

INTELLIGENT CUSTOMER SERVICE SYSTEM

Zhang Minmin, Jiao Renjie, Qian Hantao, Xu Yangmeng, An Wencheng, Du Yunhua, Hu Ning

ABSTRACT

This paper reports on a project aimed at the automation of solving repetitive problems of maintenance by using a elaborating a software, capable to handle the majority of cases; this would help reducing process time and the manpower needed. Such a software can have a great success in the market.

Keywords: maintenance, software, workload, customer serve, repetitive problems, workflow

1. BACKGROUND

1.1. Organizational background

AAA company was formally established 20 years ago. It specializes in software development and system integration services in the financial sector. The company has nearly 1,000 full-time employees. The company has a variety of certified professional and technical personnel, including: server product experts, storage product experts, system experts, product experts, database technology experts, middleware products experts, mainstream operating system experts, network management, security management, anti-virus management Experts, Cisco Network Product Specialists, PMP Project Management Specialists, ITIL Foundation Service Process Experts, etc.

AAA is one of the top ten banking service providers in China. With Bank of China, China Construction Bank, Postal Savings Bank of China, China Everbright Bank, Agricultural Bank of China, Bank of Communications, Hua Xia Bank, China Development Bank, China CITIC Bank, China Agricultural Development Bank, Bank of Beijing, China Cinda Asset Management Corporation, China Great Wall Asset Management Company, China Eastern Asset Management Corporation, State Administration of Foreign Exchange, Water Conservancy System, State Grid, State Administration of Taxation, Civil Aviation System, linkage advantage and many other financial and non-financial customers have cooperated well with CISCO and IBM. Many internationally renowned IT vendors such as HP, Microsoft, Intel, Oracle, SAS, F5, HITACHI, AVAYA, VMWARE, H3C, EMC, DELL, SUNGARD, BMC have established a wide range of strategic partnerships. The company is a high-tech enterprise and software enterprise recognized by Beijing, and has passed the CMMI-ML4 software capability maturity model integration assessment. The company successfully implemented a series of major industry projects such as the "National Post Office Postal Savings Unified Version Project". During the Olympics, the 60th anniversary, the World Expo, the Asian Games, the World Expo, etc., AAA Co., Ltd. successfully completed the Olympic guarantee and National Day guarantee tasks of Bank of China, China Construction Bank, Postal Savings Bank of China, China Everbright Bank and other banks.

1.2. Introduction to the problem

With the help of AAA Co., Ltd. for many years, it provides software development and system integration services for major banks and companies in the financial sector. Most of these projects or products are in the maintenance phase. In China, customers in the financial sector are increasingly dependent on information systems. They are more willing to let the team engaged in software development undertake the subsequent maintenance work. In this way, the company also undertakes a large number of application operation and maintenance work. And these application operation and maintenance projects have become an important part of the company's revenue.

The application operation and maintenance work in the financial field mainly solves various problems encountered by users in the financial industry in the process of using the application system, including not only the problems encountered in the traditional IT operation and maintenance process, but also a large amount of content related to the financial business. These jobs are often repetitive, appearing on one user and appearing on another. Repeated work takes up a lot of human resources, causing an increase in costs. At the same time, the repetitive work is boring, and it is easy for employees to lose their interest and patience in their work, resulting in loss of personnel. On the other

hand, because much of the work in the financial sector is phased or cyclical (for example, monthly financial operations are required at the end of each month). The processing of these repetitive tasks takes up a lot of human resources and also affects the response of other service needs. Reduce the user's satisfaction with the operation and maintenance work.

2. SOLUTION

A consulting team was asked to face the problem; it is formed by the authors of this article.

2.1. Problem Analysis

For the application operation and maintenance work, which takes up a lot of human resources problems, the consulting team uses the fishbone diagram to analyze the problem. The results are as follows:

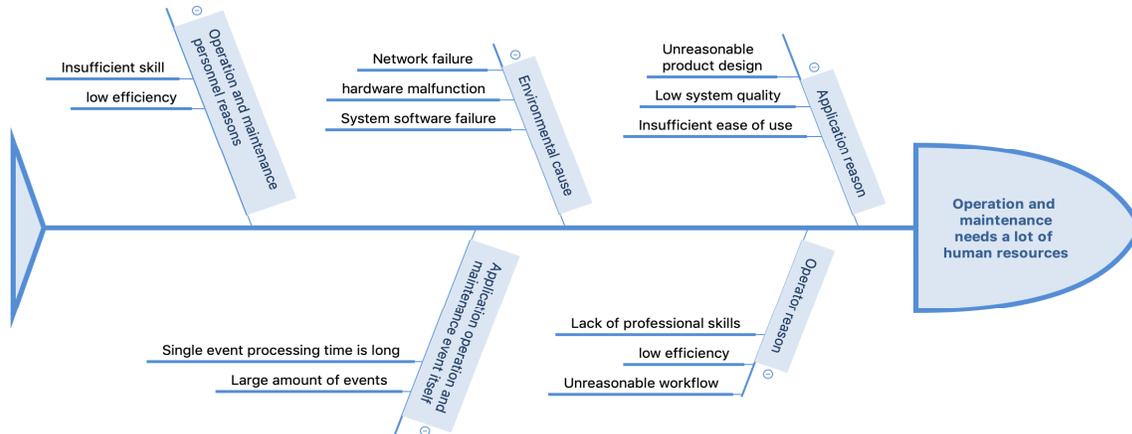


Figure 1 fishbone diagram

The consulting team analyzed the application system, user operators, environment, application operation and maintenance events themselves, and operation and maintenance personnel. the consulting team found that the large amount of events in the application operation and maintenance work is the main reason for the large amount of human resources. From the statistical data, the consulting team found that, in the application operation and maintenance work, a large number of repetitive problems occupy the majority of the work content. In our statistics, the recurring 30% of operation and maintenance service events accounted for 70% of the total workload.

2.2. Solution design

For repetitive problems, it's easy to think of letting the machine solve the repetitive problem. Therefore, the consulting team planned to develop a software to help the operations staff to handle these repetitive tasks. Due to the characteristics of the operation and maintenance of the financial sector, there are many application systems involved, and the update is relatively fast. It is unlikely that a stable knowledge base will solve all problems. Due to the complexity and management requirements of the application itself (for example, the use of a unified security account system, the need to periodically update the password) causes many users to encounter almost any problem. Although these problems can have a knowledge base, the processing flow is too cumbersome. The first is that the business personnel initiates a service request through the service phone, describing their identity information and specific problems, and the operation and maintenance personnel first record the problem and generate the work order. Then manually solve the problem according to the relevant operating procedures in the knowledge base and then call back. Less effective work and less efficiency throughout the processing cycle.

To this end, the consulting team has designed a new workflow. First, through the automatic service information collection module integrated into the application software, it is automatically found whether there is a required service, and if so, the user is guided to solve the problem self-service. If the function is not enabled to guide the user to self-solve, the user can quickly send a service request through the 'one-click request' function. After receiving the service request, the operation and maintenance personnel first check whether there is a solution that has already been made. If so, directly send the solution step to the user to help the user solve the problem. If not, and it is a recurring

problem, the solution will be created and saved after the user is assisted in resolving the problem. In the case the duplicate problem occurs, sent to the user.

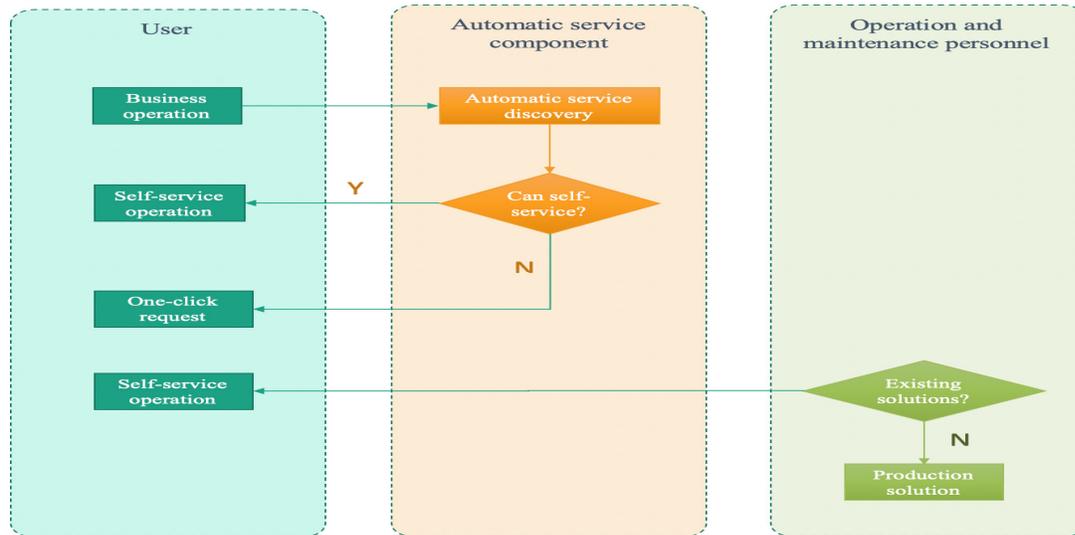


Figure 2 workflow

Through the above flow chart the consulting team can draw the key requirements of the intelligent customer service system:

- Users must be able to submit service requests quickly and easily
- Users can solve problems encountered during operation in a self-service manner
- The operation and maintenance personnel can send a resolution step to the user.
- Operation and maintenance personnel can easily make resolution steps
- The system can quickly retrieve problems and solve steps.

It should be noted that the self-service solution steps of the user designed by us are based on the scene. For example, when the user inputs the password incorrectly, the service for retrieving the password may be needed. This requires the application system to provide the appropriate interface. Achieve intelligent self-service, this design makes the user experience better.

2.3. Self-development / outsourcing development decisions

Because the human resources of our company's developers are relatively tight. the consulting team have two options for how to implement a smart client system: self-developed or outsourced to other team development. The decision process is as follows:

Criteria	Weight	Self-development		outsourcing development	
Development costs	2	8	16	5	10
Post-maintenance cost	2	8	16	4	8
Human resource consumption	1	4	4	9	9
Duration reliability	1	5	5	9	9
Change response timeliness	2	8	16	5	10
Product confidentiality	2	9	18	6	12
TOTAL			75		58

Table 1: decision table on the procurement of the software

According to the above table, the consulting team finally chose to develop this system ourselves. Although it may take longer periods, it has better controllability and lower maintenance costs in the future.

3. FEASIBILITY ANALYSIS

3.1. Environmental Analysis

3.1.1 Policy Environment

The IT industry is an important force supporting and promoting China's social and economic development. The policy plays a key role in encouraging the transformation and upgrading of the IT industry and the digital transformation of enterprises. The "Guidance Opinions on Actively Promoting 'Internet +' Actions", "Notice on Promoting the Platform for Action on Big Data Development", "Outline of National Informationization Development Strategy" and "13th Five-Year National Informationization Plan" issued since 2015 Policies have put forward higher requirements for industrial upgrading and technology integration. A good policy environment has created opportunities for IT operation and maintenance management industry, regardless of whether the government or enterprises have upgraded information construction to a strategic level, IT operation and maintenance management industry Under the guidance of the policy, it will actively combine with cloud computing, big data and other technologies to achieve its own transformation and upgrading.

The outbreak of the "Snowden incident" in 2013 gave the state a high priority for information security issues. In February 2014, the Central Cyber Security and Informatization Leading Group was established, and information security has risen to become a major strategic issue concerning national security and national development. In the same year, the "Notice of the Central Government Organs Government Procurement Center" clearly stated that all computer products are not allowed to install the Windows 8 operating system, and the IT localization of the government and state-owned enterprises has begun. Behind the localization of government procurement is the improvement of the overall competitiveness of domestic manufacturers. Under the dual role of policy and market demand, the dumping of IT industry to domestic manufacturers is an irreversible trend.

3.1.2 Economic Environment

As China's economy has steadily transitioned from high-speed growth to medium-to-high-speed growth, although the overall economic growth rate has declined, the internal structure of the economy has been adjusted and optimized, and the internal driving force for economic growth has been continuously enhanced. In 2013, the added value of China's tertiary industry accounted for more than the proportion of GDP in the second industry, marking the beginning of the tertiary industry as the main force of economic growth. In 2018, the added value of China's tertiary industry reached 46.96 trillion yuan, and the added value of the tertiary industry accounted for 52.2% of GDP. Considering that the downward pressure on the economy is expected to ease further, the macroeconomic stability and good trend will benefit enterprises. Development, which drives the growth of demand in the IT operation and maintenance management industry.

Unlike consumer Internet dividends, which are saturated with saturation, the enterprise-centric industry Internet market is still in the ascendant. Enterprise-level services are a key market segment in the industrial Internet field, and the rapid increase in the number of enterprises provides a huge market development space. Chinese enterprises have low levels of informationization and specialization, and enterprises are generally willing to increase the level of informatization and achieve refined operations by introducing enterprise-level service providers.

3.1.3 Social Environment

With the rapid development of enterprise information construction, the impact of information systems on enterprise management systems, operational processes and business models is deepening. IT strategy has become an important core competitiveness of enterprises. The promotion of the "Internet +" action plan means that traditional industries use the Internet to realize online and data-based services, which further enhances the value of information systems in enterprises, and transforms IT investment from indirect efficiency to direct business. drive. At the same time, however, more and more complex information systems have led to increasing management difficulties. Enterprises increasingly need professional service providers to undertake IT operation and maintenance management to ensure the stable and sustainable operation of information systems.

3.1.4 Technical Environment

The rapid development of IT technology has made information technology a standard for all walks of life. In particular, the development of big data technology and AI technology has greatly improved production efficiency. But now, AI technology is still in its early stages, especially in the face of complex scenes and professional fields, AI technology is still unable to replace artificial activities on a large scale. Still need a lot of manual operations.

3.2. Market opportunities

According to the published market research data, it is estimated that by 2024, the IT operation and maintenance market will be about 383.28 billion yuan, with a compound annual growth rate of about 15%. The IT operation and maintenance in the financial sector is the second largest in the entire market, accounting for about 21%.



Figure 3: market opportunities

The company's IT operation and maintenance data growth in recent years also confirmed this open research data. the consulting team believe that the IT application operation and maintenance market will continue to maintain rapid growth. As an intelligent customer service system applied to the operation and maintenance of IT applications, it also has a good market prospect.

3.3. Business model analysis

The intelligent customer service system can be used for personal use or commercial use. For self-use, the consulting team only need to consider the cost savings. For commercial use, the consulting team use a business model canvas approach to analyze the business model of this product.

a) Customer Segments

Unlike most of the current smart customer service systems, the consulting team are not targeting small businesses. Small businesses are cost sensitive, and most of AAA's customers are large and medium-sized financial companies. the consulting team mainly target two types of market segments:

- Large and medium-sized financial industry corporate customers, especially the company's existing customers.
- Application operation and maintenance team that hopes to improve the efficiency of operation and maintenance

b) Value Propositions

- Improve the efficiency of operation and maintenance
- Reduce the cost of operation and maintenance labor
- Reduce the operation and maintenance service response time
- Increasing customer satisfaction

c) Key Partnerships

- Financial industry customers
- Other business units of the company
- Head office
- Technology supplier

d) Key Activities

- Product development

- Internal product trial
 - Company promotion and External marketing
- e) Key Resources**
- Nantian company goodwill
 - A large number of financial industries have customers
 - Operational team and experience in the financial industry
 - A large number of applications that have already been used
- f) Revenue Stream**
- Save application operation and maintenance costs
 - Software sales revenue
 - Software maintenance and service revenue
- g) Cost Structure**
- Product development costs, mainly labor costs
 - System maintenance cost
 - Marketing cost
 - Other costs
- h) Customer Relationships**
- Service line
 - WeChat service number
 - Group
 - E-mail
- i) Channels**
- Company internal meeting
 - Sales visit
 - Telephone and email marketing
 - Industry media

3.4. SWOT Analysis

The consulting team performed a SWOT analysis of the project, found below:

<p>Strengths</p> <ul style="list-style-type: none"> ✓ Have good customer resources and channels ✓ Have relevant service qualifications ✓ Have professional domain knowledge accumulation ✓ Deep integration with related products of the company 	<p>Weaknesses</p> <ul style="list-style-type: none"> ✓ Difficult to achieve full automatic ✓ Relatively high cost ✓ Third-party system integration is more difficult
<p>Opportunities</p> <ul style="list-style-type: none"> ✓ IT operation and maintenance market maintains good growth ✓ Most financial IT projects enter the maintenance phase ✓ Reduce operation and maintenance work costs and enhance competitiveness 	<p>Threats</p> <ul style="list-style-type: none"> ✓ Cloud customer service low-cost competitors ✓ Other financial industry application software service providers compete ✓ The development of AI technology ✓ Relying on the company's software business in the early days

Table 2: SWOT analysis

3.5. Risk Analysis

The consulting team used a risk analysis form to analyze the risks that this product may have in development and commercial processes.

Risk events	Probability	Evaluation of impacts	Mitigation measures
Product demand is not clear	Medium	Project cost increases Project extension Project team morale reduction	Early exploration of requirements through prototype methods Iterative development, incremental delivery, and early trials within the company
Lack of human resources	Medium	Project extension The key parts of the system are unrealized Software quality is reduced	Good staffing Communicate with senior management to ensure the stability of key members of the project Motivate employees' enthusiasm for work
High-level company recognition of products is not high	Low	Low product development priority Affect product progress Affect the internal promotion of products	Do a good job in market research Communicate with senior management in a timely manner and seek support
Unreasonable product design leads to poor user experience	Low	Reduced user satisfaction Affect corporate reputation Affect product sales	Make full consideration and careful product design Recruit experienced product designers to participate in product design Invite first-line users to participate in the project team
Competitors characterized by low cost	Low	Affect the sales of products	Do a good job of differentiated competition of its own products Design products with end-user cost savings
AI technology breakthrough	Low	Product advantage disappears	Pay close attention to the development of AI technology Work with related technology providers

Table 3 risk analysis

3.6. Return on investment analysis

3.6.1 Estimate software development costs

Because the main cost of product development is labor costs. Through expert scoring, the consulting team selected three software development experts to estimate the working hours required by the intelligent customer service system. Based on the company's software cost estimation method, you can estimate the cost of system development:

Role	person-months	Price (yuan)	Cost (yuan)
Product manager	6	30K	180K
UI engineer	4	20K	80K
Business expert	2	30K	60K
Demand analyst	4.5	30K	135K
Architect	4.5	30K	135K
Development Engineer	10	20K	200K
Test Engineer	8	20K	160K
QA	2	20K	40K
Total Cost	41		990K

Table 4 estimation of cost

3.6.2 Estimate return

Estimate separately according to the two application methods of the intelligent customer service system.

a) for self-use: According to internal statistics, the annual budget for large and medium-sized financial enterprises' application operation and maintenance projects is about 5 million yuan, of which labor costs account for more than 70%. By using this product to save 15% of labor cost estimates, each project can save:

5,000K ✖ 70% ✖ 15% = 525K yuan.

b) for commercial use: If Price is 500K yuan per set, the sales costs will account for 50%.

The annual product maintenance cost is 1 million yuan, calculated according to the minimum annual sales of 10 sets: 500K ✖ (1-50%) ✖ 10 = 1000K = 1,500K yuan and ROI = 1,500K / 1,000K ✖ 100% = 150%

4. CONCLUSION

This product has a good return of self-use and market sales. It can save many HR costs. When selling it, the consulting team must make full use of existing customer resources and channels to quickly occupy the market. It is necessary to pay close attention to new technologies, especially is AI, on the field of intelligent customer service. Introduce external cooperation when necessary.

The next the consulting team should:

- ✓ Obtain the support of the company's top management as soon as possible
- ✓ Due to the lack of public data of market segmentation, further refinement of market analysis and marketing estimation is needed.
- ✓ First for self-use and then for commercial use, the quality of products is improved by trial-feedback-iteration.
- ✓ Cooperate with AI technology suppliers to enhance production competitiveness
- ✓ Expanding sales channels to occupy the market quickly

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