TE KUNENGA KI PŪREHUROA | MASSEY UNIVERSITY
UNIVERSITY OF NEW ZEALAND

Systems Analysis and Modelling Report

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Project introduction

Project Description：

Five different charities working in the area of cancer prevention and treatment have recently amalgamated into a single charity. Each charity currently has its own system for tracking details of potential and actual donors, donations and correspondence with potential donors to solicit donations. You have been engaged to manage the process of creating a single system for the new amalgamated charity.

Organisational Details：

The five charities range from a very small, local charity that uses a simple spreadsheet system and has no IT staff, to two quite sophisticated systems, used by the largest two charities in the group. Both of these large charities use an external IT company for system maintenance and support when needed, and the systems cover the full range of activities required. The final two charities have smaller systems, one is a system for generating and tracking mailings to potential donors, but not donations. The other has a system for tracking donations and donor addresses, but that charity does not conduct mailouts to donors so does not have that functionality in their system.

Resources Available：

You have access to the systems of each of the five charities, including the spreadsheets and documents that they use and generate. Both of the systems of the two large organisations were developed relatively recently and are well documented. You have access to user and technical documentation for these. The remaining two systems have user documentation but not technical documentation, and staff are available to show you these systems if required.

Assumptions

Assume different system has been used by IT department for a while

Assume external IT support still available

Assume all five charity has same process of donation

Assume five charities won't change address

After receiving suggestions from employees of other departments and complaints from donors, John smith realized that the merged institution needed a unified system to handle the connection between the charity and donors and track the information of donors. John Smith made the system request and report to the top, top agreed to after the project can be, and in high priority.

Assume project Sponsor is Project Manger

System Request

Project Sponsor: John smith from IT unit

Business Need:

Five charities have been merged, each with its own system for tracking donors, donations, and communication. Complaints received from operations staff regarding complex processes and difficult management; and from donors regarding missing information, lack of feedback channels after donations, and delays in tracking donations; as well as the absence of a unified email system, making it difficult to attract potential donors. There is a need to create a system with single, unified database and mail function.

Business Requirements:

The new system should be able to integrate donor details from all five previous systems, including information on potential and actual donors. It will track all donations made to the merged charity, regardless of the original charity's source. The system will also contain a integrated mail function as communicating method to consolidating various methods used by individual charities

Business Value:

1. **reduce the administrative burden of managing multiple systems (by 40% in 5 month)**
2. **attract potential donors**
3. **rapid response as well as tracking donations for donors (Satisfaction will increased by 30%.)**

Special Issues or Constraints:

Two large systems have complete documentation, the other two have only user documentation. Technical knowledge for these two systems may rely on staff demonstration, which could cause delays in the integration process.

Technical Feasibility

The functional area:

Risk in the functional area is LOW

Analysts are organized from previous charities, and only those who have worked for five years or more can join the team. The analysts include both IT and non-IT departments and can fully oversee the system.

For features with missing user documentation, staff can clarify core functionalities through operational demonstrations (such as the template logic of the email generation system and the field definitions of the donation tracking system). By organizing workshops to record operational processes and create data flow diagrams, the issue of missing technical documentation can be addressed.

The technology area:

Risk in technology is LOW

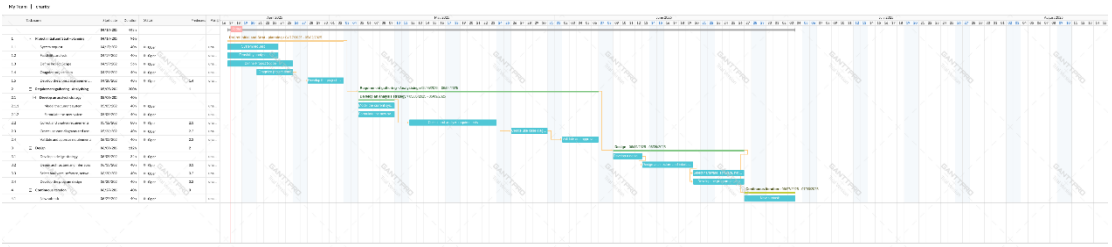
Because of there aren't technical document in two organization, but the stuff can demonstrate the system function, which don't form the technology risk, while some of these institutions do not have donate function or not have the function about sending emails to donors, but after

merging, the IT company of large charities master these skills proficiently, so don't create too high a technical risk.
Previous large charitable organizations have been integrated into the existing organization, and the IT personnel are familiar with the technical stack involved in the system, with complete user and technical documentation.

Project Size area：
Project size is moderate
The project team should be composed as much as possible of IT members with long work experience and high-level expertise. avoiding the involvement of inexperienced individuals and non-stakeholders (10-15 members).
Duration: The project duration is 10 months, which is within the reasonable range for a medium-sized system integration project

Compatibility area:
The risk in compatibility is LOW
The systems of the two large organizations are relatively well-established. The system is built on the foundations of the two largest charitable organizations. and the new system can be well integrated with these large organizations. The other three organizations have only implemented part of the features of the large systems, but the main business processes are similar. The compatibility of the technical infrastructure is moderate.

Project Manage plan – Gantt G



1. Project Initial and Strategy - Planning (April 2025)

Duration: 2 weeks

Tasks:

- System Request (April 17, 2025 - April 21, 2025)
  - Feasibility Analysis (April 17, 2025 - April 21, 2025)
  - Define Project Scope (April 17, 2025 - April 21, 2025)
  - Organize Project Team (April 21, 2025 - April 25, 2025)
  - Develop Project Management Plan (April 25, 2025 - April 28, 2025)

Dependencies: None
Milestone: Project initiation complete (April 28, 2025)

Responsible Role: Project Sponsor

2. Requirement Gathering - Analyzing (May 2025)

Duration: 4 weeks
Tasks:
- **Develop an Analysis Strategy (May 5, 2025 - May 9, 2025)**
  - **Model the Current System (May 5, 2025 - May 9, 2025)**
  - **Formulate the New System (May 5, 2025 - May 9, 2025)**
- **Collect and Analyze Requirements (May 12, 2025 - May 19, 2025)**
- **Create Use Case Diagrams and Descriptions (May 26, 2025 - May 29, 2025)**
- **Validate and Approve Requirements (June 2, 2025 - June 5, 2025)**

Dependencies: Project initiation complete
Milestone: Requirements approved (June 5, 2025)
Responsible Role: Business Analyst, Project Sponsor

3. System Design (June 2025)

Duration: 3 weeks
Tasks:
- **Develop Design Strategy (June 9, 2025 - June 12, 2025)**
- **Design Architecture and Interfaces (June 13, 2025 - June 16, 2025)**
- **Select Hardware, Software, and Network Requirements (June 16, 2025 - June 20, 2025)**
- **Develop Program Design (June 20, 2025 - June 26, 2025)**

Dependencies: Requirements approval
Milestone: Design finalized (June 26, 2025)
Responsible Role: System Architect

4. Continuous Iteration (June - July 2025)

Duration: 1 week
Tasks:
- **Execute Integration Testing (June 27, 2025 - June 30, 2025)**
- **Conduct User Acceptance Testing (UAT) with Stakeholders (July 1, 2025 - July 3, 2025)**
- **Fix Defects and Perform Regression Testing (July 3, 2025 - July 5, 2025)**
- **Validate Non-Functional Requirements (Performance, Security) (July 5, 2025 - July 7, 2025)**

Dependencies: Data migration completed
Milestone: Testing completed (July 7, 2025)
Responsible Role: System Architect, Data Engineer, Stakeholders (Donors)

Why chose the Gantt diagram?

Because of this project has a deadline about 10 months, the Gantt diagram can visualize the start and end time of every tasks. While the Gantt diagram allow the agile to handle changes in demand.

Because of this project has some dependency relationship on different phase, such as the system design can be start only after the requirement collection completed. The Gantt diagram can show these relationships clearly.

The project manager makes a comparison between the actual progress and the plan, ensuring the task completed in time. While the Gantt diagram conducive to communicate the project plan.

Methodology

Methodology: Agile Development - Scrum

Project Characteristics

1. **There are differences in the systems of charitable organizations of different sizes.**
2. **Delivery within a specified time frame (10-month deadline).**
3. **The system needs to create rapid responses in case of improving the donor experience.**

Scrum focuses on cross-organizational requirement integration and iterative delivery. Some requirements may unclear due to difficulty communicating to potential and actual donors.

The project involves organizations of different sizes and technical levels in different area. There is need for clear short time schedule, Scrum can provide schedule visibility

The new system should reliable and plan long-term use. Scrum can provided long-term iteration and fully test.

Team

1. Project Manager (1 person)

Responsibilities: Oversee project execution, ensure the project is completed on time, within budget, and within the defined scope within 10 months. Facilitate communication with stakeholders and manage project risks.

Reason: The project needs to ensure completion by having both the big picture and details, and it must coordinate team resources, manage complex system differences, and address stakeholder interests to ensure that integration meets business requirements. The project manager ensures that integration aligns with business needs by coordinating resources across different charitable organizations.

2. Business Analysts (2 people)

Responsibilities: Focuses on business issues.

Collect and document requirements from five charitable organizations through workshops, interviews, and demonstrations. Review and design business processes to ensure they meet the requirements.

Reason: During the integration process, there may be issues with existing business processes being unreasonable, incompatible, or unable to meet the requirements. Business analysts need

to integrate all functions and translate user needs (such as the unfamiliarity of small organization users with complex systems) into feasible technical requirements.

3.System Architects (2 people)
Responsibilities: Design the system architecture, focusing on scalability, security, and integration with legacy systems. Define data models and interfaces to unify different infrastructures.
Reason: The project needs to integrate five different systems, including spreadsheets from small local charities and complex systems from two large charities. The system architects utilize the integration of large systems to incorporate the functionality of smaller systems. Their design ensures the system supports reporting functions and data import from spreadsheets.

4. Data Engineers (3 people)
Responsibilities: Responsible for data migration, including extracting, cleaning, transforming, and integrating donor and donation data from five systems into a unified database.
Reason: The data formats across the five charities vary significantly, ranging from spreadsheets to full databases. Data engineers use technical documentation from large systems to extract data, while cleaning and transforming data from spreadsheets to meet a 95% data quality goal within three months.

5. UI/UX Designers (1 person)
Responsibilities: Design an intuitive and user-friendly interface for users from five charitable organizations, ensuring system usability and adoption.
Reason: Small local charities lack IT staff, and employees are unfamiliar with complex systems. The UI/UX designer creates a simple interface that integrates the complex features of large systems, ensuring all users can easily navigate and use the system.

Senior Management of integrated charity

The existing system increases the difficulty of donor and organizational management, raising the management costs of the merged organization. The new system will optimize the organization's costs.

Donors and Potential Donors

The existing system is fragmented, and the donor experience is inconsistent. The merged new system will enhance the donor experience.

Organization Staff

The new system's email functionality will improve staff experience, since missing functionalities in some systems, staff face communication challenges with donors or potential donors, and inconsistent database data creates many difficulties in their work. and a unified database will reduce maintenance costs.

Volunteers and Partners
The new system will allow the charitable organization to respond more quickly to partners.

Requirement definition Plan

Requirement definition: Charities System

Non-Functional Requirements

1. Performance:

1.1 system responses less than 2 seconds

1.2 system handle 30 number of users

1.3 system handle 5000 number of donations

1.4 system support for 20 additional charities.

2. Security:

2.1 system backup data once a week

2.2 system update user permissions once a month.

3. Usability:

3.1 system can be used in windows and ios environment

3.2 system can be used in computer phone and laptop

3.3 system support remote working and field operations.

4. Maintainability:

4.1 system update documentations everyday

5. Compliance:

5.1 system complies data protection and privacy laws (e.g., GDPR, CCPA).

5.2 system accessible to users with disabilities, follow the rules WCAG 2.1.

Functional Requirements

1.Technical staff Actions:

1.1 Technical staff can create donor records.

1.2 Technical staff can update donor records.

1.3 Technical staff can delete donor records.

1.4 Technical staff can record donations from potential donors.

1.5 Technical staff can record donations from actual donors.

2.Searching:

2.1 Company managers can search using name ,address, or contact details

3.Email sending:

3.1 Mailbox managers can send email to potential and actual donors.

3.2 Mailbox managers can track email with potential and actual donors.

3.3 Mailbox managers can get others email feedback

4. Document

4.1 Document managers can generate reports on campaign performance.

4.2 Document managers can migrate documents

4.3 Document managers can categorize documents

Requirements analysis strategies

Requirement Analysis Strategies: Problem analysis, Outcome analysis, Duration analysis

reason: The project is sensitive to time it's must finished on time, execute on Duration analysis can make sure app can finished on time.

As an integrated project Problem analysis is necessary, modeling existing system and find requirements relevant to problem.
New System should meet users need, It's necessary to execute Outcome analysis to make sure system is required by users.

Require Gathering Technique

Requirement Gathering Techniques: Using Joint Application Development (JAD) Method
Stakeholders from the five organizations will be gathered for a series of collaborative workshops based on the current charity organization process. The workshops will follow business assumptions (including guesses about the causes of current problems and methods to optimize business processes) and will propose a solution process.
During the workshops, employees will demonstrate system processes on-site, using practical operations to fill the documentation gaps of some organizations. Given that this project has a 10-month time limit, JAD allows for the synchronized verification of requirements across all organizations and real-time conflict resolution. This structured collaboration accelerates requirement gathering and reduces delays caused by repeated communication. Since this system needs to mitigate the risks associated with users' understanding of system usage, JAD ensures the project is designed with the user at the center and helps small organization employees become familiar with the large organization’ s system.
Reason: As a integrate project actual donors need on board, requirements should focus on improvements and to-be
JAD allow to get Deep information and easy to combine information together with low cost. Most important, users can highly involve in project

Stake Holder Engagement

Senior Management of integrated charity
Description
Senior Management to ensure new system meet overall goal
Role
Organizational management and resource allocation. Learn about the introduction of Champion. Be responsible for obtaining the budget and encouraging users to accept and use the system
Interest
The existing system increases the difficulty of donor and organizational management, raising the management costs of the merged organization. The new system will optimize the organization's costs. Senior managers can reduce costs from the excess costs of the management system

Donors and Potential Donors
Description
The existing system is non-stable, and the donor experience is inconsistent.
Role
System users
Interest

The merged new system will enhance the donor experience.

Organization Staff

Description

Institutions that use spreadsheets or partial functional systems are familiar with local operation procedures but lack technical documentation support.

The IT unit faces resistance using different systems after the organizational merger and needs a unified data system.

Role

System Users

Interest

The new system's email functionality will improve staff experience, since missing functionalities in some systems, staff face communication challenges with donors or potential donors, and inconsistent database data creates many difficulties in their work. and a unified database will reduce maintenance costs.

Volunteers and Partners

Description

The Volunteers and Partners faces system limitations and the lack of a professional email system, which often leads to issues in communicating with donors. The existing system is unstable and struggles to handle large volumes of information, affecting communication efficiency and accuracy.

Role

System users

Interest

Seek a stable and efficient communication system with integrated email tools for smoother interaction with donors.

Involvement of Stake holder

Organization Staff

Participation method

Through workshops, focus groups and JAD meetings, staff will demonstrate the existing system, point out pain points (such as the lack of technical documentation), and verify the system design to ensure usability and functionality.

Also, Participate in requirement collection to ensure that the new system supports its daily operation process and user requirements.

Reason

This working mode can prevent the problem of time delay caused by technical issues. Through continuous interaction in the early stage, information among different roles can be clearly conveyed to avoid conflicts, which is beneficial to the diversified development of the project.

Senior Management of integrated charity

Participation method

The senior management is responsible for high-level decision-making, budget approval, and ensuring that the project aligns with the strategic goals of the merged charity, such as increasing

donation income and operational efficiency.
They will regularly receive reports on project outcomes and outcome reports of JAD meetings, and participate in steering committee meetings to provide strategic suggestions.

Reason

The above-mentioned working mode can ensure that resources are in place and the project does not deviate from the scope.
The provided JAD outcome reports and project outcome presentations enabled them to fully understand the requirements as well as the progress and effectiveness as well as reduces the risk of system instability, promotes collaboration, maintains the stability of the system, and supports the seamless unification of data and functions.

Donors and Potential Donors

Participation method

Donors will provide feedback on their preferences for interacting with charities to ensure that the system optimizes their experience and promotes donations.
User experience, communication preferences and privacy requirements are collected through questionnaires and feedback forms, and then discussed through JAD meetings to ensure that the system meets their expectations.

Reason

The above-mentioned methods can ensure that the system optimizes the specific experience that users desire. To facilitate the optimization of donor-centered system functions, make the system intuitive and easy to use, and encourage donations.

Volunteers and Partners

Participation method

This department communicates directly with donors (such as email templates and donor reach tools) and tests the email module to ensure that it supports efficient donor interaction.
And test the stability and effectiveness of the email system and the interaction function with donors.

Diagram and document

Analysis phase

Use case diagram

Why

Because of every institution has their system that means every system have different system boundary. We use the use case diagram which can explicit and visual the boundaries of the merged system. This is beneficial for constructing the single system, if we merge the use cases of users in each organization. Meanwhile， the use case diagram can provide the requirements validation to employees lacking technical documentation and those of small charities, which can promote the decision of system boundary.

Role

Provide design basis for subsequent charts and higher-level designed charts.

As the basis tool for JAD seminar, which decrease the obstacle of communication.

Help the non-technical staff understand system and help developers understand system and reduce communication costs.

Conceptual level

Confirm the relationship between every role and use case, divide the functional boundaries of the two major use case groups," Donor Management" and" Communication Management".

merge five systems into one system and make up the functions of the systems of other organization while perfect the merged system.

Use case description

Why

Explain the flow of every use case from use case diagram, precondition, post condition and exceptional situation in detail.

Determine the Spreadsheet data migration, the Normal Flow of Events and Sub Flows for intricate tasks such as the preservation of donor record information are good for realization of later function.

Role

Take the use case description as the direct basis for implementing function. Help the technical team understand the steps or scenarios of the system or function.

Provide reference content for subsequent modeling design work and so on.

Logic level

Describe the realize details of concrete operation between the role, use case and system. Show the significance level of use cases.Put every use case into many step that are convenient to come true. Confirm the trigger condition, preconditions and postconditions.

Modeling Phase

Active diagram

Why

Visualizing all activities in the organizational merger project. Active diagram has ensured the refinement of the parallel process for manually importing spreadsheets and merging data with other institutions. Provide business logic processes for institutions lacking email sending and donation functions, which can reduce communication and development costs.

Role

Active diagram can serve as a basic operation manual to verify whether the process of each operation is intact. we can see clearly different roles by the activity diagram of the lane,

Logic level Contracted describes the control flow and data flow. Distinguish roles by swimming lanes, demonstrate the cross-role collaboration process and the objects of each activity.including branching, merging, forking and convergence functions, supports concurrent operation and condition judgment.

Class diagram

Why

Confirm the associations between different entities and ensure the data engineers who can understand the mapping relationship between spreadsheet fields and large-scale system fields. Because of the very small institutions use the simple spreadsheet systems and don't have Information technology personnel, the class diagram can help them initially understand the structure of the merged system and simplifies the understanding of the system.

Role

The class diagram is the direct basis and starting point for the design of database Schema.

Provide the help for drawing other dynamic graphics.

Logic level

Describe the static structure of the system and display the core entities and their correlations. Clearly stated the attributes and operations of different entities.

define Different field types, scopes, and the relationships among different classes.

Sequence diagram

Why

Because we have determined the concrete finish time, The sequence diagram can provide the interaction and behavior of objects in time very well. The import and integration of spreadsheet data into a unified database need the clear temporal dependencies. Because of the merged system has the requirement to communicate with donors, the sequence diagram is an important tool in terms of communication protocols.

Role

Dynamics reflect the interaction between different objects.

Help the development team to understand the interface call order.

Intuitive reflected and process.

Logic level

The sequence diagram describes the chronological order of sending messages between objects and shows the dynamic cooperation between multiple objects.

Have a clear and existing time for each object and show the corresponding things to do during this period. accept different types of information.

High-Level Design Phase

System Architecture Diagram

Why

Ensure compatibility with the needs of further optimizing the existing systems of large institutions and facilitating the use of the systems of small institutions. Help to track project progress management team and further risk assessment and demonstrate the functional additions and the part of system upgrades in the system structure process for the smallest institutions.

Role

Guide the development team to divide the labor and collaboration. Intuitive presented the overall architecture of the system and help five institutions personnel to quickly understand the system.

Conceptual level

The System Architecture Diagram shows the internal structure of the entire system, ensuring the correlation and information flow between different modules. Use appropriate image symbols, including nodes and connecting lines.

Database Schema

Why

Clarify the data in the spreadsheet system of small institutions and convert it into clear mappings in the database to ensure the accurate consolidation of historical data. Business systems such as donations and communications can be isolated. Logically group the businesses in the system to achieve modular design.

Role

Logically group objects in the same database and provide namespace functionality, which enables multiple tables with the same name in the same database.

Logic level

Display the database tables and their associated relationships and clarify the physical storage structure of the core entities.

Define field details, foreign key constraints, and index design.

Consistency and Balance

Consistency method

If a user ID conflict occurs during the data merging process, a new ID needs to be generated to replace the other redundant ids, and to merge the corresponding content. If there are other repetitive records, the duplicate data needs to be normalized. It should be indicated that each data source is from the system of that previous institution in the historical data and recorded the differences between the old and new versions of each institution. Unify the business processes of the five institutions, such as consummating the system functions for the smallest institution to communicate with donors and potential donors, and the function of the donor tracking system. When there is a conflict between different data from different institutions, the latest update should prevail.Special cases require manual assistance. In terms of the system, the systems of the two largest institutions will be the focus, and the functions of the systems of other institutions will be improved.

Balance method

Perform priority sorting, like donors-based communication information storage, donation record query, these functions are a must in every institution. Other functions with a lower priority are disabled by default and can be enabled if necessary. Because large institutions have a complete system, they can appropriately decrease the development costs the remaining money can be used

to construct the other imperfect institutions. Similarly, for the issue of no technical documentation in small institutions, we can balance this work by having the staff demonstrate these systems. Due to the significant system differences between different institutions, we can conduct task planning in layers and phases to gradually reduce the system differences.

References

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