public attributes, including implementation regulations, implementation capabilities, implementation activities, measurement and analysis, and experimental verification. In the research process of capability maturity model, it includes five steps as shown in Figure 2.

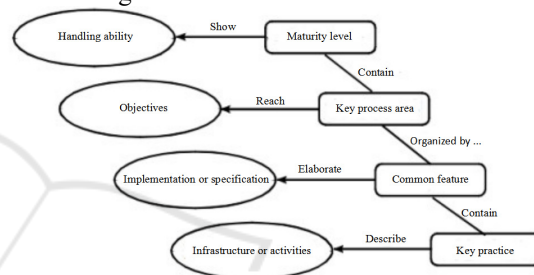


Figure 1: Schematic diagram of the capacity maturity structure.

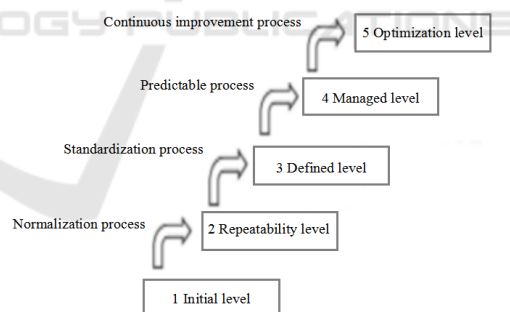


Figure 2: Capacity maturity model ladder.

4 ANALYSIS OF PUBLIC SECURITY DATA TYPES

Public security data refers to all kinds of data generated in the process of public security governance. Generalized public security data includes all kinds of data in all public security fields. The main function of public security data is to reflect the concrete phenomena of public security governance activities, and to obtain the characteristics

and laws of public security governance activities from various data, so as to optimize and improve the corresponding management decisions. The main characteristics of public security data are huge amount of data, low application value density, diversification and obvious big data characteristics. At present, there is no unified classification standard for public security data, because the amount of public security data is relatively large, and there are public security data in different industries, different organizations and different data terminals.

When studying public security data, there will be some differences in the definitions of different researchers: (1) Researchers think that the public security data of cities mainly include different categories of urban public basic data, social situation and public opinion data, physical environment and disaster monitoring data, urban operation data, departmental business data, human behavior data, emergency handling data and public security knowledge data. Different categories cover different types of specific data. (2) Some researchers directly divide urban big data into sensor system data, user-generated data, government data, private sector data, art and humanities data and other mixed data. (3) Some researchers believe that public security data simply refers to national security big data. These data are distributed in the information space, physical space and social space where people and things are highly integrated in various complex correlation forms(Sun 2019).

Because public security in a broad sense refers to all external environments and orders related to social life security, including environmental security, public health security, economic security, information security, food security, production security, workplace security and so on. The data generated in these fields are all public security data. In this research, it is necessary to scientifically evaluate the maturity of public security data management ability from the commonality of data in different security fields.

Public security data is mainly a mixed environment formed by the integration of Internet, communication network and sensor network, including physical space, social space and virtual network coupling space. The data spaces stripped from these spaces can all be called public security data spaces. Physical objects in space are the main carriers of public security data, including data of key infrastructure, road traffic structure and semi-structured infrastructure, as well as unstructured multimodal data such as environmental physical parameters and videos sensed by large-scale sensing devices in human living space. In addition, individuals

and organizations in social space are also the main producers of public security data, including basic demographic data, individual or group personality characteristics, emotional representation, cognitive decision-making and other psychological data and behavioral data. Virtual network coupling space refers to the data generated in the overlapping coupling of network space, physical space and social space. The main carrier of these data is the Internet or mobile terminal devices, including data and information risk data processed by basic networks and different types of application systems in information construction, as well as some unstructured and semi-structured data such as news reports, forum posts and blog posts.

In a word, the sources of public security data are complex and the number is huge, and its obvious feature is that the data of different industries have strong connections. Because the public security governance activity itself is continuous, it determines that the generation and acquisition of public security data have strong continuity. For example, the business systems of government departments will constantly update the corresponding data. In addition, public security data are complex, diverse and interrelated. The data of different fields, different sources and different structural types are relatively large in scale and growing at a relatively fast rate. There is a certain connection between public security data of different fields, and public security governance activities involve different departments, industries and fields. Therefore, the generated public security data also have obvious correlation. Public security data involves a wide range of subjects, and the production management and use of public security data involve different participants such as government organizations, enterprises, the public and researchers. These data characteristics determine that the management of public security data is extremely complex and difficult.

5 CONSTRUCTION OF PUBLIC DATA MANAGEMENT CAPABILITY MATURITY MODEL

5.1 Model Design

When building the maturity model of public security data management capability, we must clearly grasp the public security data management practice and key practice processes. Based on this, the key process area can ensure the effectiveness of the maturity model of

public security data management capability, and based on the maturity model, the level of public security data management capability can be scientifically divided. In CNKI, database data supervision, data guarantee, data fusion and so on should be used as key words to search for literature. When searching documents, we should eliminate the data with low correlation with public security data, such as medical, financial and energy data, and identify and sort out the documents highly related to public security data management. After importing the identified files into Nvivo software, extract and encode the data. There are inconsistencies in the codes, which need to be discussed in groups to determine the final result. Data management practice extraction is the key content that must be paid

attention to in the coding process. When extracting data management practice, it is necessary to combine similar contents, organize data management practice into key practice processes, and form key process areas based on key practice processes. In order to ensure the application effect of the public security data management capability maturity model, when designing the model, we should bring the key practices and key process areas into the model index system and carry out the grading work. In this study, it is necessary to explain the levels of capability maturity, and accurately describe the characteristics of different key process areas in each level to form the classification of public security data management maturity levels, as shown in Figure 3.

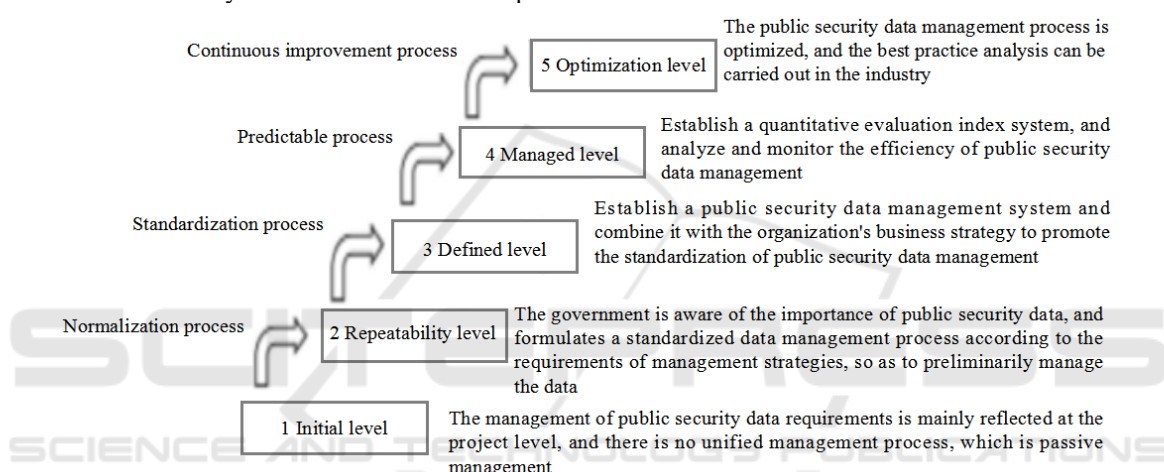


Figure 3: Schematic diagram of the public security data management capacity maturity level classification

5.2 Management Process and Practice Construction

In the design of key process areas and key practices of public security data management, we can use Nvivo files for coding, summarize the key practices of public security data management capabilities, and combine similar practices to obtain integrated data.

According to the goal of key practice, four key process area indicators can be determined, such as data acquisition and quality control, data classified storage and security management, data mining and analysis, data opening and sharing. In the specific process of information extraction and mining, it is necessary to know about researchers and research years, as shown in Table 1.

Table 1: Key process areas and key process research years and researchers.

Key process areas	Key process	Research years and researchers
Data acquisition and quality control	Clear data source	2010 Zhao Chunyan, 2014 Wen Bowei
	Determine the data acquisition method	2012 Chen Beiqing, 2014 Tian Yuchi, 2016 Hu Yu
	Determine the data collection specifications	2014 Wang Ting, 2018 Yang Jiangyong
	Data acquisition	2008 Dong Rencai, 2014 Wang Ting, 2018 Yang Jiangyong, Li Guanhua
	Data quality management	2015 Li Weibin, 2018 Yang Jiangyong

Table 1: Key process areas and key process research years and researchers (cont.).

Key process areas	Key process	Research years and researchers
Data classification, storage, and security management	Establish a data storage platform	2012 Du Hongyue, 2016 Hu Yu, Jin Hui
	Data preservation	2013 Liu Jun, 2015 Wang Weibin, 2016 Hu Yu
	Data security management	2013 Liu Jun, 2014 Tian Yuchi, 2018 Yang Jiangyong
	Authorization management	2005 Xu Yonggang, 2016 Hu Yu, Zhang Shuai
	Data backup	2005 Xu Wei, 2014 Zheng Xiufen
	Data maintenance and update	2010 Zhao Chunyan 2016 Hu Yu, 2018 Li Guanhua
	Determine the data standard system	2015 Li Xiaohong, Wang Weibin, 2016 Hu Yu, 2017 Wu Xianhua
	Data classification	2010 Zhao Chunyan, 2015 Jin Hui, 2016 Zhang Shuai, Hu Yu
Data mining and analysis	Clear the data usage requirements	2015 Deng Lan
	Data analysis	2012 Du Hongyue, 2015 Wang Weibin, 2017 Wu Xianhua, 2018 Yang Jiangyong
	Visualization processing	2011 You Hong, 2013 Hu Pian, 2014 Wen Bowei
Data opening and sharing	Fusion data	2008 Dong Rencai, 2014 Wen Bowei, 2017 Wu Xianhua
	Build a shared platform	2010 Zhao Chunyan, 2012 Du Hongyue
	Develop a data sharing mechanism	2010 Zhao Chunyan, 2012 Du Hongyue
	Complete data sharing	2014 Wen Bowei, Wang Ting, 2016 Hu Yu

5.3 Maturity Construction of Public Security Data Management Capability

After obtaining the key process areas, it is necessary to build a maturity model of public security data management based on the key process areas. Based on the maturity level of capability maturity model, it is considered that the practice of public security data management, through temporary management to fine planning, is constantly improving the formation system in China. The characteristics of different key process areas are different with different maturity levels. First, in the initial stage, the public security management system is relatively scarce, and the whole management process has not been scientifically defined, nor has a unified standard management process been formulated. Public security data is in a disorderly situation, with data islands and low data utilization rate. Second, in the repeatable stage, it has been possible to establish basic system and procedural standards according to public security data management. In addition, it is necessary to optimize and adjust the data management process based on the current situation of public security data management, which improves the standardization level of data management to a certain

extent, can carry out public security data management according to certain rules and standards, and can meet specific needs and ensure the application effect of public security data. Third, the level has been defined. This means that the public security data management process is relatively perfect. In the process of public security data management, its standardization is relatively strong, and a data demand response mechanism that can meet the requirements of public security data management has been formed, which can ensure that the public security data management can meet the specific needs. Fourth, the management stage. To determine the relevant indicators of public security data management, and to ensure the quality and efficiency of public security data management. At this stage, the public security data management mechanism is also relatively perfect, and the public security data analysis model base has been completed, and research and analysis work can be carried out according to the public security data management work. Comprehensive analysis of public security data can quantify the analysis results of public security data, thus supporting public security management decision-making. Fifthly, in the optimized stage, the public security data management has a standardized process, and the management quality is guaranteed. In addition, with the increase of

data utilization rate, data fusion and analysis can be carried out in time according to the specific situation of public security data, especially when dealing with public crisis events, and its response speed is relatively fast(Niu 2019).

5.4 Model Application

In the construction of public security data management capability maturity model, it is necessary to base on the specific situation of public security data management in China. Comprehensive research on key process areas such as key practices, data acquisition quality control, data mining and analysis, data opening and sharing, data classification and storage, and security management, etc., and use this as the main index to complete the construction of public security data management capability maturity model. After the completion of the construction, the maturity level should be scientifically divided, and its value is prominent in the process of model application, mainly in the following aspects: First, the maturity model of public security data management capability can be used to scientifically evaluate public security data management capability, and provide more scientific and perfect data support and corresponding information services for the formulation of public security data management scheme. In the application process of the model, key process areas and key practices are important indicators when establishing the model. Government agencies or related organizations can make use of the public security data management capability maturity model to deeply analyze the situation of public security data management, compare it with the indicators in the model, and master the effect of public security data management capability based on the level division of the capability maturity model, which can make relevant government agencies and organizations clear the shortcomings in the process of public security data management, and help promote the healthy development of public security data management. Secondly, the application of the model can improve the standardization of public security data management. The development stage defined in the model itself belongs to the continuous management promotion process, while different organizations carry out data security management based on the model, and take different development stages as the main criteria for data management planning of public security, which is conducive to ensuring the standardization of data security management. Third, we can compare and analyze the quality of public security data management in

different institutions. For example, when evaluating the public security data management capabilities of different county and city governments, we can use the key practice areas as the reference benchmark, and through horizontal comparison and analysis, make the institutions with low capabilities learn from those with higher capabilities (Zhou 2020).

6 CONCLUSIONS

To sum up, the construction of public security data management capability maturity model can provide perfect information services for the government and related organizations in public security data management to a great extent. The key practices and key process areas put forward in the application of the model are important contents to ensure that the capability maturity model can fully play its role. However, in the application and research process of this model, it is still in the preliminary exploration and research stage, and more attention is paid to the data creation process in the application of this model. This requires an in-depth analysis of the current situation of public security data management and continuous improvement and optimization of the capability maturity model according to the actual capabilities of public security data management, so as to provide more reliable information support for the improvement of public security data management capabilities.

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