The Forge: A Reforge Companion App

Elicitation Report

Requirements Engineering & Analysis

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Elicitation Process

To start the requirements elicitation process, one must first consider the sources from which the requirements can be elicited. One source to consider are business rules, which are statements that define or constrain some aspect of the business itself. A way to gather theses rules is to ask questions about policies that the product must conform to. These policies are considered requirement sources. Goals, or business concerns are another source of requirements. These are the high-level objectives to the software. They provide the underlying motivation for the software. Stakeholders are a vital source when eliciting requirements. Identifying, representing, and managing the viewpoints of many types of stakeholders is an important step in the elicitation process. Another source of requirements is the organizational environment. The characteristics of the organization, such as business structure, culture, and internal politics of the organization, will impact requirements. The operational environment must also be taken into consideration. Meaning the environment in which the software will be used can cause timing, performance, and other constraints. The consideration of domain knowledge can also be a useful source to gather requirements from. Knowledge of the business or industry can help the formation and clarification of the requirements elicited. Once the sources are identified, the next step is to implement the elicitation techniques. Such techniques include interviews, observations, user stories, and use cases. After the necessary information is gathered a set of formal requirements can be written and then can be reviewed by the client to be approved. This can be dependent on the methodology that the project is using. Sometimes formal requirements and use cases are used, such as in Waterfall. Other times in Agile methodology user stories are used as the basis of requirements for development. The elicitation process can be ongoing throughout the development lifecycle again depending on the methodology that is being followed.

Sources

Stakeholders	• Identify, represent, and manage “viewpoints” of many types of stakeholders. • Don’t just focus on one group of stakeholders/ cannot be the only source.
Business rules	• Statements that define or constrain some aspect of the business itself. • Ask “what policies must the product conform to?” • Policies are requirement sources.

Domain knowledge	• Knowledge of the business or industry. • Good practice to emulate an ontological approach. • Ontological - showing the relations between the concepts and categories in a subject area or domain. • Relationships between relevant concepts in the application domain should be identified. • Research the domain.
Goals	• Also known as “business concern” or “critical success factor”. • The overall, high-level objective to the software. • Derived from the business analysis. • Provide motivation for software. • Create SMART goals to avoid vagueness. • Assess the value in regard to priority and cost of goals. • Feasibility study

The operational environment	• The environment in which the software will be used.
	• Requirements derived may include:
	  ○ timing constraints (in real-time software)
	  ○ performance constraints (in business environment)
	• Must be actively looked for because they can cause a major impact on software feasibility, cost, and restrict design choices.

The organizational environment	• Characteristics of the organization will impact requirements such as:
	  ○ Business structure
	  ○ Culture
	  ○ Internal politics of the organization
	• In general, new software should not force unplanned changes in business processes.

Elicitation Techniques

Interviews	• The traditional approach to eliciting requirements.
	• Have limitations and should be conducted in a thought-out manner.
	  ○ Plan interview questions be prepared with follow-up questions to their answers.
	  ○ Plan on recording answers
	  ○ Meeting recording if possible
	  ○ Take notes
	• Follow best practices (Interview agenda worksheet/good questions link)

Scenarios	• Valuable means of providing context to the elicitation of user requirements. ○ Ask “what if” and “how is this done” type questions

	○ Use case description - scenario notations like use case diagrams help model software.
Prototypes	• Helps clarify ambiguous requirements. • Provides users with context, can better understand the information they need to provide. • Low-fidelity is good to prevent “anchoring” - meaning a higher quality prototype can cause unintended limits on design flexibility. (The client/developers might set their minds on that particular design and be unopen to change) • Various levels, like paper mockups or fully working code
Facilitated meetings	• A group of individuals can achieve a summative(cumulative) effect. More insight into the software requirements can be achieved than with individual interviews. • Can reveal conflicting requirements and where they occur. • Important to facilitate the meeting to avoid bias stemming from loyalty or an outspoken few.
Observation	• Software context within the organizational environment through techniques that are observational. ○ Ethnography - the scientific description of the customs of individual peoples and cultures. • Shadow different users - helps show the subtle and complex details of user tasks and business processes that may be hard to describe.
User stories	• Commonly used in Agile Methodologies. • Are short and high-level descriptions of the required functionality, expressed in customer terms. • Templet - “As a <role>, I want <goal/desire> so that <benefit>.” • Can be created by users themselves • Before implementation, an acceptance procedure is written by the customer to determine if the goals of the user story are fulfilled.
Other techniques	• Analyzing competitors’ products • Applying data mining techniques • Using a source of domain knowledge • Customer request databases

Elicitation of Behavioral Requirements

The requirements engineering process supports the elicitation of behavioral requirements by implementing elicitation techniques that help identify the functional behavior of a system. Behavioral requirements describe user interface issues, usage, or business rules. These requirements are captured in uses cases and user stories. Where the emphasis is on the user's interactions with the system. It allows the person who is doing the eliciting to describe what the software will do. The techniques and sources that are utilized in the process help define these functional requirements.

Fundamental Challenges of Requirements Elicitation

There are many challenges that can arise when trying to elicit requirements. One such fundamental challenge is that sometimes stakeholders are unable to specify, clearly state, or even really know what they want in a software solution. Without clear communication there may be unspoken or assumed requirements. It can also be difficult to meet expectations when the stakeholders give conflicting requirements. Terminology can create misunderstandings if terms are not agreed upon. A glossary of terms specific to the project can be useful in preventing this. Also, it can be challenging to organize meetings with stakeholders due to scheduling or their reluctance to do so. Many clients will not fully understand the importance of the elicitation process and might think it is a one and done situation and not fully apricate the importance of continuous validation/verification to ensure that the right project is being built the right way. It also helps deal with other challenges such as changing requirements and can help mitigate risks.

Specific Process for the Elicitation of Requirements for - The Forge: A Reforge Companion App

A series of interviews and surveys with different stakeholders was performed to elicit requirements related to the functionality, performance, usability, and interface. The first interview was a one on one with the client. A series of questions was asked based on "Good Questions to Ask Your Client", taken from *More About Software Requirements* by Karl E. Wiegers. A survey was also conducted to reach a wider number of potential users. This survey was sent to people who have played the game previously and to those who have expressed interest in the future game. The three groups of stakeholders that were interviewed and surveyed were the client, those potential users who were familiar with the game, and potential users who have not played the game. After the interviews and surveys, the information was

used to create business rules, a set of requirements, user stories, and more in-depth use cases. There have been continued weekly meeting with the client where these artifacts have been presented. This allows for continuous feedback from the client so that changes can be made in a way that minimizes risks to the project. As well as validation of the requirements as they evolve. A mockup of the software system was also created using Inkscape and was presented as well. The mockup proved valuable to gather the UI requirements that were had to recognize without the aid of such a visualization tool.

Stakeholders

Secret Boss Games (Client)	• Major decision-maker on the project. • (High power, High interest)
Development team	• Responsible for the design, development, testing, and deliverable of product. There might be certain constraints on the project due to the skillset of the team. • (High power, High interest)
Artists	• Responsible for providing art assets to the development team for user interfaces. • (Low power, Low interest)
User	• Product satisfaction and feedback will have a direct impact on the success metrics and future business decisions. • (Low power, low interest)

Business Operational Policies and Rules

Contract of work	• Before any persons that are independent contractors or freelancers start work on a project, they must first sign a contract that stipulates their conditions of employment and compensation.
Inclusion and Diversity	• All members of the team shall foster an inclusive and diverse working environment. Discrimination of any kind is not allowed.
File sharing	• All file sharing is done through google drive, with specifically designated folders. Software

	application projects will also use Github for collaboration and version control.
Open communication policy	• There will be open meetings where the expectations of all team members are made clear to everyone and everyone has the opportunity to make their expectations clear to the team.
Integrity policy	• All members of the team are expected to follow the company's integrity policy which can be found in the HR google docs folder.
Art assets	• All art formatting must be done in Adobe Illustrator, Inkscape, or Photoshop and follow the designated size and formatting guidelines that are project specific. These specifications can be found in the corresponding project folder on google drive.

User Characteristics

- The intended group of users for the software is the players of the Reforge game series.
- This group will include individuals with varying levels of technical experience, educational levels, as well as experience with the games that this system is meant to supplement.
- The ages of the users will differ, but the target market is 14 years of age and up.
- The users will also be using different devices to run the software.
- Consideration should be given to users with disabilities to make the end solution accessible to all who wish to use it.

Mission and Goals of Project

- To allow for the manufacture of products without physical components that can be offered in a digital manner. The offer of digital options for customers without physical dice (product), to eliminate tariff expenses and lower the price of product manufacturing.

Interview Questions and Answers

Initial Interview for Reforge Dice Solution (Client/Product Owner)

Business Requirements

● What problem are you trying to solve?

Decrease the cost of goods sold (COGS) to increase profit margins.

● What's the motivation for solving this problem?

A perceived loss of potential profits if having to supply physical dice with the next manufacturing shipment of the game.

● What would a highly successful solution do for the company?

Allow the COGS to be decreased without losing the quality of the product.

● Is there anyone that could influence this project?

Customer feedback

● Who could be influenced by this project?

Customer response to products and overall company financial health

● Are there any related projects to this one?

The previous game project, Reforge

● Could there be any unintended consequences of the new system?

A decrease in the perceived value of new copies without dice, compared to previous editions of Reforge that include dice.

Business Rules

●Are there specific policies that this product must conform to?

Quality standards as determined by the company owner. -Need more elaboration

User Requirements

● What goals could this product help you accomplish?

This will allow the sale of products with fewer components, decreasing COGS and increasing profit margins.

● What problems do you expect this product to solve?

Thin profit margins and high COGS

● What words would you use to describe the product?

Convenient, quality-of-life, simple, available

● What aspect of the product excites you?

It will be the first commercial digital product release

● What aspects are most/least valuable to the users? - Need to add the actual functionality of the program such as dice roll and health tracking.

Most: Ease of use, bug-free, intuitive

Least: Extra features (themes, tutorials)

Non-functional Requirements

● What qualities (e.g., efficiency, security, reliability, etc.) are critical for the specific parts of the product?

Intuitive end of user experience (ease of use)

The product must be reliable.

External Interfaces features

● What events must the product respond to?

The product must respond to user interaction such as button pushes.

● Can you describe the environment in which the product will be used?

During games of Reforge on mobile devices.

Other Constraints

● What is most important to you about the product?

Quality and polish above all

- How would you judge whether the product is a success?

  The reception of a new game that does not include dice.

- Is there anything else we should be asking you?

  No

Survey Questions sent out to potential users

- Users - Group 1(Experienced players of the game):
  - Would you be willing to use a digital alternative to physical dice?
  - Would such an alternative be seen as a convenience or a hassle?
  - What do expect of such an alternative in terms of basic functionality?
  - If you could include extra features what would they be?
  - How many players do you normally have per game?

  *Responses for user surveys were varied and are still coming in.

- Users - Group 2(New players of the game):
  - Would you be willing to use a digital alternative to physical dice?
  - Would such an alternative be seen as a convenience or a hassle?
  - Do you feel that using a digital alternative would make the game harder to learn?
  - What do expect of such an alternative in terms of basic functionality?
  - If you could include extra features what would they be?
  - Would access to the directions of the game contained in the digital solution be useful?
  - Would an included tutorial be beneficial?

  *Responses for user surveys were varied and are still coming in.

Use Cases

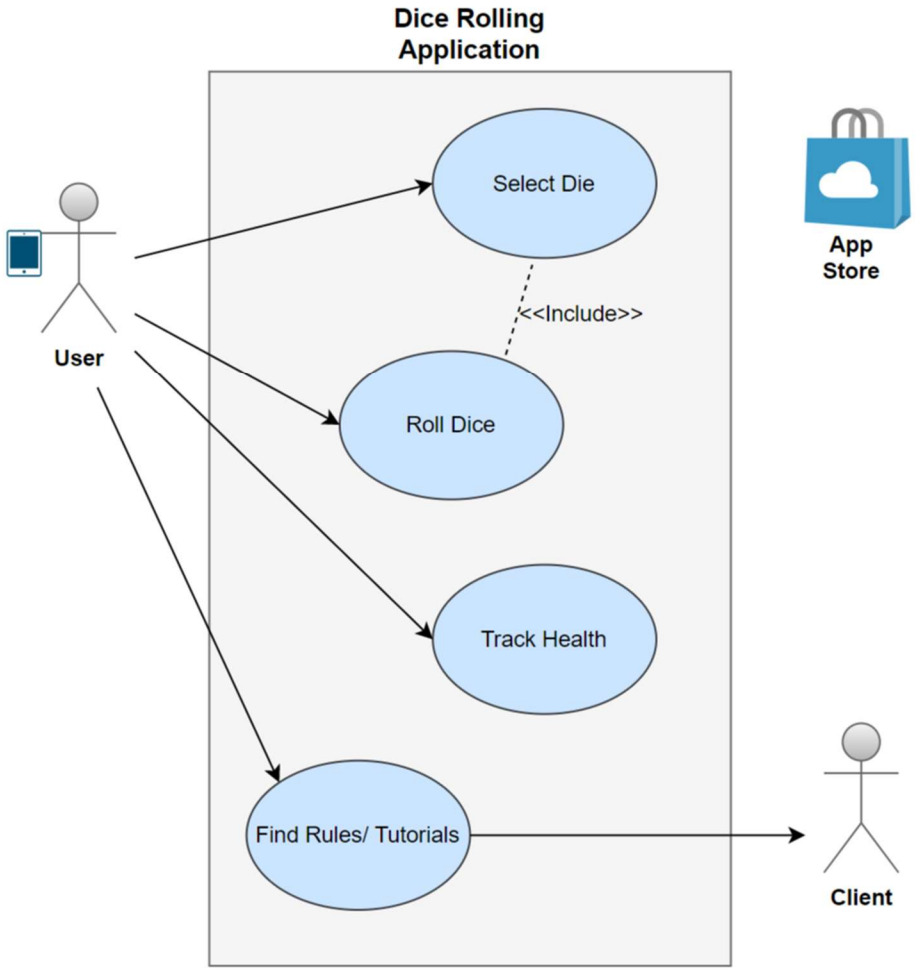
UC ID and Name:	UC-1 Roll Dice		
Created By:	Rachel Matthews	Date Created:	2/18/2021
Primary Actor:	User	Secondary Actors:	N/A
Trigger:	When the User clicks the die image.		
Description:	To be an effective dice rolling software system the end result of this use case must be consistent with the rolling of a physical die. When the User clicks the die image, the system will return a random number within the range of the die selected.		
Preconditions:	App installed App is open Die is selected		
Postconditions:	The value of the roll is displayed on the screen.		
Normal Flow:	The User will click the die image and the system will display a dice rolling animation. The system will calculate a random number within the range of the selected die being rolled. The system will then display the image of the face of the die that corresponds with the random number that was generated.		
Alternative Flows:	The User clicks the image of the die. The system calculates the random number within the range of the selected die being rolled. The system will then display the image of the face of the die that corresponds with the random number that was generated. The User closes the app (on purpose or by accident). The User opens the app. The value of the last die roll is still displayed.		
Priority:	**Highest**		

UC ID and Name:	UC-2 Track Health		
Created By:	Rachel Matthews	Date Created:	2/18/2021
Primary Actor:	User	Secondary Actors:	N/A
Trigger:	When the User clicks the plus or minus buttons on either side of the health bar image.		
Description:	The User will be able to track their health stats through the system during a game instead of relying on the traditional twenty-sided die that has been used previously when there was no software available. The User will utilize buttons to increase or decrease the health meter.		
Preconditions:	App installed App is open		
Postconditions:	The health meter accurately displays the User's current health score.		
Normal Flow:	The User clicks the minus button on the left side of the health meter. The system decrements the health score by 1(for each click). The system displays the new health score on the health bar.		
Alternative Flows:	The User clicks the plus button on the right side of the health meter. The system increments the health score by 1 (for each click). The system displays the new health score on the health bar.		
Priority:	**High**		
Other Information:	The health score will only range from 0 to 20. Any additional clicks by the User to increase or decrease beyond this range will not change the score.		

UC ID and Name:	UC-3 Select Die		
Created By:	Rachel Matthews	Date Created:	2/19/2021
Primary Actor:	User	Secondary Actors:	N/A
Trigger:	When the User clicks the image of the dice option they would like to use.		
Description:	The User will be able to select the die for the specific situation during game play as needed. They will do this by clicking on either the Reforge button to go up in die level, or by clicking the Deforge button to go down in die level.		
Preconditions:	App installed App is open		
Postconditions:	The system displays the new die selection to be rolled.		
Normal Flow:	The User clicks the Reforge button. The system increases to the next die level. The system displays the new die level image. This process is repeated until the desired die level is reached, traversing upwards in die level.		
Alternative Flows:	The User clicks the Deforge button. The system decreases to the next lower die level. The system displays the new die level image. This process is repeated until the desired die level is reached, traversing dowards in die level.		
Priority:	**Highest**		
Other Information:	The Reforge and Deforge buttons will only increase or decrease the die level from a four-sided die to a twelve-sided die.		

UC ID and Name:	UC-4 Find Rules of Game		
Created By:	Rachel Matthews	Date Created:	2/19/2021
Primary Actor:	User	Secondary Actors:	Client (Secret Boss Games)
Trigger:	When the user clicks the Rules/Tutorial option in the menu bar.		
Description:	The User will be able to access the rules and tutorials for the Reforge games to clarify any questions about gameplay. Will include a link to the Client's website to get full set of tutorial videos.		
Preconditions:	App installed App is open.		
Postconditions:	The game rules/tutorial page is displayed.		
Normal Flow:	The User clicks on the menu bar in the app. The system displays the app menu. The User then clicks on the Rules/Tutorials option. The system displays the names of the different Reforge games. The User clicks the desired game. The system displays a screen that contains the corresponding rules and tutorials from that specified game.		
Alternative Flows:	The User clicks on the menu bar in the app. The system displays the app menu. The User then clicks on the Rules/Tutorials option. The system displays the names of the different Reforge games and link to website. User clicks the link to website. The system redirects the User to the Client's website.		
Priority:	**Low**		
Other Information:	When the User returns to the main dice-rolling screen, all data is displayed as it was before they left the screen.		
Assumptions:	A set of in app rules and tutorials will be utilized by the User.		

Use Case Diagram



User Stories

Key	Summary	Description
RS-20	As a user, I want to be able to cycle through the die levels as needed in gameplay.	Allow the user to go up or down in die levels. Using a reforge and deforge button.
RS-19	As a user, I want to be able to change the theme of my background to match the version of the game I am playing.	Allow the user to choose the background that will correspond with the Reforge game they are playing.
RS-18	As a new user, I want access to a tutorial of the game, so that I can understand game play.	Create a tutorial for new users that describes basic gameplay.
RS-17	As a user, I want to be able to decrease or increase my health meter when needed to keep track of my health during the game.	Allow the user to decrease or increase their health using the health bar tracker.
RS-16	As a user, I want to be able to roll a twelve-sided die in the program so that I don't need to have a physical die.	Create a twelve-sided die in the program so that the user can utilize it instead of needing physical dice.
RS-15	As a user, I want to be able to roll a ten-sided die in the program so that I don't need to have a physical die.	Create a ten-sided die in the program so that the user can utilize it instead of needing physical dice.
RS-14	As a user, I want to be able to roll an eight-sided die in the program so that I don't need to have a physical die.	Allow the user to roll an eight-sided die in the program so that the user can utilize it instead of needing physical dice.
RS-13	As a user, I want to be able to roll the six-sided die in the program so that I don't need to have a physical die.	Create a six-sided die in the program so that the user can utilize it instead of needing physical dice.
RS-12	As a user, I want to be able to change the color of my dice to match the player color of the starting cards of the game.	Allow the user to select a dice color that corresponds with their starting card of the game. Each player has a unique color.

RS-11	As a user, I want to be able to see my health score on the screen so that I can track my health throughout a game.	Create a health bar on the screen so that the user can see and keep track of their health score throughout the game.
RS-10	As a user, I want to be able to roll the four-sided die in the program so that I don't need to have a physical die.	Allow the user to select the four-sided die to be rolled.

Mockup