CS7CS3 Advanced Software Engineering Group Project

Project Development Plan

Project Name: *SUSTAINABLE CITY MANAGEMENT*

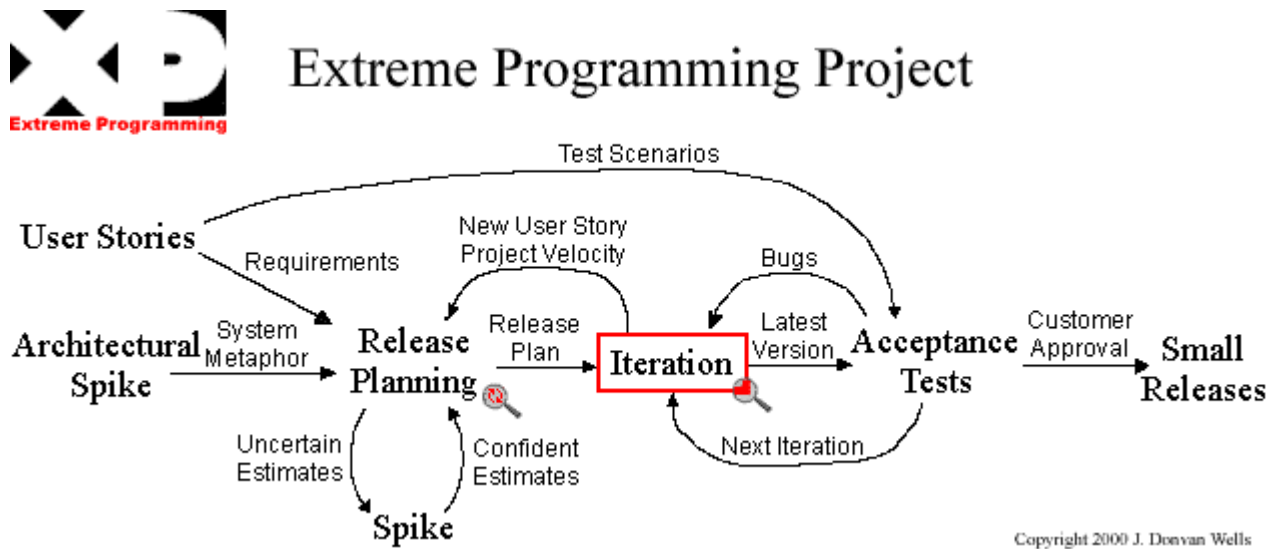**Group *5***

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Detailed Iteration Plan using eXtreme Programming approach:

The iteration plan for our project is developed using the Extreme Programming approach by creating an initial release plan. We identified the different user stories from different end-users perspectives and related them to the identified use cases. Different User stories pointing to the same functionality are logically grouped and given an identifier. This ID is used as a reference for all system releases in iteration plans. The grouping of user stories is tabulated below.

| Use Cases	User Story (For City Managers)	User Story (for the general public)	User Story ID
View station information (bike numbers/free stands) on a map of Dublin. Calculate the number of bikes already in use. (Filters for >90% full or >90% empty?)	As a City Manager, I need to view the current volume of usage of bikes so that I can regulate the flow and maintain a balance of resources in the city.	As a student, I need to view all the free bike stands nearby my university to park my bike. As a traveler, I need to see the map of all the bike stands and see the availability of bikes to plan my view around the city.	User Story 1
To stations that are spending 'too much time full or empty. (i.e. % of the day at >90% capacity, or >90% empty) Generate heat-map/flow-map for station use on the map display	As a City Manager, I need to understand the potential areas of over-or-under use of bike stations so that I can decide where to add new bike stations or remove the existing bike stations.	As part of the general public, I need to check which station remains occupied most of the time to plan my journey accordingly.	User Story 2

Suggesting bike swaps between overcapacity and under-capacity stations	As a City Manager, I need to know the current volume of usage of bikes in every station so that I can increase or decrease the resource capacity station-wise.	*(Not available to general public)*	User Story 3
View map with bus stops, heat-map of bus/bus stops locations within the city, location of buses. (For emergency situations)	As a City Manager, I need to view the current volume of usage of buses so that I can regulate the flow and maintain a balance of resources in the city.	As part of the general public, I need to see the location of all the bus stops and decide which bus to board for my journey.	User Story 4
Display environmental impact of current bus use in the city	As a city manager, I need to understand the emissions impact of buses in the city so that I can regulate pollution levels.	As a citizen, I am interested in knowing the environmental impact of transport services in my region.	User Story 5
Predict CO2 emissions caused by buses in the following days			
Display rerouting suggestions based on congestions/CO2 emissions/busy periods		*(Not available to general public)*	
View map of current Luas locations, Luas stops, and service interruptions	As a City Manager, I need to view the current volume of usage of Luas so that I can regulate the flow and maintain a balance of resources in the city.	As part of the general public, I need to see the map of all the Luas stops and timings to plan my travel for the day.	User Story 6
Display Luas electricity usage estimates	As a city manager, I need to understand the current electricity consumption pattern of Luas so that I can estimate the requirement and do the required optimization.	*(Not available to general public)*	User Story 7
Display event locations within the city and estimations of crowd size	As a city planner, I need to know about the upcoming events and estimate the audience size so that I plan	As part of the general public, I'm interested in knowing which events are happening in my city and which road would be the	User Story 8

	for necessary actions to ensure social distancing and reroute resources.	busiest around that time so I can plan my day accordingly.	
Display suggestions for increasing bus route frequency based on current events	As a city planner, I need to have suggestions for optimizing the bus routes so that I can increase the efficacy of public modes of transport	*(Not available to general public)*	User Story 9
Display maintenance events for each of the 3 transport types	As a City Manager, I need to understand the maintenance events around the city, so that I can reroute the resources optimally.	As part of the general public, I want to see which Public Transport stations and roads are under maintenance	User Story 10
MET Éireann weather warnings. Notifying of extreme weather conditions	As a City Manager, I need to know the upcoming weather extremities so that I can reallocate resources to avoid chaos.	As part of the general public, I'd like to see the weather to be able to plan my journey accordingly.	User Story 11
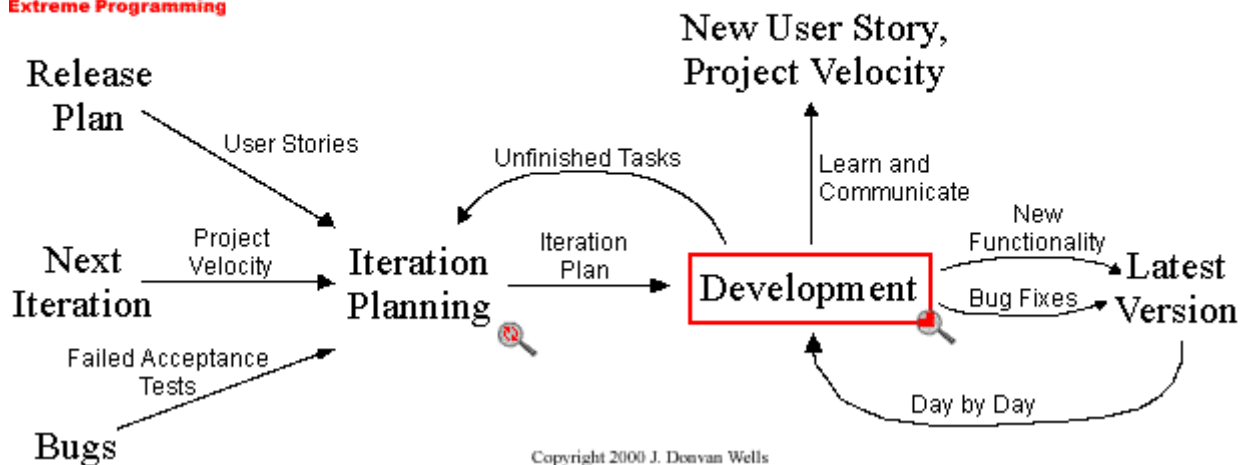
The project is planned to release using a three-step approach with each System Release containing two to three iterations. User stories are divided into each iteration based on priority. Each iteration is allocated with a time estimate and probable release date. In every iteration, the failed acceptance tests from the previous iteration are also included. The detailed release plan with acceptance tests for every set of user stories is tabulated below.

Release Plan

System release	Iteration	User Stories	Estimated Time	Release Date
System Release 1 [Buses + Events]	Iteration 1	User Story 4, User Story 5	15 Days	4th February
	Iteration 2	Failed Acceptance Tests + User Story 8, User Story 9	15 Days	22nd February
	Iteration 3	Failed Acceptance Tests + User Story 10, User Story 11	7 Days	1st March
System Release 2 [Bikes]	Iteration 4	Failed Acceptance Tests + User Story 1, User Story 2	7 Days	8th March
	Iteration 5	Failed Acceptance Tests + User Story 3	7 Days	15th March
System Release 3 [Luas]	Iteration 6	Failed Acceptance Tests + User Story 6, User Story 7	14 Days	29th March
	Iteration 7	Final Integration	7 Days	April 14th, 2022

Note: The architecture is designed in such a way that all user stories involve all the components involved in the technical architecture of the system.

Acceptance Test:

User Stories	Acceptance Test Scenario	Iteration
User Story 1	**AT1 [City Manager]:** Display all the stations with the usage of more than 75%. Pass if the data matches, fail if there are discrepancies or other issues. **AT2 [Student/Traveler]**: View the current volume of usage at Trinity Bike Station and cross-check with the live data.	Iteration 4
User Story 2	**AT1 [City Manager]:** Display all the stations with usage greater than 75% for more than 4 hours a day. Pass if the data matches, fail if there are discrepancies or other issues. **AT2 [General Public]**: View the general pattern of usage at Trinity Bike Station and cross-check with the live data. Pass if the data matches, fail if there are discrepancies or other issues.	

User Story 3	**AT1 [City Manager]:** Cross-check the suggestions to equalize the over-usage and under-usage of bikes. Pass if our suggestions are sensible, and optimize the usage, fail if they are inaccurate.	Iteration 5
User Story 4	**AT1 [City Manager]:** Cross-check the heat map showing the usage pattern of bus routes in the city. Pass if the data matches, fail if there are discrepancies or other issues.	Iteration 1
User Story 5	**AT1 [City Manager]:** Cross-check the CO2 estimate in the city and compare it with the CO2 estimate in the suburbs. Pass if estimates are sensible and fail if they are inaccurate.	
User Story 6	**AT1 [City Manager]:** Cross-check the map visualization of current usage of Luas between Sandyford and Broombridge. Pass if visualization is accurate, fail if they are inaccurate.	Iteration 6
User Story 7	**AT1 [City Manager]:** Cross-check the electricity estimate in the frequent route in the city center and compare it with the electricity estimate in the suburban. Pass if estimates are sensible and fail if they are inaccurate.	
User Story 8	**AT 1 [City Manager/General Public]:** Cross-check if the event happening in a particular part of the city is displayed in the application. Pass if the visualization is accurate and fail if it is not. **AT 2 [City Manager/General Public]:** Cross-check if the most-crowded road is visualized in the application. Pass if the visualization is accurate and fail if it is not.	Iteration 2
User Story 9	**AT 1 [City Manager]:** Check if the suggested route has more influx of people due to the event and the number of buses suggested can reduce the crowd. Pass if the suggestion works and fail if it is not feasible.	Iteration 2
User Story 10	**AT 1 [City Manager]:** Check if the application is displaying the details about an inactive road in the city. Pass if the data matches; fail if any blocked road information is missed. **AT 2 [City Manager]:** Check if the application displays details about the bikes that are sent for maintenance. Pass if data matches; fail if any inactive bike station details are not displayed. **AT 3 [City Manager]**: See if the rerouting of buses suggested by the application is feasible based on the transport availability. Pass if the number of buses Are available and the route is correct, fail if the suggestion is not practical.	Iteration 3
User Story 11	**AT 1 [City Manager/General Public]:** Verify the weather reports on a rainy day and check if the application is displaying the correct estimations. Pass if the correct details are reported and fail if they are incorrect or absent.	Iteration 3

Pair Programming Schedule:

*Note: The below structure ensures that everyone is working with everyone and on every task of the project. The task, start date, and end date can be decided as and when we do it. If additional tasks are included we can reuse the same structure again. (Task 8 ~ Task 1)

Day	Provisional Task Description	Provisional Pairs - can be changed later
Day 1	UI Development	Shubham and Ayush
		Ayush and Deeksha
	Server Development	Deeksha Yatheen
		Yatheen and Kevin
	Data Engine	Kevin and Karina
		Karina and Lokesh
	Prediction Engine	Lokesh and Kalaivani
		Kalaivani and Shubham
	Handover	
Day 2	Server Development	Deeksha and Karina
	Data Engine	Yatheen and Kevin
	Prediction Engine	Lokesh and Shubham
	UI Development	Kalaivani and Ayush
	Handover	
Day 3	Data Engine	Deeksha and Kevin
	Prediction Engine	Yatheen and Lokesh
	UI Development	Kalaivani and Shubham
	Server Development	Karina and Ayush

Handover		
Day 4	Prediction Engine	Deeksha and Lokesh
	UI Development	Yatheen and Kalaivani
	Server Development	Karina and Shubham
	Data Engine	Kevin and Ayush
Handover		
Day 5	UI Development	Deeksha and Kalaivani
	Server Development	Yatheen and Ayush
	Data Engine	Karina and Lokesh
	Prediction Engine	Kevin and Shubham
Handover		
Day 6	Server Development	Deeksha and Ayush
	Data Engine	Yatheen and Shubham
	Prediction Engine	Karina and Kalaivani
	UI Development	Kevin and Lokesh
Handover		
Day 7	Server Development	Deeksha and Shubham
	Data Engine	Yatheen and Karina

	Prediction Engine	Kevin and Kalaivani
	UI Development	Ayush and Lokesh
Handover		

Coding standards:

Framework	Reference
Flutter	https://github.com/flutter/flutter/wiki/Style-guide-for-Flutter-repo
Python - Django	https://google.github.io/styleguide/pyguide.html https://docs.djangoproject.com/en/dev/internals/contributing/writing-code/coding-style/

References:

[1] Extreme Programming. 1999. Extreme Programming: A gentle introduction. Retrieved from http://www.extremeprogramming.org/map/iteration.html

[2] Extreme Programming. 1999. Extreme Programming: A gentle introduction. Retrieved from http://www.extremeprogramming.org/map/project.html