# 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.

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| --- |
| Sharing Room  Publish House source  Query house source  Mood interaction  Experience communication  house commendation  sublease house  house owner publish  identity review  house authentication  Make friends in community |

### 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%.

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| --- | --- | --- |
| **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".

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| --- | --- | --- |
| **Estimate the workload of project R & D** | | |
| Estimation formula | Project R & D workload ≈ 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 ≈ 10  System design workload ≈ 15  Programming workload ≈ 25  Test workload ≈ 16  …… |
| **Estimate the workload of project management** | | |
| Estimation formula | Project management workload ≈ project R & D workload \* proportion coefficient | |
| Scale factor | 1/2 | |
| Project management workload | 33 | Subdivision: project planning workload ≈ 6  Project monitoring workload ≈ 6  Demand management workload ≈ 13  Risk management workload ≈ 8  …… |
| **Estimate the amount of work supported by the mechanism** | | |
| Estimation formula | Institutional support workload ≈ 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  …… |

## 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.

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| **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

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| --- | --- | --- |
| **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

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| Risk types | Risk exists | Risk factor | Evasion method |
| 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.

# 18. Project closing management

## 18.1 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.

## 18.2 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.

## 18.3 Closing review

### 18.3.1 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.

### 18.3.2 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.

### 18.3.3 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.

### 18.3.4 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.

### 18.3.5 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.