



Software Project Management

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1. Project initiation Management

1.1 Project proposal

The project proposal team should repeatedly conduct project investigation, product conception and feasibility analysis. After careful consideration, the project proposal team will write the project proposal and apply for the project. Project investigation and feasibility analysis are usually time-consuming and laborious so that they are often ignored. Deeper project investigation and feasibility analysis are not only helpful for product conception, but also helpful for project review.

1.1.1 Project investigation

The project proposal team should carry out project investigation, including:

- (1) Market survey: development history and trend of rental app market, market total and share statistics.
- (2) Policy survey: investigate policies related to rental software.
- (3) Investigation of similar products: investigate the function, quality, price, main advantages and disadvantages of rental app.
- (4) Competitor survey: investigate the market situation of each competing app and their strength in development, sales, capital, brand and so on.

(5) User survey: investigate some old users and potential users, and record their needs and suggestions.

(6) other relevant investigations.

The following principles shall be followed in the project establishment investigation:

(1) The investigator should treat the investigated things objectively, and shall not intentionally write "advantages" or "disadvantages".

(2) The data and charts in the investigation report shall be true and well documented, and shall not be fabricated.

(3) The investigation report should be easy to understand and should not be written as an academic article.

Project establishment investigation method:

(1) search relevant information from the Internet.

(2) extract information from publications.

(3) talk with users and ask questions to users.

(4) send questionnaires to user groups.

(5) talk with peers and experts and listen to their opinions.

(6) analyze the existing similar products.

1.1.2 Product conception

The project proposal team should carry out product conception, including:

- (1) Main functions of products to be developed
- (2) Technical scheme of products to be developed
- (3) Make or buy decision (determine which product parts should be purchased, outsourced or independently developed.)
- (4) Development plan
- (5) Marketing plan
- (6) Other relevant plans

1.1.3 Feasibility analysis

The project proposal team carries out feasibility analysis, which mainly includes:

- (1) market feasibility analysis:
 - a. analyze the market development history and trend, and explain what development stage the product is in.
 - b. price analysis of this product and similar products
 - c. count the total amount of the current market and the share of competitors, and analyze the share of this product.
 - d. analysis of the characteristics of product consumer groups, consumption patterns and factors affecting the market
- (2) policy feasibility analysis: whether there is "support" or "restriction" from local government (or other institutions)

(3) analysis of competitive strength: the market situation of competitors and their own strength.

(4) technical feasibility analysis: analyze whether the app can be realized from a technical perspective

(5) time and resource feasibility analysis: whether the development products are put into the market in time, and whether all kinds of resources are in place in time.

(6) analysis of intellectual property: whether app can get intellectual property protection

(7) other relevant feasibility analysis

1.1.4 Write and improve relevant documents of project proposal

After sufficient project investigation, product conception and feasibility analysis, the project proposal team shall write and improve the project proposal, project investigation report, project feasibility analysis report and relevant documents.

1.1.5 Apply for project approval

The project proposal team shall submit the project proposal, project investigation report, project feasibility analysis report and relevant materials to the organization leaders to apply for project establishment.

1.2 Project approval review

The leader of the organization shall organize a review committee to conduct project approval review. The review committee shall, according to the project proposal, the project investigation report, the project feasibility analysis report and the reply of the project proposal team, vote to decide whether to approve the project (according to the principle that the minority is subordinate to the majority). The review committee shall, according to the actual situation of the organization (development strategy, funds, human resources, etc.), put forward suggestions for improvement of the project proposal.

The organization leader has the final approval right for the project. If the leader of the organization agrees with the decision of the review committee, they will share the responsibility of decision-making. If the leader exercises "one vote veto", he will be fully responsible for the decision.

1.3 Project preparation

The organization leader appoints a suitable person as the project manager. After being appointed, the project manager shall try to negotiate with the finance department and the human resources department to strive for necessary funds, project funds, human resources, software and hardware and other resources for the project as much as possible.

If the necessary funds and resources are in place, the project manager and the core members of the project shall write the project plan according to the actual situation, and carry out the project research and development and management.

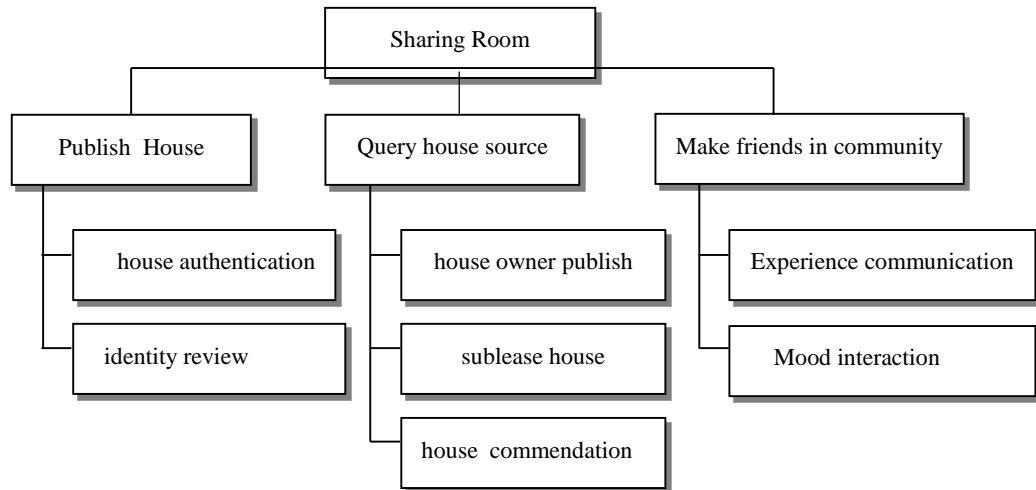
2. Project planning

2.1 Project estimate

2.1.1 Estimated project scope

The project team first estimates the scope of the project, which can be represented by the WBS of app. The project team decomposes the functions of the product according to the needs of users, and develops the WBS of the product.

The initial establishment of a relatively complete search system for shared houses is mainly composed of three subsystems, i.e. release of houses, inquiry of houses and community making friends.



2.1.2 Estimated product size

The estimation method of product scale is as follows:

- (1) Each member of the planning team independently estimates the product scale according to the product WBS, and fills in the "product scale estimation form".
- (2) Summarize the "product size estimation table" of each member for comparative analysis. If the difference estimated by each person is less than 10%, take the average value. If the difference is greater than 10%, move to step (1), and team members estimate the size of the product until the difference is less than 10%.

Components of the product	Scale of new development components (document pages)	Size of reused or auto generated components (document pages)
Listing certification	5	2
Identity review	4	1
Homeowner release	2	1
Sublease sources	2	1
Housing recommendation	4	2
Experience world	2	1
Mood exchange	2	1
Total	21	9

2.1.3 Estimated workload

The workload of the project is the sum of "project R & D workload", "project management workload" and "institutional support workload". The unit of measurement of workload can be "man hour", "man day", "man month" or "man year".

Estimate the workload of project R & D		
Estimation formula	Project R & D workload \approx scale of newly developed components * difficulty coefficient / per capita productivity	
Scale of new development components	3Man Month	
Degree of Difficulty	3	
Per capita productivity	1Man day	
Project R & D workload	66	Subdivision: demand development workload \approx 10 System design workload \approx 15 Programming workload \approx 25 Test workload \approx 16
Estimate the workload of project management		
Estimation formula	Project management workload \approx project R & D workload * proportion coefficient	
Scale factor	1/2	
Project management workload	33	Subdivision: project planning workload \approx 6 Project monitoring workload \approx 6 Demand management workload \approx 13 Risk management workload \approx 8
Estimate the amount of work supported by the mechanism		
Estimation formula	Institutional support workload \approx project R & D workload * proportion coefficient	
Scale factor	1/2	

Workload of mechanism support	33	Subdivision: configuration management workload ≈ 5 Quality assurance workload ≈ 10 Outsourcing and procurement workload ≈ 5 Training management workload ≈ 13
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2.2 Develop project plan

2.2.1 Determine objectives and scope

The planning team first determines the objectives and scope of the project. Goals must be "achievable" and "verifiable". The scope of work includes "what to do" and "what not to do".

2.2.2 Determine process model

According to the characteristics of the project, the planning team determines the process model, including the project development process, project management process, institutional support process, etc.

The planning team identifies (describes) the methods and tools used in the process model.

Process area	Methods and tools
Rational Rose	Object oriented analysis and design
Android Studio	software development
Mysql	Database support
Visual SourceSafe	configuration management
Microsoft Office	Document production

2.2.3 Develop HR plan

role	duty	personnel
project manager	Responsible for organizing the operation of the project, conducting market research, demand analysis and feasibility analysis in the early stage of the project	Caipiao Yang
Developer	Responsible for software design, writing design documents and development code	Chuihuan Kong
Maintenance Engineer	Responsible for software service and maintenance to ensure software quality	Yalou Song

2.3 Approve project plan

The project manager submits the project plan to the organization leader for approval. The leader of the organization carefully approves the project plan according to the "project plan Checklist". If the project plan is unreasonable, the planning team shall revise the project plan in time according to the opinions of the organization leader. After being signed and approved by the leader of the organization, the project plan will come into effect. After that, the planning team cannot modify the project plan at random.

2.4 Project plan change control

The project manager applies to the organization leader for changing the project plan. The application for change shall state: **reasons for change、the content of the change and the impact of the change on the project.**

The leader of the organization approves the change application. If he does not agree with the change, the change request will be returned and the project will be implemented according to the original plan. If the change is agreed, the change plan shall be modified and the new project plan shall be approved by the leader of the organization.

3. Project monitoring and control

3.1 Monitor project against plan

3.1.1 Task tracking

The project manager tracks every important task periodically (such as once a week), and saves the collected data in the project monitoring data table.

The task tracking table records the task name, actual start and end time, tracking date, current progress, actual workload and actual work results.

3.1.2 Expense tracking

The project manager tracks the project cost periodically and saves the collected data in the project monitoring data sheet. The expense category, major expense items, purpose, amount and time are recorded in the expense tracking table.

3.1.3 Resource tracking

The project manager tracks the software and hardware resources periodically and saves the collected data in the project monitoring data table. The resource name, level, actual configuration, acquisition method and time, and instructions are recorded in the resource tracking table.

3.1.4 Work achievements and scale tracking

The project manager periodically tracks the work results and their scale, and saves the collected data in the project monitoring data sheet. The work achievement tracking table records the name of work achievement, the scale of newly developed achievements and the scale of reused achievements.

3.2 Control deviation

3.2.1 Identify significant deviations

According to the data generated from task tracking, cost tracking and work achievement tracking, the project manager compares the "actual progress of the project" with the "project plan" to find out the **remarkable** deviation items (for example, the deviation of progress or cost is greater than 20%).

3.2.2 Analyze the cause

The project manager analyzes the causes of significant deviation so as to take correct corrective measures.

3.2.3 Give the measures to correct the deviation

The project manager gives the measures to correct the significant deviation:

(1) If the deviation is mainly caused by the unreasonable project plan, the project plan shall be changed;

(2) If the project plan itself is reasonable and the deviation is mainly caused by the project members during the implementation, the project members are required to make up for the deviation and avoid the failure of the original reasonable plan during the implementation.

3.2.4 Track the process of correcting deviation

The project manager tracks the process of correcting the deviation until it is eliminated.

3.3 Project progress report

The project manager periodically holds project progress meetings to discuss problems and summarize work, so that all project members can clearly understand the actual progress of the project.

The project manager shall prepare the project progress report and timely report it to all project members and organization leaders.

The progress report records in detail the comparison between the actual situation and the planned task progress, work results, costs, human resources, software and hardware resources.

4. Risk management

4.1 Prepare for Risk Management

4.1.1 Determine Risk Sources and Categories

Potential risks types include technology、people、organizational、tools、requirement and estimation.

4.1.2 Define Risk Parameters

The purpose of risk management is to identify risks before they cause hazards, so as to eliminate or weaken risks in a planned way.

To facilitate quantitative management, the team defines three parameters for risk:

- (1) risk severity: refers to the degree of harm caused by the risk to the project.
- (2) risk possibility: refers to the probability of risk occurrence.
- (3) risk coefficient: the product of risk severity and risk possibility.

The value of risk severity is 1-5, and the higher value implies the higher risk severity. The value of risk probability is 1-5, and the higher value implies the higher the probability of risk occurrence is. The value of risk coefficient is 10-25. The higher the coefficient, the risk should be treated first.

4.1.3 Establish a Risk Management Strategy

According to the "risk checklist", the project manager identifies the risks of the project on a regular basis (e.g. once a week).

The project manager evaluates the severity, probability and risk coefficient of each risk, and arranges the risks in the order of risk coefficient from high to low.

For each risk whose risk coefficient exceeds the "threshold" (10 recommended), the project manager shall provide risk mitigation measures and designate the responsible person. The higher the risk coefficient is, the better to deal with it first.

The project manager tracks the risk mitigation process until the risk has been resolved. If the risk has been changed, the risk mitigation should be updated in time.

4.2 Identify and Analyze Risks

Risk types	Risk exists	Risk factor	Evasion method
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Schedule risk	Due to time constraints, the project can not be completed on time.	20	Take full account of various potential factors and leave room appropriately; the task decomposition shall be detailed and easy to assess; at the same time, make full use of resources through reasonable use of the methods such as the acceleration period and quick follow-up. In case of any delay, the project manager shall communicate with the client in time and apply for the extension time.
	The system does not have enough test time	15	Continuous monitoring, project progress control with the progress of the project, to ensure that each link has enough time.
Technology risk	There are some problems in the development of software structure system, which makes the finished software products fail to achieve the expected objectives of the project	15	Development with genuine software
	The lack of in-depth understanding of the development software results in poor performance and quality of the developed products.	18	Make a two-week learning plan in advance. All team members should learn the development tool Android studio + MySQL quickly. Grasp the key points as soon as possible. At the same time, the difficulty of software design should be reduced as much as possible so that the project can be completed successfully.
Quality risk	Quality does not meet user requirements	20	Exchange work results with users frequently, adopt development process that meets requirements,

			organize inspection and review of output carefully, organize strict independent test, etc.
Tool risk	Management tools, development tools and test tools necessary for software project development and implementation are not in place in time	15	In the start-up phase of the project, the source of various tools or possible alternative tools shall be implemented, and the tools shall be tracked and put in place before they need to be used. Before the project development, the infrastructure of the system is designed and built and the performance test is carried out to ensure that the architecture meets the performance indicators before the subsequent work.
Human resource risk	Members of the team were unable to participate in the design due to an accident	10	Discuss solutions with users in advance. There are two key positions, one for implementation and one for monitoring.

5. Requirements management

5.1 Demand confirmation

The project manager organizes personnel to conduct informal requirements review within the project to eliminate obvious errors and differences. The project manager invites peer experts and users (including customers and end users) to review the requirements documents together, and makes every effort to make the requirements documents accurately reflect the real wishes of users. After the requirement document passes the

formal review, the project manager and the customer make a written commitment to the requirement document to make it have the effect of commercial contract.

5.2 Requirement tracking

5.2.1 Establish and maintain requirement tracking matrix

(1) Forward tracking. Check whether each requirement in the requirement document can find corresponding points in the follow-up work results.

(2) Reverse tracking. Check whether the design documents, codes, test cases and other work results can be found in the requirements documents.

(3) Establish and maintain the requirement tracking matrix. When the requirement document or subsequent work results have been changed, the requirement tracking matrix shall be updated in time.

5.2.2 Find inconsistencies

The advantage of using the requirement tracking matrix is that it is easy to find inconsistencies between requirements documents and subsequent work results, such as:

(1) The follow-up work results did not meet some requirements in the requirements document;

(2) The follow-up work results realize the non-existent requirements in the requirements document;

(3) The follow-up work results did not correctly meet the requirements in the requirements document;

The project manager records the "inconsistencies" found in the requirements tracking report and tells the developers.

5.2.3 Eliminate inconsistencies

The developer gives the measures and plans to eliminate the "inconsistency", and the project manager records the measures and plans in the demand tracking report.

After eliminating the "inconsistency" in the development, the project manager updates the "demand tracking matrix".

5.3 Requirements change control

The request change applicant shall write "request change application form" and submit it to the project manager.

The "request for change" must state: (1) the reason for the change; (2) the content of the change; (3) the impact of the change on the project.

The project manager and the customer jointly approve the "request change application". If either party disagrees with the change, the change request shall be returned and the project shall be executed according to the "original requirements document". If both parties agree on the change, carry out the next change to the requirements document.

The Requirement Analyst changes the "original requirement document" as needed to generate a new requirement document.

Review the requirements again, obtain the written requirements commitment again, and fill in the requirements change control report finally.

6. Requirement development

6.1 introduce

6.1.1 Demand survey

The purpose of the demand survey is to obtain the technician demand information (raw materials) through various ways and generate the user requirements specification.

6.1.2 requirement analysis

The purpose of requirement analysis is to analyze all kinds of requirement information, eliminate errors and describe details. The commonly used demand analysis methods are "question and answer analysis", "structural analysis" and "Object-Oriented Analysis".

6.1.3 Requirements definition

The purpose of requirement definition is to further define accurate product requirements and generate product requirements specification according to the results of requirement investigation and analysis. The system designer will carry out the system design according to the product requirements specification.

6.2 User demand survey

6.2.1 Roles and responsibilities

Demand analysts investigate and analyze the needs of users.

Customers and end users provide necessary demand information.

6.2.2 Main steps

The requirements analyst determines the method of requirements investigation, such as:

Talk to users and ask questions.

Visit the technician workflow and observe the technician operation.

Send questionnaires to user groups.

Talk with peers and experts and listen to their opinions.

Analyze existing similar software products and extract requirements.

Extract requirements from industry standards and rules.

Search the Internet for information.

The demand analyst prepares the questionnaire (questionnaire).

The demand analyst shall establish contact with the respondents to determine the time, place and personnel of the investigation.

6.3 Product requirements definition

6.3.1 Roles and responsibilities

The requirements analyst defines the product requirements.

Customers and end users shall provide necessary demand information and confirm product demand.

6.3.2 Main steps

The main contents of the product requirements specification include:

Product introduction;

Describe the characteristics of user groups;

Define the scope of the product;

Describe the standards or specifications that the product should follow;

Define roles in the product;

Define the functional requirements of the product;

Define non functional requirements of products, such as user interface, software and hardware environment, quality and other requirements;

7. Technology pre research

7.1 Technical pre research rules

7.1.1 Starting criteria

Technical challenges in the project have been identified.

Technical pre researchers have been appointed.

7.1.2 Main steps

The technical pre research personnel shall formulate the technical pre research plan, which mainly includes:

Determine the contents and objectives of technical pre research.

Determine the work results to be submitted.

Assign tasks and schedule.

7.2 Implementation suggestions

Technology pre research is different from the real development of products, the investment of personnel and time is relatively small. A project may have multiple technical pre studies, which shall be determined by the project manager or technical director according to the specific situation.

Configure and manage all valuable documents generated in the process of technical pre research.

8. system design

8.1 Architecture design

Project manager or technical director shall assign system design tasks, including architecture design, module design, user interface design, database design, etc. This activity may result in a phased development plan, such as the system design plan, depending on the workload.

The architecture designer reads the requirements document and clarifies the design task.

Architecture designers prepare relevant design tools (such as rational rose) and materials.

8.2 User interface design

The interface designer reads the requirements document and architecture design document, and clarifies the interface design task.

Interface designers communicate with users to understand their working habits and their views on the interface.

Interface designers prepare relevant design tools and materials, collect or create basic interface resources such as images, icons and general components.

8.3 Database design

Database designers read requirements documents and architecture design documents to clarify database design tasks.

Database designers prepare relevant design tools and materials.

The database designer determines the database design rules (or guidelines) of the software, mainly including:

Database naming rules

Logic design rules

Physical design rules

Safety design rules

Optimization rules

Database management and maintenance rules

8.4 Module design

The module designer reads the requirements document and architecture design document, and clarifies the module design task.

Module designers prepare relevant design tools and materials.

The module designer determines the programming specification of the software to ensure that the style of the module design document is consistent with the style of the code.

9. Implementation and testing

The purpose of implementation and test is to write and test the whole system code according to the system design documents. In this specification, implementation and testing is a comprehensive expression of "programming, code review, unit testing, integration testing, defect management and error correction".

Implementation and test process area is an important part of SPP model. This specification describes two main procedures for the implementation and testing process areas:

Get ready

Implementation and testing

The objectives, roles and responsibilities, launch criteria, inputs, main steps, outputs, completion criteria, and metrics for each of the above disciplines are defined.

This specification is applicable to software R & D projects of domestic IT enterprises. It is suggested that users modify this specification according to their own conditions, and then promote its use.

9.1 Get ready

The development team negotiates the implementation and test plan. The development team leader shall draft the implementation and test plan according to the designated template. The plan mainly includes:

Programming plan

Code review plan

Unit test plan

Integration test plan

Defect management and error correction plan

9.2 Implementation and testing

Developers write software code according to "programming plan", and record programming technology, problems and countermeasures, experience, etc. at any time to produce "programming document" (similar to programming Diary).

Developers have to review and test their own code as they write each module.

10. System testing

10.1 System test procedure

10.1.1 Roles and responsibilities

The project manager shall establish a system test team and appoint a member as the test team leader.

All members of the system test team work together to develop test plans, design test cases, execute tests, and write corresponding documents. The test team leader shall manage the above affairs.

Developers eliminate defects found by testers in time.

10.1.2 Main steps

All members of the system test team negotiate the test plan. The test team leader shall draft the system test plan according to the designated template. The plan mainly includes:

- Test scope (content)

- test method

- Test environment and auxiliary tools

- Test completion criteria

- Personnel and task list

11. beta test

11.1 Beta test regulations

Developer packaging software products.

The developer contacts beta customers and establishes beta customer database. And establish various channels to communicate with beta customers, such as email, website, telephone, fax, etc.

The developer has a mutually beneficial agreement with beta customers.

Developers deliver software products to beta customers.

Beta customers will timely feed back the problems found during trial and test, as well as the suggestions for products to the developers. The developer records this information in the beta test report.

The developer shall timely handle the problems and suggestions from beta customers and record them in the beta test report.

The developer shall immediately correct any errors found by beta customers in the software.

It is up to the project manager to decide how to deal with some useful suggestions that are difficult to realize immediately.

12. Customer acceptance

12.1 Customer acceptance procedures

12.1.1 Roles and responsibilities

The client shall set up an acceptance team and appoint the person in charge of acceptance.

The project manager and other members of the developer shall provide assistance for the technician acceptance work. The developer shall promptly solve the problems found by the client.

12.1.2 Starting criteria

The system test has been completed.

The developer has carried out necessary training for customers, see training management specification

12.2 Main steps

The developer and the client jointly develop the client acceptance plan, which mainly includes the "achievement review plan" and "acceptance test plan". The heads of both parties approve the plan.

The developer and the client jointly design "acceptance test cases".

The developer shall prepare the work results to be accepted and submit the necessary materials to the acceptance team in advance.

Results review. The acceptance personnel shall review the deliverables of the developer according to the plan, such as code, documents, etc. Make sure the results are complete and correct. The acceptance personnel shall record the review results in the customer acceptance report.

Acceptance tests. According to the plan and test cases, the acceptance personnel shall conduct comprehensive test on the delivered products to ensure that the products meet the requirements. The acceptance personnel shall record the test results in the customer acceptance report.

If the acceptance personnel find problems in the work results during the review and test, the developer shall consult with the customer according to the severity of the problems and provide appropriate treatment measures.

If there are serious defects in the work results, they shall be returned to the developer. The developer shall provide measures to correct the defects and both parties shall negotiate the time of the second acceptance. If losses are caused to the client, the developer shall be punished according to the contract.

If there are some minor defects in the work results, the developer shall provide measures to correct the defects, and both parties shall negotiate whether the second acceptance is required.

13. Technical review

In theory, in order to ensure the quality of products, all work results of products should be subject to technical review. In reality, in order to save time, people are allowed to carry out technical evaluation of work results

selectively. The way of technical review also depends on the importance and complexity of the work results.

There are three main procedures for technical review process area

"Develop technical review plan", "formal technical review" and "informal technical review".

There are two basic types of technical review:

Formal technical review (FTR).FTR is relatively strict, and a review meeting needs to be held. There are many people participating in the review meeting.

Informal technical review (ITR).The form of ITR is flexible. It is usually carried out among peers, and there is no need to hold review meetings. There are few reviewers.

13.1 Precautions for technical review:

The reviewer's responsibility is to find defects in the work results and help the developers to provide solutions to eliminate the defects, rather than eliminating the defects for the developers.

The technical review should be "just about the matter", not to crack down on the enthusiasm of the developers who have made mistakes, let alone engage in personal attacks (such as sarcasm, satire, etc.).

Limit too many arguments during the meeting review to avoid wasting others' time.

Develop technical review plan

Determine the work results to be reviewed, review methods, scheduled review time, place and relevant personnel.

Roles and responsibilities

The technical director (or technical backbone) of the project shall formulate the technical review plan.

The project manager approves the technical review plan.

13.2 Main steps

1.Determine the work results to be reviewed

If the time of the project is sufficient, in order to ensure the quality of the product, all the work results of the product shall be subject to technical review. If the time of the project is not enough, in order to save time, some important work results can be selected for technical review.

2.Determine the technical review method

Determine the technical review method according to the importance and complexity of the work results. The importance and complexity are divided into three levels: high, medium and low.The corresponding relationship between importance complexity combination and technical review method is shown in the table below.

Importance complexity combination Technical review method (FTR, ITR)

High High FTR

high Middle FTR

High Low Either FTR or ITR

Middle Middle Either FTR or ITR

Middle Low ITR

Low Low ITR

3. Scheduled review time, place and relevant personnel

According to the schedule in the project plan, schedule the review time and place.

The review host and other reviewers are scheduled according to the characteristics of the work results.

4. Approval plan

The project manager shall review and approve the technical review plan according to the project plan and the actual situation (such as disposable human resources).

The technical director (or technical backbone) of the project shall revise the technical review plan according to the instructions of the project manager.

14. Configuration management

There are two main types of configuration items:

(1) work achievements that are part of the product, such as requirements documents, design documents, source code, test cases, etc.

(2) documents generated from project management and institutional support process areas. Although these documents are not part of the product, they are worth saving.

The main properties of each configuration item are: name, identifier, file status, version, author, date, etc. All configuration items are saved in the configuration library to ensure that they are not confused or lost. Configuration items and their history reflect the evolution of software.

Baseline consists of a set of configuration items, which constitute a relatively stable logical entity. Configuration items in the baseline are "frozen" and can no longer be modified by anyone at will (see change control procedure). Baselines usually correspond to milestones in the development process. A product can have multiple baselines or only one baseline. The main attributes of baseline include name, identifier, version, date, etc. Generally, the baseline delivered to customers is called a "release", and the baseline for internal development is called a "build".

All project members use configuration management software to protect their work. The organization shall adopt unified configuration

management software. Common configuration management software includes Microsoft's visual SourceSafe and rational Clear Case. In order to improve the efficiency and security of configuration management, an organization should have a special configuration administrator (role). The configuration administrator makes the configuration management plan for each project, and creates and maintains the configuration library.

In view of the importance and complexity of configuration management, an organization should also establish a configuration control board (CCB). CCB is a virtual group, which has decision-making power for configuration management activities (such as approving plans, approving change requests, etc.). For configuration management, CCB is the decision maker, and configuration administrator is the executor.

If each project of the organization is closely related (for example, multiple projects under a product line), it is recommended that the organization establish a public CCB, which has decision-making power for configuration management of all projects. If the organization's projects are relatively independent, each project can have its own CCB. The decision-making of CCB adopts the principle of "minority is subordinate to majority".

14.1 Configuration management process

1. Develop configuration management plan

The configuration administrator shall prepare the configuration management plan, which mainly includes configuration management software and hardware resources, configuration item plan, baseline plan, delivery plan, backup plan, etc. CCB approves the plan.

2.Configuration library management

Configuration administrators create configuration libraries for projects and assign permissions to each project member. Each project member operates the configuration library according to their own permissions. The configuration administrator maintains the configuration library on a regular basis, such as clearing garbage files, backing up the configuration library, etc.

3.version control

In the process of project development, most configuration items need to be modified many times before they are finally determined. Any changes to the configuration item will result in a new version. Because we can't guarantee that the new version is "better" than the old one, we can't abandon the old one. The purpose of version control is to save all versions of configuration items according to certain rules, avoid version loss or confusion, and quickly and accurately find any version of configuration items.

There are three statuses of configuration items: "draft", "official release" and "being modified". This procedure establishes the rules of configuration item status change and version number.

4.Change control

In the process of project development, configuration item changes are almost inevitable. The purpose of change control is to prevent configuration items from being randomly modified and causing confusion.

Modifying the configuration item in draft status is not a "change" and does not require the approval of CCB. The modifier can execute according to version control rules.

When the configuration item status becomes "officially released" or "frozen", no one can modify it at will. It must be implemented according to the rules of "Application - Approval - change implementation - reevaluation - end".

5.Configuration audit

In order to ensure that all personnel (including project members, configuration administrators and CCB) comply with the configuration management specifications, the quality assurance personnel shall regularly audit the configuration management work. Configuration audit is a kind of "process quality inspection" activity, which is one of the responsibilities of quality assurance personnel.

15. Quality assurance

There are three basic ways to improve product quality:

Quality assurance. Quality assurance personnel monitor and improve the "process quality" and "product quality" by systematically checking whether the "work process and work results" conform to the established specifications.

Technical review. Experts and technicians of the same trade are invited to review the work results and find the defects in the work results as early as possible.

Test. By running test cases to find defects in the software. For example, unit test, integration test, system test, acceptance test, etc.

Quality assurance concerns both process quality and product quality. If the "work process and work results" do not meet the established specifications, the product quality must be in question. Based on this reasoning, quality assurance personnel can objectively check and monitor the quality of products even if they are not technical experts. This is the productive side of quality assurance methods. But "work process and work results" in line with the established specifications does not mean that the product quality must be qualified, because only the specifications can not identify a large number of possible defects in the product. This is the

deficiency of quality assurance method. So "quality assurance" alone can't "guarantee quality".

Technical review and test focus on product quality rather than process quality, and their technical strength is much higher than quality assurance. Technical review and test can make up for the deficiency of quality assurance, and they are complementary quality management methods. In practice, we cannot confuse quality assurance, technical review and testing, nor isolate them for implementation. It is a good way for quality assurance personnel to participate in and supervise important technical review and test work. The combination of the three can improve work efficiency and reduce cost.

15.1 Quality assurance group (QAG):

15.2 Quality Assurance Planning

I. develop quality assurance plan

The quality assurance team designates a quality assurance officer (i.e. interface person) for each project. The quality assurance personnel shall write the quality assurance plan, which shall be approved by the project manager and the quality manager. The main contents of quality assurance plan are "process and product quality inspection plan", "participation in technical review plan" and "participation in test plan".

II. Process and product quality inspection

The quality assurance personnel shall objectively check whether the "work process" and "work results" of the project members conform to the established specifications, and negotiate with the project members for improvement measures. The quality assurance personnel shall record the results and lessons of this inspection, and timely report to all relevant personnel.

III. problem tracking and quality improvement

The quality assurance personnel shall try to solve the quality problems within the project first. If it is difficult to solve the problems within the project, it shall be submitted to the superior leader for handling. The quality assurance team analyzes the common quality problems in the mechanism and gives the quality improvement measures.

Quality assurance procedures

1. Develop process and product quality inspection plan

Quality assurance personnel shall determine the main process areas and main work results to be inspected according to the characteristics of the project, and estimate the inspection time and personnel. Note that some process areas should be checked periodically rather than once, such as configuration management, requirements management, and so on.

2. Make a plan of "participating in technical review"

The technical review plan is generally formulated by the project manager or the technical backbone of the project.

Quality assurance personnel shall participate in and supervise the technical review of important work results such as requirements, design and code. The quality assurance personnel shall formulate the plan of "participating in the technical review" according to the technical review plan.

3. Develop a plan for "participating in the test"

Generally, the project development team is responsible for unit test and integration test, and the agency independent test team is responsible for the final product test (such as system test and acceptance test). Due to the variety of tests, there may be more than one test plan.

Quality assurance personnel shall participate in and supervise the testing of important work results. The quality assurance personnel shall refer to various test plans to make plans for "participating in tests".

4. Approval of quality assurance plan

Although the quality assurance team is administratively independent of any project, the work of the quality assurance personnel is closely related to the project, so the quality assurance plan shall be approved by the project manager before it comes into effect, so as to ensure that the quality assurance plan is consistent with the project plan.

If there is a quality manager in the organization, the quality manager shall also approve the quality assurance plan to ensure that the quality assurance plan meets the requirements of the organization (to avoid too loose and formality).

16. Project closing management

16.1 Application for junction item

Within the scheduled time, the project manager shall write the application for closing the project and submit it to the leader. The main contents of the application for closing project include: project introduction, comparison of plan and actual situation, main work achievements, patent and copyright situation, main assets of the project and handling opinions.

16.2 Leader approval

Organization leaders review the application for project closure. If the application is in line with the rules and regulations of the organization and the interests of the enterprise, it is approved to enter the "closing review" stage, otherwise, the closing application will be carried out again.

16.3 Closing review

16.3.1 Get ready

According to the characteristics of the project, the leader of the organization establishes a closing Review Committee to determine a chairman. The chairman of the review committee and the project manager shall jointly determine the time and place of the closing review and notify all relevant personnel.

16.3.2 Inspection and treatment of project assets

The closing review committee examines the tangible and intangible assets of the project and discusses how to use these assets effectively with the project manager.

16.3.3 Comprehensive evaluation of the project

The closing Review Committee makes a comprehensive evaluation of the project, which mainly includes: the completion of the project, project quality, IO analysis, market value of the project and the contribution of the project to the organization.

16.3.4 Lessons learned

The conclusion Review Committee and project members summarize experiences and lessons together, save them in the

form of documents, share them in the organization, and benefit the collective.

16.3.5 Final review by organization leader

The project closing Review Committee shall prepare the project closing review report and deliver it to the organization leader. The leader of the organization signs the final comments and the project is officially completed.

17. Questions:

Project Plan questions:

1. There is no clear way to obtain the house information and we don't acquire enough houses to show in the app.

2. We don't have an explicit plan to advertise our application. If we do it, users maybe can see our app and make suggestions about it actively. We can save waste less resource to invite users to evaluate the app in the testing process.

Technical questions:

1. The modeling and analysis method of user requirements is too simple and lacks a complete analysis system.

2. The technology used in our products does not consider confidentiality and does not guarantee the personal information security of users.

3. Our products are not beautiful enough in user interface design and the user experience is not good enough. The architecture design is not perfect, and the function needs to be further improved. The efficiency of data access needs to be further improved.

4. The product needs to be tested in an all-round way to ensure that the product can be officially launched.

Configuration management questions:

1. Project review: Lack of project review personnel and documents

2. Configuration management: Lack of milestones, configuration administrators and configuration management regulations

3. QA: There is no effective quality assurance team to find problems in the initial release.

4. Maintenance and service: Lack of maintenance team personnel, unable to obtain the user's needs and feedback in time

18. Impact of questions

Requirement review

In order to improve the standardized process, first train the project manager and customers to master the necessary requirements management knowledge. In this way, the project manager and the customer can save time when approving the "request change application" and improve the quality of the review.

Technical review

The technical review can effectively discover the software's errors in function, logic and implementation; at the same time, it can verify that the software conforms to its requirements and specifications; confirm that the software conforms to the pre-defined development specifications and standards; ensure that the software is developed in a unified mode;

facilitate project management. At the same time, formal technical review provides a training way for novices to analyze, design and implement software, and subsequent developers can also use formal technology to familiarize themselves with software developed by others.

configuration management

Using the optimized configuration management can effectively solve the increasingly complex software system and user needs. Configuration management needs to cover all aspects of software development and maintenance, and also plays an important supporting role in the macro management of software development process, namely project management. Configuration management can make the software development process more predictable, make the software system more repeatable, and give users and competent departments more confidence in the software quality and development team. The control and reporting functions evolved from the configuration management process can help project managers better understand the project progress, developer load, work efficiency, product quality status, delivery date and other information. At the same time, the standardized workflow and clear division of labor in the configuration management process are conducive to managers to cope with the

dilemma of developer flow, so that new members can quickly achieve task handover and minimize the loss caused by personnel flow.

QA

Quality assurance effectively solves the defects in the early stage of the project, which can be captured just when the defects are generated, so that the defects can be solved before the next stage. Quality assurance can act on the process rather than the final product, so it has a wide range of impacts and huge benefits. Quality assurance runs through all activities, not just one point.