Construction and application of lean standardized testing management system based on innovative mode

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Abstract: At present, the construction of Lab is constantly advancing, and the quality of Lab and the safe and reliable operation of Lab have become the main concerns. In the construction of intelligent Lab, to ensure product quality and safe and reliable Lab, not only strict product quality inspection is needed, but also scientific product quality inspection is needed. Lab mainly test products and then send them to other enterprises for re-inspection, which not only increases the testing cost of enterprises, but also easily leads to inaccurate and irregular product testing data. In view of this situation, this paper puts forward a construction method of lean standardized test management system based on lean management idea, aiming at ensuring the quality of Lab and the safe and reliable Lab through reasonable allocation of resources, strengthening process control and continuous improvement. Construction and application of lean standardized test management system based on innovative mode. Based on the idea of lean management, the system aims at "the quality of Lab and the safe and reliable Lab", integrates the internal and external resources of the enterprise, combines with the actual situation of the enterprise from the aspects of on-site quality management, equipment condition evaluation, abnormal defect control and test result analysis, and adopts the method of continuous improvement to continuously promote the implementation of lean standardized test management, gradually realize the standardized, unified and effective management of test data, and thus realize the organic unity of product quality and safe and reliable operation of power grid. The system has been applied in smart substation construction projects. In this paper, the requirements and influences on inspection work are analyzed, and a lean standardized inspection management system based on innovative mode is constructed.

Keywords: quality; Detection; Lean; standardization

1. Introduction

With the rapid development of information technology, the product research and development cycle is shortened, and product testing plays an increasingly important role in product research and development. The testing work has gradually developed from traditional manual operation and manual recording to automation, informationization and digitalization. In the implementation of agile development mode, enterprises usually use automated testing tools to test the function, performance and safety of software. However, the traditional automated testing tools have the following problems: R&D personnel do not have a clear definition and specification when testing software automatically, which leads to repeated work and waste of resources; There is no clear definition of the work content of automated testers, which leads to scientific and reasonable arrangement and planning; There is no systematic training for automated testers, which leads to repeated labor and waste of resources; Lack of a unified platform for test data management and sharing leads to low development efficiency and waste of resources; Lack of comprehensive evaluation and verification of software function, performance and security by automated testing tools; Lack of effective system analysis tools for comprehensive evaluation of software functions, security and other aspects cannot provide effective data support for project management. In view of the above problems, this paper analyzes the problems and shortcomings of traditional automated testing tools in project management from the perspective of improving the quality of enterprise product research and development, and puts forward the construction and application scheme of lean standardized testing management system based on agile development mode in combination with the requirements of software testing management in the process of research and development under agile development mode. In this paper, from the perspective of lean project management, research and application practice are carried out from multiple dimensions

such as R&D personnel, processes and technical means. Through lean project management and lean software testing management, the problems in product research and development are fundamentally solved to ensure product quality. Under the innovative mode, through the construction and application of lean standardized test management system, a comprehensive software test management system is established for enterprises while improving the quality and efficiency of enterprise software, which ensures the integrity and consistency of data in the product development process and provides strong support for enterprises to implement agile development mode in the future[1-2].

2. Background of system construction

In the agile development mode of enterprises, in the process of product development, automatic testing tools are usually used to test the function, performance and safety of software, so as to ensure the quality of software and provide strong support for subsequent project development. At present, enterprises implement agile development mode, which puts forward new requirements for test management in product development process. In the process of software research and development, quality control, demand change control, development progress control and teamwork are the basic elements, and management is carried out according to PDCA (Plan, Do, Check and Action) cycle method, so as to ensure that the software can be completed within the specified time and meet the needs of customers. In the whole product development process, a lot of testing work is needed, so a perfect test management system is needed to ensure the quality and efficiency of software. At present, some domestic enterprises have introduced software testing into project management. The traditional automated testing tools are widely used in project management, but the main problems are:

(1) There is no clear definition and specification for the testing work, which leads to the failure of unified management and sharing of testing data.

(2) There is no clear definition of the work content of automated testers, which leads to the unscientific and reasonable arrangement and planning.

(3) Lack of a unified platform to manage and share test data leads to low development efficiency and waste of resources.

(4) Lack of effective system analysis tools to comprehensively evaluate and verify the software function, performance and security.

Therefore, enterprises need to combine their own needs, take lean project management as the guiding ideology, and combine the methods and tools of lean software test management to build a perfect software test management system, so as to ensure the integrity and consistency of data in the product development process.

3. System construction ideas

3.1 adhere to the problem-oriented, focus on solving problems

Taking solving problems as the goal and the company's "two transformations" as the direction, we adhere to the "problem-oriented" idea in system construction and pay attention to solving outstanding problems existing in current test management.

According to the requirements of the company's standardization construction, the standardization system framework and test process template are established, and the secondary development is carried out on this basis. Train testers, compile corresponding teaching materials and learning materials according to the training content, and make "learning cards" and "test process templates" to ensure that testers can operate as required; The third is to establish a work account to record the test process and the implementation of the test documents in detail; The fourth is to apply the standardized system framework and process template to the actual testing work; The fifth is to systematically manage and use personnel and other resources[3-4].

Establish a sound business process, from the beginning of demand analysis to the completion of implementation and solidify it into a process, and manage the process according to the principle of "finding problems and solving problems"; The second is to use scientific methods to analyze and evaluate the process and formulate control measures. For example, factors such as staffing, resource investment and execution time are included in the evaluation scope, and all links in the process are

monitored and managed in real time; The third is to adopt the way of "continuous improvement" for continuous optimization. Constantly find and solve problems, and constantly optimize processes and standards.

3.2 Strengthen process management and control, and comprehensively improve the detection ability

The inspection process control of inspection institutions includes four links: inspection plan, inspection process, inspection result analysis and report writing, which is an important guarantee for improving inspection ability. Among them, the testing plan is the basis for testing institutions to carry out their daily work. Combined with measurement management, the plan is divided into basic plan, field plan and specific plan. The inspection process refers to the whole process from sample receiving, storage and circulation to inspection, including sample management and inspection process management. The analysis of test results refers to the statistics and analysis of test results and the conclusion of the test; Report writing refers to summarizing and refining the analysis conclusions and forming a written report. Establishing a scientific and standardized laboratory system is the basis and guarantee for testing. Through the investigation and analysis of the existing laboratory management standards and methods in the industry, the laboratory management standards and methods system have been formulated.

By analyzing the existing laboratory management system, the personnel, equipment, facilities, sample management, reference materials and measuring instruments of testing institutions are sorted out, and the laboratory system of testing institutions is improved. The establishment of this system will play an important role in improving the detection ability of testing institutions.

The inspection process is the key link to reflect the inspection results, which mainly includes sample collection, preservation and circulation, sample preparation, pretreatment and analysis. Documents such as the Code of Practice for Sample Management of Testing Institutions and the Code of Practice for Sample Transportation and Circulation Management were formulated, which standardized the inspection process, defined the responsibilities of all personnel, ensured the accuracy and effectiveness of the inspection results, and ensured the continuous and stable development of the inspection work. By establishing a perfect management system and strengthening the control of the testing process, it provides a reliable basis for testing institutions.

By combing the existing management system, the "Code of Practice for On-site Supervision and Inspection of Testing Institutions" and other documents were formulated, and the contents and procedures of supervision and inspection were clarified, which provided a basis for on-site supervision and inspection. By sorting out the existing management system, the quality manual, program files and work instructions of testing institutions are formulated, and the quality management system and work instructions are sorted out in detail, so as to clarify the basis and content of the quality manual, program files and work instructions, and ensure that testing institutions can use the system files correctly. By combing and perfecting the management system, it provides an operable institutional basis for testing institutions and standardizes every link of the testing process[5-6].

3.3 Focus on continuous improvement and optimize business processes

In order to ensure the efficient and orderly inspection work, it is necessary to start from all aspects of inspection management, run the concept of lean management through the whole inspection process and continuously improve the process. By establishing the improvement mechanism of inspection work, problems can be found and solved in time, and the inspection process can be lean, standardized and standardized. The first is to establish and improve the working mechanism. Continuously improve the inspection management system, strengthen the publicity of business training and management system, clarify departmental responsibilities, management standards and work requirements, and enhance the implementation awareness of all staff. The second is to establish a "three ones" working mechanism. That is, establish a set of "daily summary" working mechanism in the testing work, and insist on summarizing the completion of various tasks every day; The working mechanism of "weekly analysis" analyzes and summarizes the completion of testing tasks every week; The working mechanism of "monthly assessment".

Through the "three ones" working mechanism, strengthen the management of testing work and enhance the standardization and execution of testing work.

Thirdly, strengthen process control. Through the establishment of weekly, monthly, quarterly and

annual analysis and reporting system, the inspection management work is analyzed and summarized regularly, and the existing problems are continuously found and corrected in time; Through regular inspection of test data quality, adjust and improve the abnormal data in time when it is found; Through regular skill training and business knowledge examination for testing personnel, the comprehensive quality and business skills of personnel are continuously improved. Finally, carry out continuous improvement. For the problems found, formulate feasible solutions and constantly improve the work according to the actual situation; For new problems and difficulties encountered in the work, we should report to the superior leaders in time and put forward solutions.

3.4 Consolidate the management foundation and improve the detection efficiency

① Based on the scientific and standardized system, build a testing management system. Comprehensively sort out the existing inspection management system, systematically sort out, comprehensively improve and solidify the results, and build a standardized inspection management system to provide guarantee for standardizing the inspection business process and promoting the standardized and orderly development of the inspection business.

② Strengthen process control by means of quality supervision. Establish a quality supervision system covering all links, clarify the quality control requirements and measures of all links, build a quality control system covering the whole process, and continuously improve all key control points to ensure that the testing process is effectively monitored.

③ Strengthen information management with the support of informatization. Carry out the construction of testing business information system in an all-round way, and realize the automatic collection and interactive sharing of the whole process information, such as testing plan, instruments and equipment, sample receiving, sample preparation, sample circulation and result review.

3.5 Strengthen information construction and expand application scenarios

① The application of intelligent instruments and meters, through technical means to achieve intelligent management of testing work. Combining intelligent instruments and equipment with testing business process, the whole process of testing process is recorded technically, and the efficiency of equipment testing is improved through intelligent analysis of testing data.

② Applying information management means to improve the efficiency of detection management. Through the automatic collection of equipment running state data, the real-time online monitoring and analysis of equipment running state is realized, and the whole detection process is driven by data. At the same time, using computer technology, the intelligent management of the whole process of inspection work is realized, and digital elements are added to the traditional working mode, which greatly improves the efficiency and information level of equipment operation management.

③ Applying "internet plus" technology and innovating management methods. With the help of internet technology, on the basis of traditional management mode, the innovation of management mode is realized at two levels of business management and information technology by using internet thinking, which optimizes traditional business processes and improves work efficiency. Through technical means, the automatic collection and analysis of test data are realized, which provides effective data support for equipment condition evaluation[7-8].

4. System content and application effect

4.1 Clear organizational structure

Combined with the characteristics of testing business, the organizational structure of testing center is defined, and the organizational structure of the director, deputy director, assistant director, quality director, quality inspector and inspector of testing center is established, and the responsibilities and workflow of each level are defined, forming a scientific and standardized organizational system. The director of the testing center is responsible for the overall work of the testing center, mainly responsible for formulating the long-term development plan and annual work plan of the testing center, and organizing the formulation, revision and implementation of the quality policy, objectives and various rules and regulations of the center; Formulate and implement the annual work plan of the Center; Organize the annual performance assessment, quality assessment, technical innovation award

declaration and other related work of the Center; Preside over or participate in the project evaluation of major technological innovation projects of the Center; Preside over or participate in the investigation and handling of major quality accidents and product quality accidents in the Center; Organize the training and assessment work of the center; Organize the internal audit of the center, and supervise the effectiveness and continuous improvement of the management system; Be responsible for formulating the technical specifications of the center, providing technical training and guidance to testing personnel, and conducting research and experiments on new testing methods.

4.2 Improve business processes

For the optimization of inspection business process, it is mainly to integrate, improve, optimize and adjust the existing process. According to the requirements of the optimized inspection business process and the actual work, relevant systems such as Inspection Business Management Process, Inspection Quality Supervision Management Process, Inspection Result Report Management Process and Inspection Quality Complaint Handling Management Process have been formulated. On the basis of testing the business process, it was improved according to the actual situation, and information communication and supervision and inspection links were added. In the supervision and management of inspection quality, conduct inspection and assessment according to the development of inspection work, and organize personnel to conduct spot checks regularly to ensure the quality of work; Inform the relevant departments of the problems found in time, and rectify the problems found.

In the management of inspection result report, the regulations on submission, issuance, approval and use of inspection report are formulated, which ensures the quality of work. In the process of handling inspection quality complaints, the procedures of complaint acceptance, investigation and feedback are established, and the time limit and requirements for complaint handling are defined.

In addition, in view of some problems in the testing work, such as: lack of equipment verification procedures; Lack of management methods and systems for measuring instruments; Lack of on-the-job training and continuing education system for testing personnel; Lack of environmental monitoring system, etc., based on the existing business processes, the business processes were sorted out and adjusted. It is mainly embodied in the formulation of Detailed Rules for the Implementation of Inspection Procedures and Measures for the Administration of Measuring Instruments, etc., which standardizes various work processes in the process of testing.

4.3 Optimize resource allocation

The effective operation of the system requires reasonable allocation of resources based on business processes to improve detection efficiency. In the testing business process, the role of testing personnel is reasonably positioned, and the performance appraisal standard is formulated, and the resource allocation is linked with the performance appraisal, so as to ensure the orderly development of testing work and enhance the enthusiasm of personnel.

The Detailed Rules for the Application Assessment of Internal Audit and External Audit Results were formulated. While assessing the application of internal audit and external audit results of various departments (units), the workload of testing projects was dynamically evaluated and evaluated, and incentive policies were formulated. In order to fully understand the testing demand and actual situation, all departments (units) actively promote the budget funds at the company level.

4.4 Improve the safeguard mechanism

In order to ensure the smooth operation of the system, the company set up a leading group for testing system construction to strengthen organizational leadership and overall coordination; The implementation plan of detection system construction is compiled, and the overall goal, implementation steps and safeguard measures are defined. A testing system construction promotion team was set up to study and solve the difficult problems in the work promotion. The Management Specification for Inspection Quality Archives is compiled, which clearly stipulates the filing scope, classification, filing, filing time and storage period of inspection documents, which provides a guarantee for the efficient use of archives. Combined with the application requirements of the system, the Technical Specification for Inspection Management Information System and the Construction Scheme for Inspection Management Information System were compiled to unify the management information system standards, which laid the foundation for the unified use of all departments (units).

5. Conclusion

Based on the innovative model, this paper constructs a lean standardized testing management system by combining lean management with standardized management, and applies it to practical work. This system can effectively improve the quality and efficiency of the company's inspection work, improve the company's inspection management level, and provide strong support for the company's development.

(1) Through the combination of lean management and standardized management, the management and control ability of the detection process is improved, and the problems existing in the detection process are effectively solved.

(2) Through the organic combination of lean thinking, standardized management and information technology, the whole process of digital control is realized, which provides an effective guarantee for the company's testing work.

(3) Through the combination of lean thinking, standardized management and refined management, the scientific and effective system construction has been realized, which has laid a solid foundation for the company's standardized and standardized management.

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