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**Test Plan, Test Design Specifications and Test Cases**  
Version 1

**CENG 408**

Innovative System Design and Development II

**BelsisMIS-Intelligent-Customer-Support-Assistant-BICSA**

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## 1. INTRODUCTION

### 1.1 Version Control

Version No	Description of Changes	Date
1.0	Initial version of the test plan.	March 24, 2025

### 1.2 Overview

This document outlines the testing strategy for the AI-powered chatbot developed using the OpenAI Assistant model. The chatbot is designed to respond to user prompts by referencing a set of HTML-based end-user documents, which serve as its primary knowledge base. The test plan aims to ensure that the chatbot accurately retrieves and presents information from this knowledge base in a coherent and contextually appropriate manner.

### 1.3 Scope

This test plan applies to all components of the chatbot that interact with the knowledge base [1], including:

- Prompt understanding
- Knowledge base document parsing
- Response generation
- Context retention within a session
- Response traceability to HTML content

It includes both manual and automated test cases, test design specifications, and validation strategies to ensure the chatbot performs correctly under various scenarios.

### 1.4 Terminology

Acronym	Definition
KB	Knowledge Base
HTML	HyperText Markup Language
TC	Test Case
AI	Artificial Intelligence
NL	Natural Language

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## **2. FEATURES TO BE TESTED**

### **2.1 Prompt Understanding (PU)**

The chatbot should be able to parse and understand the intent of user input using natural language processing (NLP) techniques.

### **2.2 Knowledge Retrieval (KR)**

The chatbot should extract relevant information from the uploaded HTML documents (knowledge base) based on the user's query.

### **2.3 Response Generation (RG)**

The chatbot should provide human-like, coherent, and accurate responses grounded in the knowledge base content.

### **2.4 Source Reference Inclusion (SR)**

The chatbot should reference specific sections of the knowledge base (e.g., using anchor tags or headings) to justify its response.

### **2.5 Session Context Management (SCM)**

The chatbot should maintain context within a session and provide follow-up answers based on previous interactions.

## **3. FEATURES NOT TO BE TESTED**

- External API integrations (not part of current implementation)
- User Login (not part of current implementation)
- Multilingual support (limited to Turkish for this phase)

## **4. ITEM PASS/FAIL CRITERIA**

A test passes if the chatbot provides an accurate, relevant, and traceable response based on the knowledge base content.

A test fails if:

- The chatbot gives irrelevant or hallucinated content
- No citation/reference to HTML document is included
- The prompt is misunderstood

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## **4.1 Exit Criteria**

- 100% of the test cases executed
- At least 95% test case pass rate
- All high and medium priority test cases must pass

## **5. REFERENCES**

[1] Ali Emrehan Selvili, Ahmet Selçuk Özdil, Ege Beçin, Yusuf Tuna Üner, Mehmet Efe Kaya, *Software Requirements Specification (SRS) for Level-0 Support Chatbot for BelsisMIS*, Çankaya University, March 2025.

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## 6. TEST DESIGN SPECIFICATIONS

### 6.1 Prompt Understanding (PU)

#### 6.1.1 Subfeatures to be tested

- **PU.INT** – Intent Detection: The chatbot correctly identifies the user’s goal or information need.
- **PU.ENT** – Entity Recognition: The chatbot detects and isolates important entities within the input prompt.

#### 6.1.2 Test Cases

Here list all the related test cases for this feature:

TC ID	Requirements	Priority	Scenario Description
PU.INT.01	3.1.4.1 – User Inquiry Resolution [1]	H	User asks a question directly based on a heading in the KB
PU.INT.02	3.1.4.1 – User Inquiry Resolution [1]	H	User asks an abstract or vague question to see if chatbot guesses intent
PU.ENT.01	3.1.4.3 – AI-Based Text Response [1]	M	User includes multiple entities; chatbot should resolve them correctly

### 6.2 Knowledge Retrieval (KR)

#### 6.2.1 Subfeatures to be tested

**KR.HDR** – Heading-Based Retrieval: Retrieve based on HTML headings

**KR.SEQ** – Sequential Scanning: Scan full document for matching content beyond headers.

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## 6.2.2 Test Cases

Here list all the related test cases for this feature:

TC ID	Requirements	Priority	Scenario Description
KR.HDR.0 1	3.1.4.5 – Step-by-Step Guidance [1]	H	Ask a question that maps directly to an HTML heading
KR.SEQ.0 1	3.1.4.5 – Step-by-Step Guidance [1]	M	Ask a question that requires scanning paragraph text

## 6.3 Response Generation (RG)

### 6.3.1 Subfeatures to be tested

- **RG.COH** – Coherent Response: Response must be grammatically correct and readable.
- **RG.COMP** – Complete Answer: Covers all parts of a multi-part question.

### 6.3.2 Test Cases

Here list all the related test cases for this feature:

TC ID	Requirements	Priority	Scenario Description
RG.COH.0 1	3.1.4.3 – AI-Based Text Response [1]	H	Provide a prompt and evaluate the linguistic quality of the output
RG.COMP. 01	3.1.4.3 – AI-Based Text Response [1]	M	Ask a two-part question; chatbot should answer both parts clearly



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## 6.4 Source Reference Inclusion (SR)

### 6.4.1 Subfeatures to be tested

- **SR.INL** – Inline References: Include direct reference (e.g., “As described under section 4.1”).

### 6.4.2 Test Cases

Here list all the related test cases for this feature:

TC ID	Requirements	Priority	Scenario Description
SR.INL.01	3.1.4.5 [1]	H	Answer includes inline mention of section or heading
SR.INL.02	3.1.4.5 [1]	M	Chatbot references two or more relevant HTML sections in a single response

## 6.5 Session Context Management (SCM)

### 6.5.1 Subfeatures to be tested

- **SCM.FUP** – Follow-Up Prompt Resolution: Chatbot retains context of previous message.
- **SCM.MUL** – Multi-turn Sessions: Handles 3+ interactions with consistent context.

### 6.5.2 Test Cases

Here list all the related test cases for this feature:

SCM.FUP. 01	3.1.4.5 – Step-by-Step Guidance [1]	H	Ask follow-up question using pronouns or ellipsis
SCM.MUL. 01	3.1.4.5 – Step-by-Step Guidance [1]	M	Conduct a 3-turn conversation and check for context retention

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## 7. Detailed Test Cases

### 7.1 PU.INT.01 — Understand Direct Prompt with Clear Intent

<b>TC_ID</b>	PU.INT.01
<b>Purpose</b>	Test if the chatbot can understand a direct, clearly-intentioned question
<b>Requirements</b>	3.1.4.1
<b>Priority</b>	High.
<b>Estimated Time Needed</b>	3 Minutes
<b>Dependency</b>	Knowledge base must be loaded with HTML docs
<b>Setup</b>	Load an HTML file that contains a section titled "How to log in to the system"
<b>Procedure</b>	[A01] User enters the prompt: "How do I log in to the system?"
	[V01] Chatbot analyzes the input and matches it to the relevant HTML section
	[V02] Chatbot responds with accurate login steps
<b>Cleanup</b>	None

### 7.1 PU.INT.02 — Handle Vague or Abstract Prompt

<b>TC_ID</b>	PU.INT.02
<b>Purpose</b>	Test if chatbot can infer intent from vague input
<b>Requirements</b>	3.1.4.1
<b>Priority</b>	High.
<b>Estimated Time Needed</b>	4 Minutes
<b>Dependency</b>	None
<b>Setup</b>	HTML content loaded with topic coverage across modules
<b>Procedure</b>	[A01] User enters the prompt: "I'm having trouble with reports."
	[V01] Chatbot infers the user is referring to "report generation"
	[V02] Chatbot provides appropriate guidance from KB
<b>Cleanup</b>	None

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## 7.2 PU.ENT.01 — Entity Recognition with Multiple Concepts

<b>TC_ID</b>	PU.ENT.01
<b>Purpose</b>	Test whether the chatbot can resolve multiple entities
<b>Requirements</b>	3.1.4.3
<b>Priority</b>	Medium.
<b>Estimated Time Needed</b>	5 Minutes
<b>Dependency</b>	None
<b>Setup</b>	Load HTML doc with sections on "Password Reset" and "Support"
<b>Procedure</b>	[A01] User enters: "Can I reset my password and contact support?"
	[V01] Chatbot extracts both entities: password reset and support
	[V02] Chatbot provides responses for both topics
<b>Cleanup</b>	None

## 7.3 KR.HDR.01 — Match Prompt to HTML Heading

<b>TC_ID</b>	KR.HDR.01
<b>Purpose</b>	Test heading-based retrieval
<b>Requirements</b>	3.1.4.5
<b>Priority</b>	High.
<b>Estimated Time Needed</b>	3 Minutes
<b>Dependency</b>	None
<b>Setup</b>	HTML contains <h2>How to upload a document</h2>
<b>Procedure</b>	[A01] User enters: "How can I upload documents?"
	[V01] Chatbot locates heading in KB
	[V02] Chatbot summarizes and responds based on that section
<b>Cleanup</b>	None

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## 7.4 KR.SEQ.01 — Sequential Scanning Retrieval

<b>TC_ID</b>	KR.SEQ.02
<b>Purpose</b>	Test retrieval from paragraph-level, not heading-based
<b>Requirements</b>	3.1.4.5
<b>Priority</b>	Medium.
<b>Estimated Time Needed</b>	3 Minutes
<b>Dependency</b>	None
<b>Setup</b>	HTML document contains embedded paragraph on export limits
<b>Procedure</b>	[A01] User asks: "Is there a size limit when exporting files?"
	[V01] Chatbot searches non-header content
	[V02] Responds with info found in paragraph text
<b>Cleanup</b>	None

## 7.5 RG.CO.H.01 — Generate Coherent Response

<b>TC_ID</b>	RG.CO.H.01
<b>Purpose</b>	Ensure chatbot's reply is grammatically correct and readable
<b>Requirements</b>	3.1.4.3
<b>Priority</b>	High.
<b>Estimated Time Needed</b>	2 Minutes
<b>Dependency</b>	None
<b>Setup</b>	Knowledge base loaded
<b>Procedure</b>	[A01] User enters: "What does the red button do?"
	[V01] Chatbot analyzes intent and locates related info
	[V02] Chatbot responds in full, coherent sentences
<b>Cleanup</b>	None

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## 7.6 RG.COMP.01 — Multi-Part Answer Completion

<b>TC_ID</b>	RG.CO.H.01
<b>Purpose</b>	Ensure chatbot handles multi-part queries completely
<b>Requirements</b>	3.1.4.3
<b>Priority</b>	Medium.
<b>Estimated Time Needed</b>	3 Minutes
<b>Dependency</b>	None
<b>Setup</b>	HTML has info on password reset and email change
<b>Procedure</b>	[A01] User asks: "How do I reset my password and change my email?"
	[V01] Chatbot parses both tasks
	[V02] Provides responses to both in one message
<b>Cleanup</b>	None

## 7.7 SR.INL.01 — Inline Reference in Response

<b>TC_ID</b>	SR.INL.01
<b>Purpose</b>	Validate inline reference to a section
<b>Requirements</b>	3.1.4.5
<b>Priority</b>	High.
<b>Estimated Time Needed</b>	3 Minutes
<b>Dependency</b>	None
<b>Setup</b>	HTML contains section "Exporting Reports"
<b>Procedure</b>	[A01] User enters: "How can I export reports?"
	[V01] Chatbot finds relevant section
	[V02] Chatbot includes phrase like "As described in the 'Exporting Reports' section..."
<b>Cleanup</b>	None

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## 7.7 SR.INL.02 — Inline Reference for Multiple Sections

<b>TC_ID</b>	SR.INL.02
<b>Purpose</b>	Reference two HTML sections in one response
<b>Requirements</b>	3.1.4.5
<b>Priority</b>	Medium
<b>Estimated Time Needed</b>	3 Minutes
<b>Dependency</b>	None
<b>Setup</b>	HTML contains "Data Export" and "Email Reports" sections
<b>Procedure</b>	[A01] User enters: "How can I export reports?"
	[V01] Chatbot finds relevant section
	[V02] Chatbot includes phrase like “As described in the 'Exporting Reports' section...”
<b>Cleanup</b>	None

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## 7.8 SCM.FUP.01 — Handle Follow-Up Prompt

<b>TC_ID</b>	SCM.FUP.01
<b>Purpose</b>	Test context management with follow-up prompts
<b>Requirements</b>	3.1.4.5
<b>Priority</b>	High.
<b>Estimated Time Needed</b>	4 Minutes
<b>Dependency</b>	None
<b>Setup</b>	HTML includes user profile and password management
<b>Procedure</b>	[A01] User enters: "How do I change my email?"
	[V01] Chatbot responds with correct steps
	[A02] User follows with: "What if I forgot my password?"
	[V02] Chatbot understands context and provides password reset steps
<b>Cleanup</b>	None

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## 7.9 SCM.MUL.01 — Multi-Turn Conversation with Context

<b>TC_ID</b>	SCM.FUP.02
<b>Purpose</b>	Verify chatbot retains context for multiple exchanges
<b>Requirements</b>	3.1.4.5
<b>Priority</b>	Medium
<b>Estimated Time Needed</b>	4 Minutes
<b>Dependency</b>	None
<b>Setup</b>	Simulate 3-question user session
<b>Procedure</b>	[A01] User: "How do I create a report?"
	[V01] Chatbot replies
	[A02] User: "How can I export it?"
	[V02] Chatbot continues from same context
	[A03] User: "Can I email it too?"
	[V03] Chatbot delivers cohesive answer integrating all 3 prompts
<b>Cleanup</b>	None