Requirements

A) Elicitation of requirements

1. The provided product brief indicated the overall goals and intentions of the finished product and contained general descriptions of its desired functionality
2. Group brainstorming session was held to compare our interpretations of the brief and to raise a list of questions to address to the customer
3. In a group meeting with the customer, answers to the questions and any other customer comments were detailed in informal meeting notes.
4. Recorded info was formalised as a set of user requirements.
5. User requirements were distilled down into more specific functional and non-functional requirements.
    i. Functional requirements detailed concrete, specific functionality and capabilities of the product as related to its software implementation.
    ii. Non-functional requirements captured the performative characteristics of the completed product as a whole which could be perceived by the user or tester.
6. Resulting functional and non-functional requirements were closely evaluated for possible risks to their implementation; these were detailed within the risk register.

Research into requirement specification and presentation

- IEEE requirements engineering document[1]:
    - Provided comprehensive information on all aspects of requirement elicitation and presentation, although sections 5.1-5.2.8 and 6.1-6.6.3 were most helpful
    - Contained robust justification for the need for requirements and their role in the overall software lifecycle process
    - Informed our choice of specific language, priority language(low/medium/high), the choice of imperative tone, and justifications for these
    - Ultimately, aimed at larger, more critical projects than ours
- ENG1 lecture on requirements engineering:
    - Provided an excellent overview of the motivations for requirements engineering and a lucid overview of this process
    - Introduced the user/functional/non-functional requirements methodology which proved an excellent fit for our scope of project (versus lifecycle-based requirement methodology in the IEEE document)
    - Demonstrated requirements tables as a tool for writing down and detailing requirements

  Informed by these resources, we chose a tabular format for implementing for the requirements register, allowing us to easily add additional metadata to individual rows as extra columns and permitting a quick, comprehensive overview of the entire register. All rows were labeled with unique identifiers, permitting cross-referencing between user and

(non-)functional requirements, as well as with other sections of project documentation, such as the risk register and architecture specs.

[1] *Systems and software engineering -- Life cycle processes -- Requirements engineering*, ISO/IEC/IEEE 29148:2018(E), 2018.

B) Requirements Tables

ID	Description	Priority
UR_PLATFORM	The user shall use a standard laptop PC to play the game	High
UR_GAME_INIT	The user shall begin a new game from an initial state	High
UR_SHIP_CONTROL	The user shall control a ship sailing across the great Lake of York	High
UR_COMPETING_COLLEGES	The user shall encounter at least 3 other colleges	Medium
UR_LEARNING_CURVE	The user shall play the game without training	High
UR_GAME_DURATION	The user shall be able to complete the game within a ~5 minute timespan	High
UR_GAME_OBSERVABILITY	The game shall accomodate onlookers in the PCs surroundings	Low
UR_FRIENDLY_SHIP_ENCOUNTER	The user shall encounter friendly NPC ships	Low
UR_HOSTILE_SHIP_ENCOUNTER	The user shall encounter hostile NPC ships	Low
UR_FIRE_WEAPONS	The user shall be able to fire weapons from the ship	High
UR_BULLET_DODGE	The user shall be able to maneuver their ship to dodge fired munitions	Medium
UR_FRIENDLY_BUILDING_INTERACT	The user shall interact with friendly buildings	Low
UR_HOSTILE_BUILDING_COMBAT	The user shall engage in combat with hostile buildings	Medium
UR_HOSTILE_COLLEGE_CAPTURE	The user shall capture other colleges via combat	High
UR_EARN_PLUNDER	The user shall earn plunder	High
UR_EARN_XP	The user shall earn XP	High
UR_QUEST_PROGRESS	The user shall progress through a series of quests	Medium

ID	Description	Priority
UR_GAME_WIN	The user shall win the game through achieving an ultimate objective unlocked by the fulfilment of preceding requirements/quests	Medium
UR_GAME_LOSE	The user shall lose the game through being defeated in combat	High
UR_SHIP_COMBAT	The user should be able to engage in combat with other ships	High
UR_OBSTACLE_ENCOUNTER	The user may encounter obstacles while sailing in game	High
UR_WEATHER_ENCOUNTER	The user may encounter bad weather while sailing	High
UR_SPEND_PLUNDER	The user should be able spend the plunder earned	High
UR_POWER_UP	The user should be able to obtain power ups through either the shop or at random locations on the map.	High
UR_DFCLTY_LVL	The user should be able to choose from 3 difficulty levels (e.g. easy, normal, hard)	High
UR_GAME_SAVE	The user should be able to save the state of the game at any time and be able to resume it at a later point.	High

Functional Requirements

ID	Description	User requirement	Ris
FR_MENU_KB_INPUT	The game shall accept keyboard input for menu navigation	UR_PLATFORM	
FR_VIEWPORT_SCALING	The game shall render on a 13"-27" monitor	UR_PLATFORM	R6

ID	Description	User requirement	Ris
FR_MIN_FPS	The game shall render at a minimum of 30 FPS	UR_PLATFORM	R7, R3
FR_CROSS_PLATFORM_WIN	The game shall be playable on Windows	UR_PLATFORM	
FR_CROSS_PLATFORM_MAC	The game shall be playable on Mac OS	UR_PLATFORM	R9, R1(
FR_CROSS_PLATFORM_GNU_LINUX	The game shall be playable on GNU/Linux	UR_PLATFORM	
FR_GAME_RESET	The game shall allow restarting play from an initial configuration	UR_GAME_INIT	
FR_SHIP_KB_INPUT	The game shall accept keyboard input for ship control	UR_SHIP_CONTROL	
FR_COLLEGE_ENTITY_TRACKING	The game shall keep track of ships and buildings for a minimum of 3 distinct factions	UR_COMPETING_COLLEGES	
FR_FRIENDLY_AI	The game shall control the actions of friendly ships	UR_FRIENDLY_SHIP_ENCOUNTER	

ID	Description	User requirement	Ris
FR_HOSTILE_AI	The game shall control the actions of enemy ships	UR_HOSTILE_SHIP_ENCOUNTER	R1
FR_PLAYER_FIRE	The game shall enable the user to fire ship weapons	UR_FIRE_WEAPONS	
FR_PLAYER_AMMO	The game shall maintain the state of the user's ship armament and ammunition	UR_FIRE_WEAPONS	
FR_BULLET_TRAVEL	The game shall render the travel of a ship's fired munition	UR_BULLET_DODGE	R2
FR_PLUNDER_TRACKING	The game shall keep track of a player's plunder	UR_EARN_PLUNDER	
FR_PLUNDER_UPDATE	The game shall reward plunder on success in quests and encounters	UR_EARN_PLUNDER	
FR_XP_UPDATE	The game shall give XP with time survived and obstacles navigated	UR_EARN_XP	

ID	Description	User requirement	Ris
FR_XP_TRACKING	The game shall keep track of a player's XP	UR_EARN_XP	
FR_XP_UPDATE	The game shall give XP on successful combat encounters completed	UR_EARN_XP	
FR_QUEST_TRACKING	The game shall maintain the state of the user's progress through multiple objectives	UR_QUEST_PROGRESS	
FR_QUEST_RANDOMISE	The game shall randomise user's objectives between different playthroughs	UR_QUEST_PROGRESS	
FR_QUEST_OBJECTIVE	The game shall associate quest objectives with game entities	UR_QUEST_PROGRESS	

ID	Description	User requirement	Ris
FR_BOSS_UNLOCK_TRACKING	The game shall monitor quest progression status prior to unlocking final objective	UR_GAME_WIN	
FR_PLAYER_DEFEAT	The game shall display game stats upon player defeat	UR_GAME_LOSE	
FR_SCENARIO_FAIL	The game shall display game stats upon game over scenario completion	UR_GAME_LOSE	

Non-Functional Requirements

ID	Description	User requirement	Fit criter
NFR_SHIP_COLLISIONS	The game shall detect collisions between different ships	UR_HOSTILE_SHIP_ENCOUNTER	Distance between drawn assets <5
NFR_WORLD_COLLISIONS	The game shall detect collisions between ships and world objects	UR_COMPETING_COLLEGES	Distance between drawn assets <5
NFR_BULLET_COLLISIONS	The game shall detect collisions between game entities and fired munitions	UR_BULLET_DODGE	Distance between drawn assets <5

ID	Description	User requirement	Fit criter
NFR_USER_INPUT_LAG	The game shall be responsive to user input	UR_SHIP_CONTROL	Input lag <200ms
NFR_AI_LAG	NPC actions' responsiveness shall approximate that of player actions	UR_HOSTILE_SHIP_ENCOUNTER	AI respon time <200ms
NFR_RENDER_SMOOTHNESS	The game world shall render smoothly during player movement	UR_SHIP_CONTROL	Visual render lag <200ms
NFR_COLOURBLINDNESS	Game map and assets should be distinguishable by a colourblind person	UR_PLATFORM	Subjectiv screensh test via colourblin accessibi evaluatio app
NFR_EASE_OF_USE	The game shall be self-explainable and feature obvious controls	UR_LEARNING_CURVE	Tester mu be able to pick up a play with prior instructio
NFR_GAME_DURATION	The game shall finish within ~5 mins in a win or loss for the player	UR_GAME_DURATION	Tester mu reach the game stat screen within 4-6 mins

ID	Description	User requirement	Fit criter
NFR_LARGE_ASSETS	The game assets shall be large enough to observe from several metre's distance away on a standard laptop PC screen	UR_GAME_OBSERVABILITY	Observer standing 2 away should be able to answer questions about gameplay state