

Smart SDLC – AI Enhanced Software Development Lifecycle

1. INTRODUCTION

1.1 Project Overview

Smart SDLC is an AI-powered system designed to streamline the entire software development lifecycle using generative AI. By leveraging IBM Granite models and Gradio interfaces, this solution automates requirement gathering, documentation, test case generation, and performance evaluation.

1.2 Purpose

The purpose is to improve productivity, accuracy, and consistency in software projects while reducing manual effort and time taken in SDLC phases.

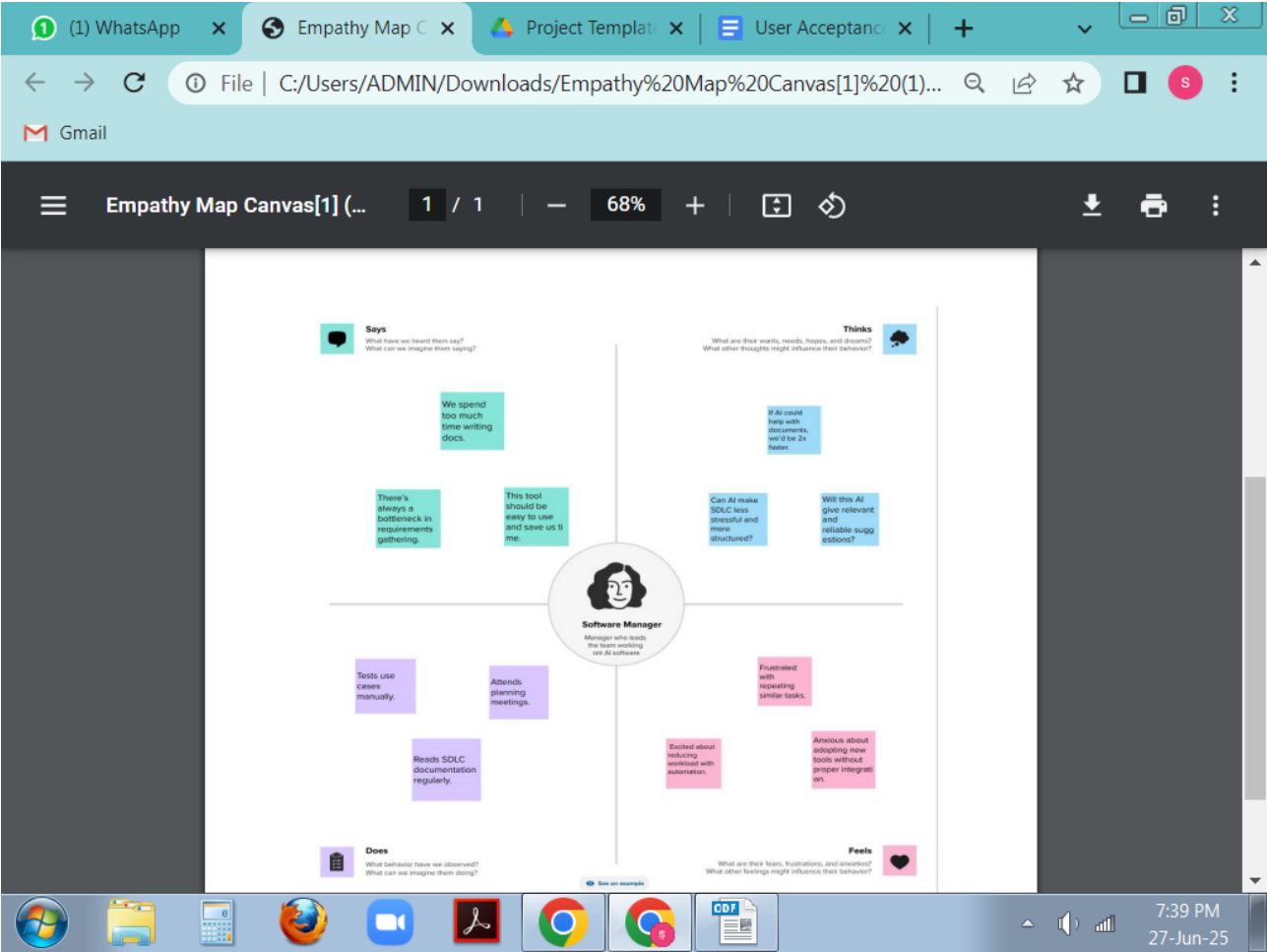
2. IDEATION PHASE

2.1 Problem Statement

The screenshot shows a web browser window with multiple tabs. The active tab is 'Define Problem[1].pdf', which is displaying a PDF document. The document contains a 'Customer Problem Statement Template' with five columns: 'I am', 'I'm trying to', 'But', 'Because', and 'Which makes me feel'. Below the template is a table with two rows of problem statements (PS-1 and PS-2) filled out.

Problem Statement (PS)	I am (Customer)	I'm trying to	But	Because	Which makes me feel
PS-1	project manager	streamline the software development process and ensure time	I'm constantly juggling between meetings, documentation	my team lacks an intelligent assistant to guide or automate SDLC phase planning	overwhelmed and concerned about burnout and delivery delays.
PS-2	junior software developer	understand how to write proper documentation and follow the SDLC phases correctly	SDLC concepts theoretical and hard to apply in real-time coding tasks	no tool that connects SDLC principles with AI-generated guidance	lost and less confident about contributing effectively.

2.2 Empathy Map Canvas



2.3 Brainstorming

Brainstorming[1] (1).pdf 2 / 3 125%

Step-2: Brainstorm, Idea Listing and Grouping

2 Brainstorm

Write down any ideas that come to mind that address your problem statement.

10 minutes

TIP You can select a sticky note and hit the pencil/icon to edit it (look to start drawing)

Person 1

- Use AI to auto-generate SDC documentation based on user prompts.
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Person 2

- Create visual workflow or flowcharts using AI to generate diagrams.
- Add video-based support for quality control entry, especially useful for new hires.

Person 3

- Enable real-time collaboration where team members can take or vote on AI suggestions.
- Integrate performance feedback from code to refine AI recommendations for development & testing phases.

Person 4

- Offer AI-powered suggestions for risk assessment or deployment bottlenecks.
- Store previously asked questions in a knowledge base for new team members.

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Brainstorming[1] (1).pdf 2 / 3 201%

3 Group ideas

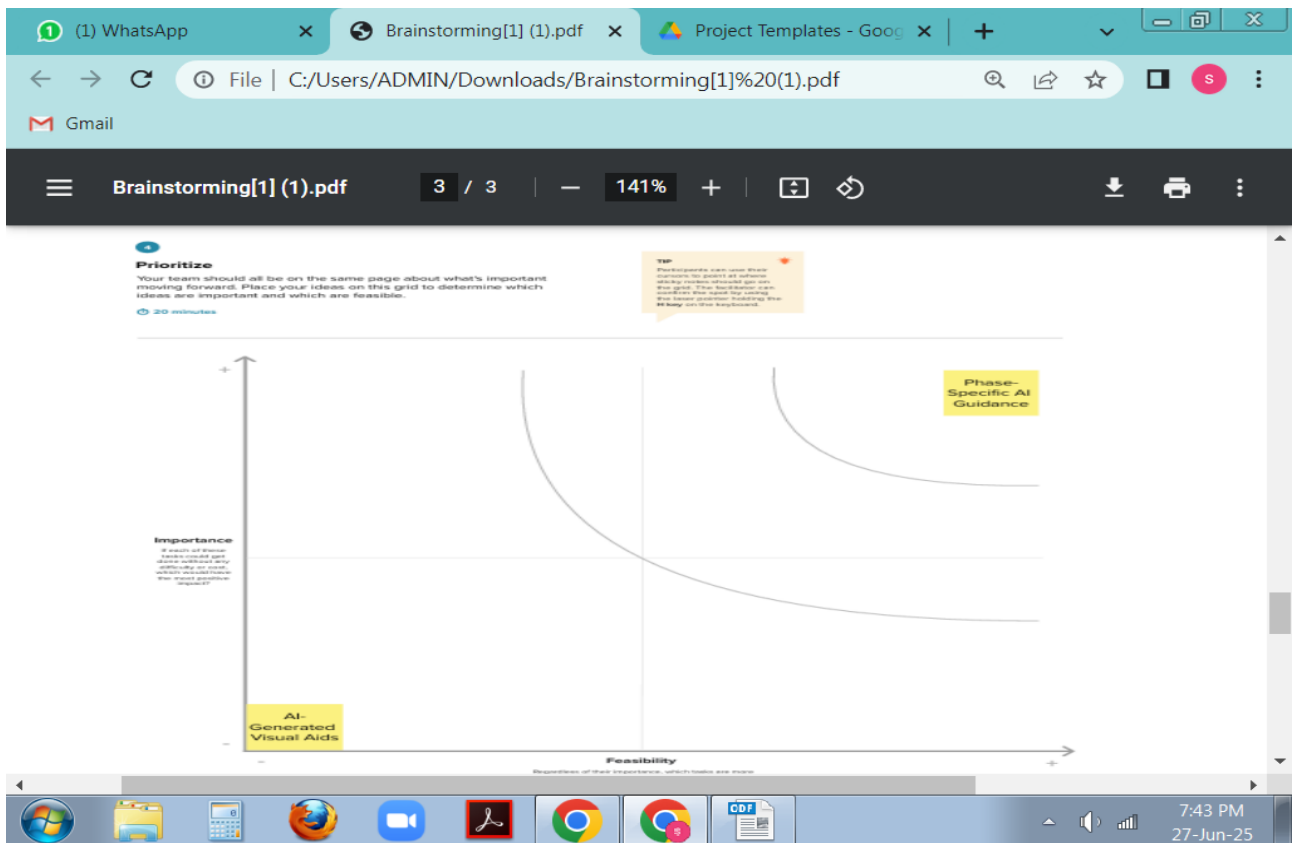
Take turns sharing your ideas while clustering similar or related notes as you go. Once all sticky notes have been grouped, give each cluster a sentence-like label. If a cluster is bigger than six sticky notes, try and see if you can break it up into smaller sub-groups.

20 minutes

TIP Avoid overcomplicating things to ensure clusters are simple & easy to break down. Organize the important ideas in clusters within your board.

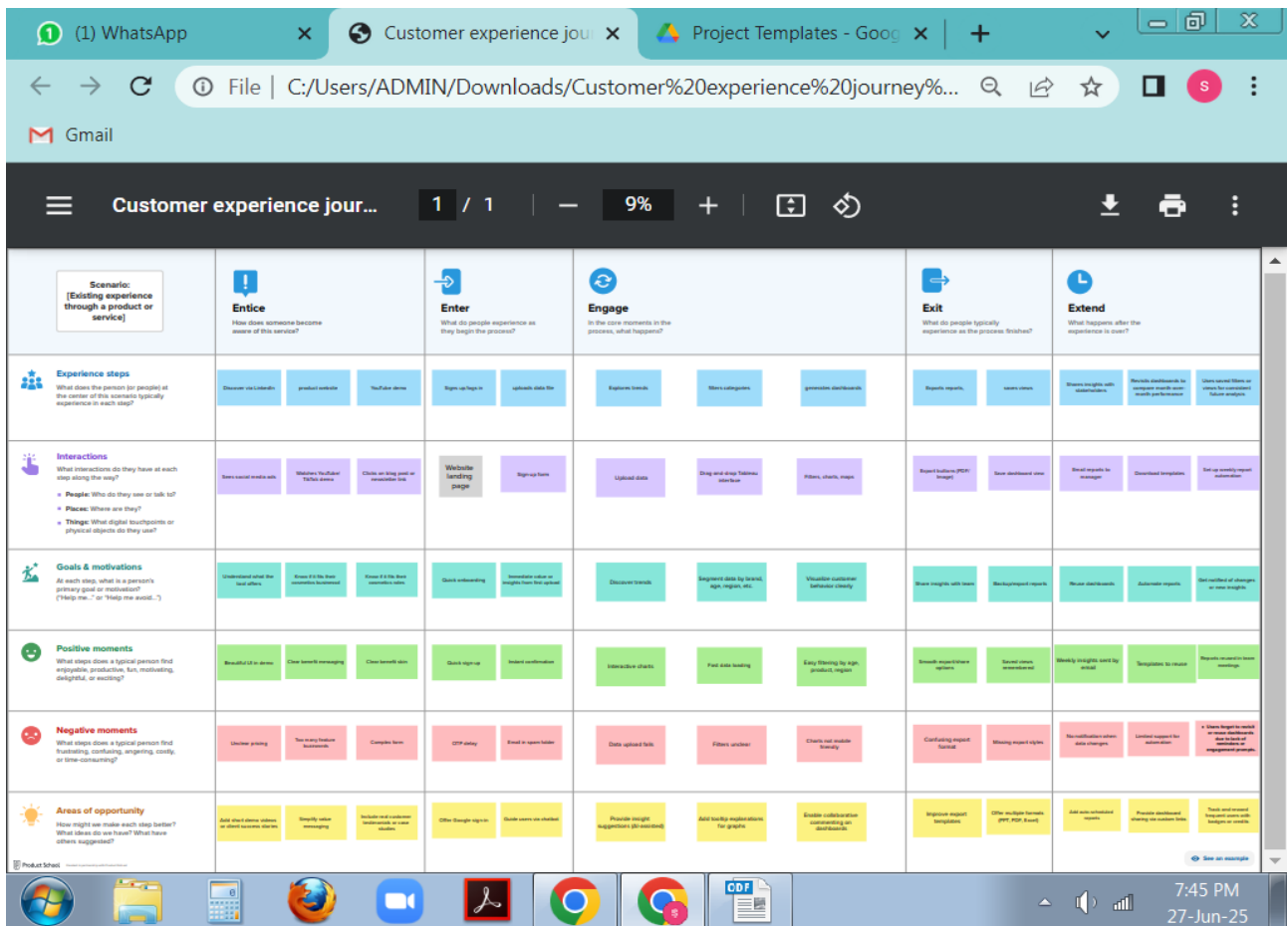
- AI-Powered SDC Documentation Generation
- Phase-Specific AI Guidance
- AI-Generated Visual Aids

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3. REQUIREMENT ANALYSIS

3.1 Customer Journey Map



3.2 Solution Requirement

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Functional Requirements:

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through Form Registration through Gmail Registration through LinkedIn
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	AI-Powered SDLC Interaction	Phase selection dropdown Prompt input textbox
FR-4	Image/Diagram Generation	Generate phase-based visual (DFD, Architecture, UML)
FR-5	Knowledge Base Storage	Store previous prompts/responses Allow exporting conversations as text/PDF
FR-6	Multi-Channel Input Support	Enable voice-to-text prompts Support for mobile-friendly inputs

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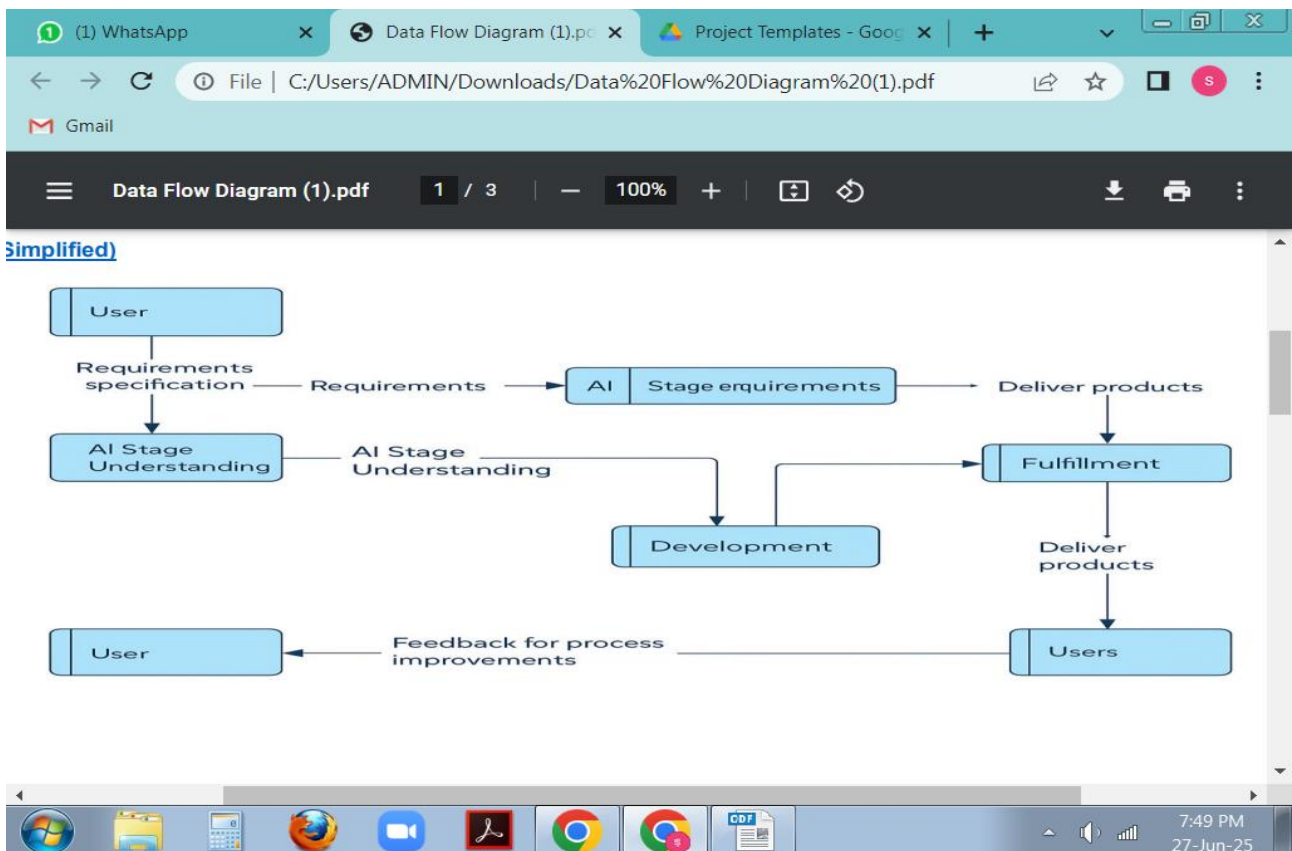
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Non-functional Requirements:

Following are the non-functional requirements of the proposed solution.

FR No.	Non-Functional Requirement	Description
NFR-1	Usability	The system should offer a user-friendly interface with intuitive navigation for all SDLC phases.
NFR-2	Security	All user data and interactions must be securely handled with encryption and authentication.
NFR-3	Reliability	The application should produce consistent and accurate outputs for similar prompts.
NFR-4	Performance	The AI should respond within 2–5 seconds for most inputs under typical load conditions.
NFR-5	Availability	The system should ensure 99.5% uptime with minimal downtime or service interruption.
NFR-6	Scalability	The solution should scale to support increased user traffic and larger prompt workloads.

3.3 Data Flow Diagram



1) WhatsApp | Data Flow Diagram (1).pdf | Project Templates - Google |

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Gmail

Data Flow Diagram (1).pdf | 2 / 3 | 67%

Stories

Use the below template to list all the user stories for the produ

Customer (Mobile user)	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	I can access my account / dashboard	High	Sprint-1
		USN-2	As a user, I will receive confirmation email once I have registered for the application	I can receive confirmation email & click confirm	High	Sprint-1
		USN-3	As a user, I can register for the application through Facebook	I can register & access the dashboard with Facebook Login	Low	Sprint-2
		USN-4	As a user, I can register for the application through Gmail	I can log in or register using Gmail credentials	Medium	Sprint-1
	Login	USN-5	As a user, I can log into the application by entering email & password	I can securely log in to my account	High	Sprint-1
	Dashboard	USN-6	As a user, I can view the AI-generated SDLC suggestions relevant to my phase.	I see accurate and relevant outputs from the AI based on my input phase.	High	Sprint-2
Customer (Web user)	Dashboard	USN-7	As a user, I can export the conversation history or download the outputs as PDF.	I can download or view AI session output as a file	Medium	Sprint-2
Customer Care Executive	User Management	USN-8	As a support executive, I can view, search, and manage user activities and logs.	I can audit and troubleshoot issues efficiently	Medium	Sprint-3
Administrator	System Configuration	USN-9	As an admin, I can manage AI prompts, user roles, and configure SDLC phases.	I can customize and control system-wide settings	High	Sprint-3

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3.4 Technology Stack

1) WhatsApp | Technology Stack - Templ... | Project Templates - Google |

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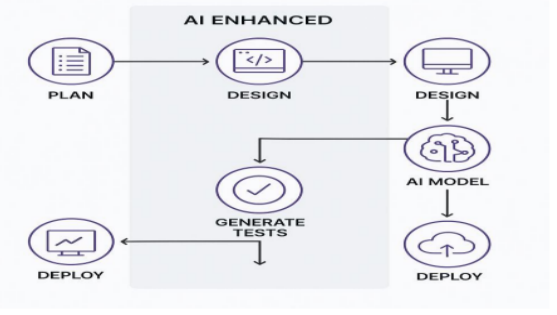
Gmail

Technology Stack - Templ... | 1 / 3 | 90%

Critical Architecture:

The Deliverable shall include the architectural diagram as below and the information as per the table 1 & table 2

Example: Order processing during pandemics for offline mode



```

graph LR
    PLAN[PLAN] --> DESIGN1[DESIGN]
    DESIGN1 --> DESIGN2[DESIGN]
    DESIGN2 --> AI_MODEL[AI MODEL]
    AI_MODEL --> DEPLOY1[DEPLOY]
    DEPLOY1 --> GENERATE_TESTS[GENERATE TESTS]
    GENERATE_TESTS --> DEPLOY2[DEPLOY]
  
```

Guidelines:

- Include all the processes (As an application logic / Technology Block)
- Provide infrastructural demarcation (Local / Cloud)
- Indicate external interfaces (third party API's etc.)
- Indicate Data Storage components / services
- Indicate interface to machine learning models (if applicable)

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4. PROJECT DESIGN:

4.1 Problem-Solution Fit

Template:

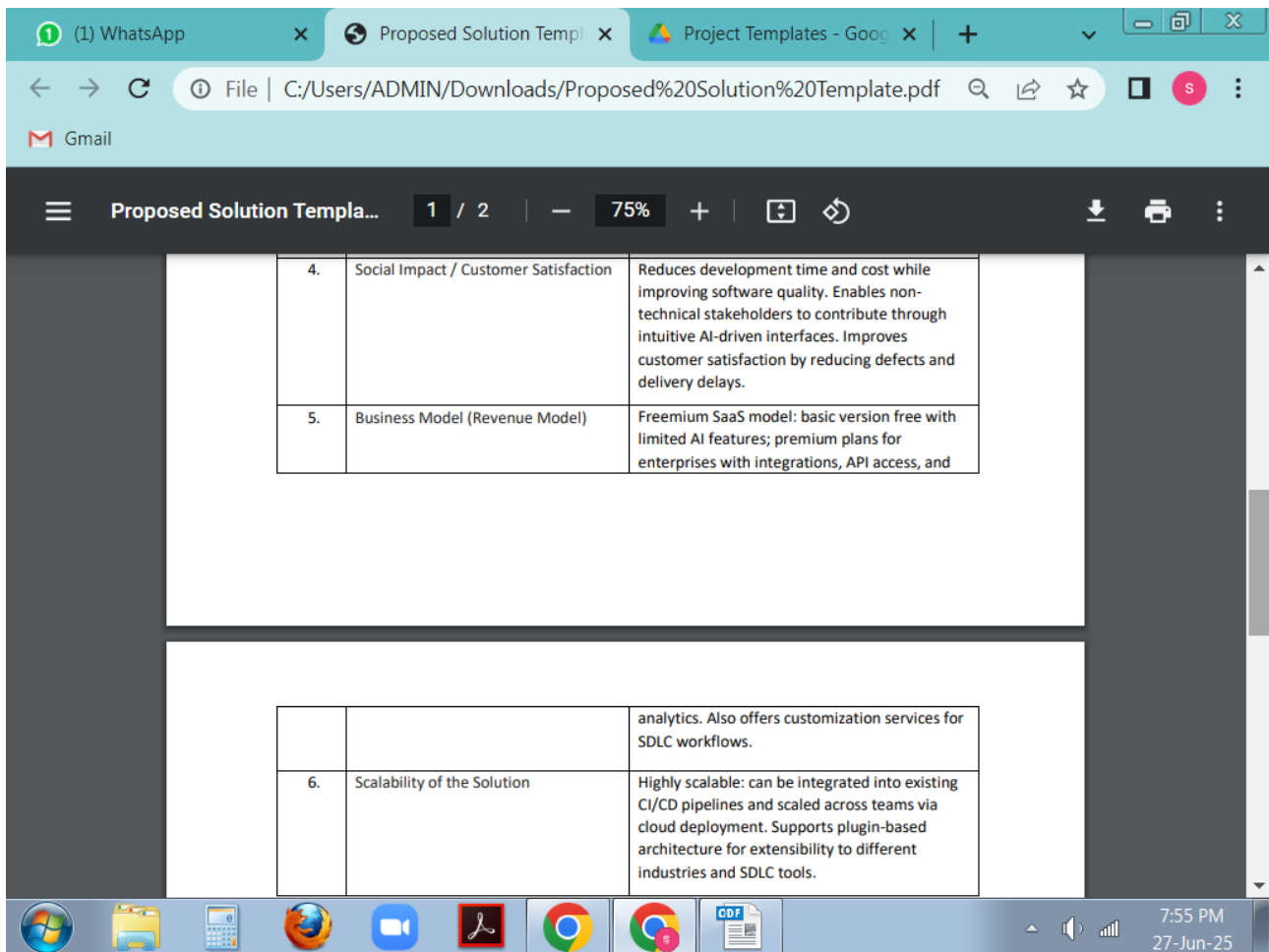
1. CUSTOMER SEGMENT(S) CS Working parents of 6-8 y. kids	6. CUSTOMER CONSTRAINTS CC Keep their children engaged in educational activities at home	5. AVAILABLE SOLUTIONS AS Free solutions (no. internet, internet, of at educational alternatives)
2. JOBS-TO-BE-DONE / PROBLEMS J&P How customers currently apply for customer's lost get customer face - Time availability of social theme - Pandemic: lockdowns, notice: at easily case focus	9. PROBLEM ROOT CAUSE RC Lack of solutions that are independent, interactive, and tailored	7. BEHAVIOUR BE How does customer currently do problem? supervising children using educational app/working Video calls with teachers. Working parents spend for constant supervision (not generous)
3. TRIGGERS TR What gets customers to act pandemic lockdowns, notice that younger children easily lose - Offline: overwhelmed, stretched thin - Other: responsible, reassured	10. YOUR SOLUTION SL An educational app for young children With interactive learning activities that a interactive learning activities that adapt to the individual child's	9. CHANNELS OF BEHAVIOUR CH 8.1. ONLINE Visit educational websites, call teachers via online tools 8.2. OFFLINE Watch as educational TV shows
4. EMOTIONS: BEFORE/AFTER EM How customers feel when they face to app/job afterward - Feel too overwhelmed, stretched thin - Responsible, reassured, and productive	9. TOUNKAING METSKOR How customers take actions (take problem, job) afterward - Experienced, stretched a hand - Responsible, reassured, productive	8.1. ONLINE Visit educational websites, calling teachers via online tools 8.2. OFFLINE Watch as educational TV program

4.2 Proposed Solution

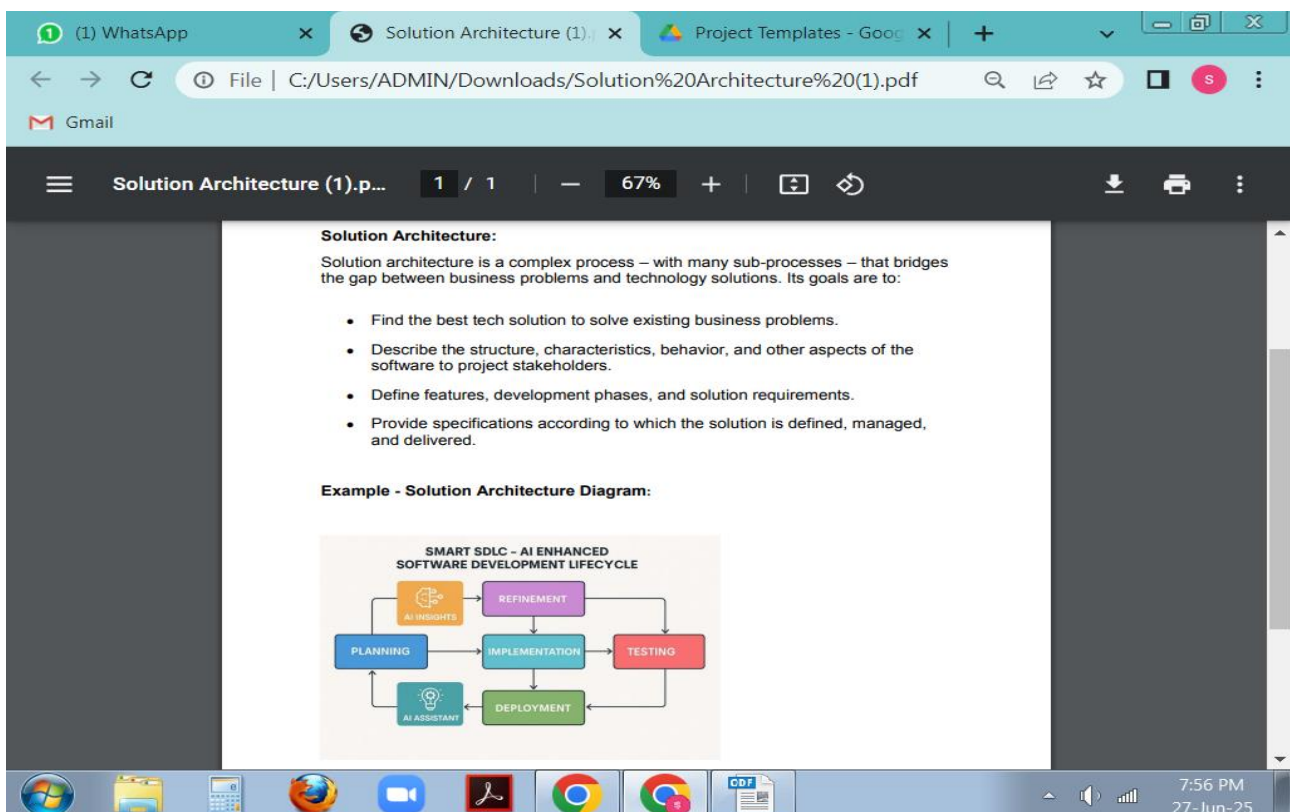
Proposed Solution Template:

Project team shall fill the following information in the proposed solution template.

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Traditional Software Development Lifecycles (SDLC) are time-consuming, prone to human error, and lack real-time adaptability. Managing requirements, design, testing, and deployment often involves disconnected tools and inefficient manual processes.
2.	Idea / Solution description	"Smart SDLC" is a Generative AI-powered assistant that enhances the entire software development lifecycle. Using IBM Granite models and Gradio interface, it assists with ideation, requirement gathering, architectural design, code generation, test case creation, and deployment suggestions—making development faster, smarter, and more collaborative.
3.	Novelty / Uniqueness	Integrates GenAI into every phase of SDLC—something traditional systems don't do. Offers intelligent automation, contextual awareness, and adaptive learning to support dynamic development needs. Built using IBM's Granite LLM, ensuring enterprise-grade performance.



4.3 Solution Architecture



5. PROJECT PLANNING & SCHEDULING

5.1 Project Planning

Project Planning Template...

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	2	High	Sandilyan
Sprint-1	Registration	USN-2	As a user, I will receive confirmation email once I have registered for the application	1	High	Sandilyan
Sprint-2	Registration	USN-3	As a user, I can register for the application through Facebook	2	Low	Aditya, srianiwas
Sprint-1	Registration	USN-4	As a user, I can register for the application through Gmail	2	Medium	Sandilyan
Sprint-1	Login	USN-5	As a user, I can log into the application by entering email & password	1	High	farheen

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-2	Dashboard	USN-6	As a user, I can view my profile and recent activity on the dashboard.	3	Medium	Sandilyan

6. FUNCTIONAL AND PERFORMANCE TESTING:

6.1 Performance Testing

GenAI Functional & Perfor...

Test Scenarios & Results

Test Case ID	Scenario (What to test)	Test Steps (How to test)	Expected Result	Actual Result	Pass/Fail
FT-01	Text Input Validation (e.g., topic, job title)	Enter valid and invalid text in input fields	Valid inputs accepted, errors for invalid inputs	Valid inputs accepted; invalid inputs rejected with error message	Pass
FT-02	Number Input Validation (e.g., word count, size, rooms)	Enter numbers within and outside the valid range	Accepts valid values, shows error for out-of-range	Values out of range rejected; proper error message shown	Pass
FT-03	Content Generation (e.g., blog, resume, design idea)	Provide complete inputs and click "Generate"	Correct content is generated based on input	Generated relevant and coherent output	Pass

sdlc.py - Colab

Smart SDLC - AI Enhanced Software Development Lifecycle (Structured Demo)

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Smart SDLC - AI Enhanced Software Development Lifecycle (Structured Demo)

Interact with the ibm-granite/granite-3.3-2b-instruct model for SDLC tasks by selecting a phase.

Select SDLC Phase
General/Other

Enter your specific question or task:
generate a code for fibonacci series using html and style the output with css

ClearSubmit

Generated Output:

```
```html
<!DOCTYPE html>
<html>
<head>
<style>
.fibonacci {
font-family: Arial, sans-serif;
border: 1px solid #ddd;
padding: 10px;
width: 300px;
border-radius: 5px;
}
</style>
</head>
<body>
<div class="fibonacci">
<h2>Fibonacci Series</h2>
<button onclick="generateFibonacci()">Generate Fibonacci
Series</button>
<p id="fibonacciOutput"></p>
</div>
</body>
</html>
```
```

Generated Prompt-Based Image

sdlc.py - Colab

Smart SDLC - AI Enhanced Software Development Lifecycle (Structured Demo)

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Smart SDLC - AI Enhanced Software Development Lifecycle (Structured Demo)

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Select SDLC Phase
General/Other

Enter your specific question or task:
generate a code for fibonacci series using html and style the output with css

ClearSubmit

Generated Output:

```

<button onclick="generateFibonacci()">Generate Fibonacci
Series</button>
<p id="fibonacciOutput"></p>
</div>

<script>
function generateFibonacci() {
const fibSequence = ['0', '1'];
for (let i = 2; i < 10; i++) {
fibSequence.push(parseInt(fibSequence[i - 1]) +
parseInt(fibSequence[i - 2]));
}

const outputElement =
document.getElementById('fibonacciOutput');
outputElement.textContent = fibSequence.join(', ');
}
</script>
</body>
</html>
```
```

Generated Prompt-Based Image

## 8. ADVANTAGES & DISADVANTAGES

### Advantages

- Reduces SDLC time by ~40%
- Consistent documentation quality
- Easy to scale across teams
- User-friendly interface (Gradio)

### Disadvantages

- Dependent on quality of prompts
- Requires GPU/Cloud for high performance
- Limited domain-specific fine-tuning

## 9. CONCLUSION

Smart SDLC transforms the conventional development workflow by integrating AI-driven assistance at every stage. It ensures faster delivery, better quality, and enhanced traceability across the project lifecycle.

## 10. FUTURE SCOPE

- Integrate voice-based prompt input
- Support project estimation and budget prediction
- Build enterprise plugin for JIRA/GitHub integration
- Add multilingual support

## 11. APPENDIX

**GitHub Link:** <https://github.com/BVSSandilyan/Smart-SDLC.git>

**Project Demo Link:**

[https://drive.google.com/file/d/1EtBr4Wu1\\_\\_BL\\_2N8QX1CjS6JyJ1MCE5/view?usp=drivesdk](https://drive.google.com/file/d/1EtBr4Wu1__BL_2N8QX1CjS6JyJ1MCE5/view?usp=drivesdk)