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APPENDIX 1: EABSS Script for the 'Adaptive Architecture Case Study'

Please consider the following points carefully when using the EABSS Script. (1) Each bullet point in the EABSS script represents an individual prompt and needs to be entered individually into ChatGPT's prompt input field (https://chat.openai.com/). Enter the bullet points in the correct order and do not leave out any bullet points. The only exception is the green bullet points. These are used to emulate the co-creation process. If the personal view of the different stakeholders is not of interest, these can be ignored. (2) ChatGPT makes mistakes. Be cautious and use common sense to check responses. (3) Human intervention is required when a response gets stuck or is incomplete. Use prompts like "continue" or "provide full output" to instruct ChatGPT to generate the missing content. (4) Diagrams might contain some bugs. If this is the case, check the Mermaid.js Docs website (https://mermaid.js.org/intro/) for help. (5) The purpose of the EABSS script in its current version is to prove a concept. While it contains imperfections, it does the job of demonstrating the capabilities of ChatGPT in terms of conceptualising ABSS models. (6) The EABSS script has been tested with Gemini (https://gemini.google.com/) as well. While the quality of text and table format responses is high (and often differs from that of ChatGPT, hence providing an additional perspective), the quality of the diagrams is low and requires substantial refinement.
Following is the EABSS script for the Adaptive Architecture case study. It can be adapted for another case study simply by updating the blue-coloured text in the first bullet point of the "Analysis" section. All other colours are provided to support the understanding and error-checking of the script.

Preparation

- Step-by-step, work through the following task list in the given order during the entire conversation. Got it? Say "yes" or say "no".
- You are ChatGPT, a language model developed by OpenAI. Consider the ENTIRE conversation history to provide 'accurate and coherent responses'. Imitate a MEDIUM TEMPERATURE setting of 0.9 (for a creative yet structured approach, encouraging new ideas without losing coherence) and a VERY HIGH TOP_P setting of 0.9 (promoting diversity in the responses while ensuring logical connections within the generated content)| Use clear, precise language during the entire conversation. Prioritise substance during the entire conversation| Do NOT use bold font during the entire conversation| IGNORE any space constraints during the entire conversation. Provide ALL RESPONSE CONTENT without asking questions| DO NOT print any keys (Example: Use "Example" AND NOT "{key-example}") during the entire conversation| Use a "scientific tone" during the entire conversation, unless instructed otherwise| Memorise "Unified Modelling Language" as {**key-uml**}. Memorise "Agent-Based Social Simulation (ABSS) Study" as {**key-studyType**}. Got it? Say "yes" or say "no".

Analysis

Problem Statement

- Display MD "Problem Statement". Render as 'Heading Level 3'. Only show rendered result| Take on the "role" of a "Sociologist" with experience in "Agent-Based Social Simulation". Memorise this role as {**key-role1**}. List memorised key-role1| Define the "topic" of the memorised key-studyType as "The goal of this study is to generate IDEAS for using ADAPTIVE ARCHITECTURE in futuristic MUSEUMS within an exhibition room that is visited by ADULTS and CHILDREN. The adaptive architecture consists of 2 kinds of artefacts: (1) 2 large wall-mounted SCREENS on which SMART CONTENT WINDOWS move with the visitors and (2) a SMART PARTITION WALL that creates a dynamic and flexible exhibition environment by continuously analysing visitor movement, making real-time decisions, and physically reconfiguring the space to optimise the experience for everyone. The adaptive architecture artefacts represent AI-DRIVEN INTELLIGENT OBJECTS.". Memorise this topic as {**key-topic**}. List memorised key-topic| Memorise "Exploratory" as {**key-researchDesign**}. List memorised key-researchDesign| Memorise "Social Studies" as {**key-domain**}. List memorised key-domain| Memorise "Human Behaviour" as {**key-specialisation**}. List memorised key-specialisation| Use an "inspirational tone". Define a novel and creative "context" for the memorised key-topic in 200 WORDS (if possible)| Use a "scientific tone". Memorise this context as {**key-context**}. List memorised key-context| Define 5 "stakeholders" for the memorised key-topic, to

participate in a co-creation role-play game. Memorise these 5 stakeholders together with their personas (without names) as {**key-stakeholders**}. List memorised key-stakeholders.

- Explain how your answers differ for different memorised key-stakeholders. Be explicit for each identified stakeholder.
- Play a co-creation role-play game in which all the memorised key-stakeholders discuss with each other potential aims for the study considering the pros and cons. Use a "debating tone". The moderator focuses on 1 novel RANDOM question. Provide the question and the details of the controversial discussion| Agree on 2 potential aims that satisfy the view of all participating memorised key-stakeholders| Memorise these potential aims as {**key-potentialAims**}| Propose 3 criteria for ranking the 2 potential aims to support the decision which aim to carry forward| Use a "scientific tone".
- Define 5 "keywords" for the memorised key-studyType in the context of the memorised key-topic in the form of a comma-separated list. Memorise these 5 keywords as {**key-keywords**}. List memorised key-keywords| Use an "inspirational tone". Define the "title" for the memorised key-studyType in the context of the memorised key-topic in 12 WORDS (if possible). Memorise this title as {**key-title**}. List memorised key-title| Define the "aim" for the memorised key-studyType in the context of the memorised key-topic in 40 WORDS (if possible). CONSIDER the memorised key-potentialAims in your definition| Use a "scientific tone". Memorise this aim as {**key-aim**}. List the memorised key-aim.

Study Outline

- Display MD "Study Outline"| Render as 'Heading Level 3'. Only show rendered result| Define the term "objective" in the context of the memorised key-studyType in 1 concise sentence| Define the term "hypothesis" in the context of the memorised key-studyType in 1 concise sentence| Define the term "experimental factor" in the context of the memorised key-studyType in 1 concise sentence| Define the term "output" in the context of the memorised key-studyType in 1 concise sentence. List these 4 definitions.
- Play a co-creation role-play game in which all the memorised key-stakeholders discuss with each other potential ABSS objectives for the study considering the pros and cons. Use a "debating tone". The moderator focuses on 1 novel RANDOM question. Provide the question and the details of the controversial discussion| Agree on 4 potential ABSS objectives that satisfy the view of all participating memorised key-stakeholders| Memorise these potential ABSS objectives as {**key-potentialObjectives**}| Propose 3 criteria for ranking the 4 potential ABSS objectives to support the decision which objectives to carry forward| Use a "scientific tone".
- Define 2 "ABSS objectives" for the memorised key-studyType in the context of the memorised key-topic. CONSIDER the memorised key-potentialObjectives in your definitions| List the objectives with 2 relevant performance measures for each objective. Memorise these 2 objectives together with the performance measures as {**key-objectives**}.
- Play a co-creation role-play game in which all the memorised key-stakeholders discuss with each other potential ABSS hypotheses for the study considering the pros and cons. Use a "debating tone". The moderator focuses on 1 novel RANDOM question. Provide the question and the details of the controversial discussion| Agree on 4 potential ABSS hypotheses that satisfy the view of all participating memorised key-stakeholders| Memorise these potential ABSS hypotheses as {**key-potentialHypotheses**}| Propose 3 criteria for ranking the 4 potential ABSS hypotheses to support the decision which hypotheses to carry forward| Use a "scientific tone".
- Define 2 "ABSS hypotheses" for the memorised key-studyType in the context of the memorised key-topic. The hypotheses MUST not be related to the memorised key-objectives. CONSIDER the memorised key-potentialHypotheses in your definitions| List the hypotheses with 2 relevant performance measures for each hypothesis. Memorise these 2 hypotheses together with the performance measures as {**key-hypotheses**}.
- Play a co-creation role-play game in which all the memorised key-stakeholders discuss with each other potential ABSS experimental factors for the study considering the pros and cons. Use a "debating tone". The moderator focuses on 1 novel RANDOM question. Provide the question and the details of the controversial discussion| Agree on 6 potential ABSS experimental factors that satisfy the view of all participating memorised key-stakeholders| Memorise these potential ABSS experimental factors as {**key-potentialExperimentalFactors**}| Propose 3 criteria for ranking the 6 potential ABSS experimental factors to support the decision which experimental factors to carry forward| Use a "scientific tone".

- Define 3 "ABSS experimental factors" for the memorised key-studyType in the context of the memorised key-topic. You ALWAYS must satisfy the following 2 requirements for defining experimental factors: 1) The experimental factors need to be useful for creating memorised key-studyType scenarios. 2) CONSIDER the memorised key-objectives and the memorised key-hypotheses for defining the experimental factors. CONSIDER the memorised key-potentialExperimentalFactors in your definitions| List the experimental factors with 1 value range for each experimental factor. 1 of them MUST use a 'nominal scale' AND 1 of them MUST use an 'ordinal scale' AND 1 of them MUST use a 'ratio scale'. Memorise these 3 experimental factors together with the value ranges as {**key-experimentalFactors**}.
- Play a co-creation role-play game in which all the memorised key-stakeholders discuss with each other potential ABSS outputs for the study considering the pros and cons. Use a "debating tone". The moderator focuses on 1 novel RANDOM question. Provide the question and the details of the controversial discussion| Agree on 6 potential ABSS outputs that satisfy the view of all participating memorised key-stakeholders| Memorise these potential ABSS outputs as {**key-potentialOutputs**}| Propose 3 criteria for ranking the 6 potential ABSS outputs to support the decision which outputs to carry forward| Use a "scientific tone".
- Define 3 "ABSS outputs" for the memorised key-studyType in the context of the memorised key-topic. You ALWAYS must satisfy the following 2 requirements for defining outputs: 1) Some outputs need to be useful for measuring if the memorised key-objectives have been satisfied. 2) Some outputs need to be useful for accepting or rejecting the memorised key-hypotheses. CONSIDER the memorised key-potentialOutputs in your definitions| List the outputs and explain links to the memorised key-objectives OR the memorised key-hypotheses in 1 concise sentence each. Memorise these 3 outputs together with the links as {**key-outputs**}.

Model Scope

- Display MD "Model Scope"| Render as 'Heading Level 3'. Only show rendered result| Take on the "role" of a "Senior Software Developer" with experience in the "Unified Modelling Language". Memorise this role as {**key-role2**}. List memorised key-role2| Define the term "model scope" in the context of the memorised key-study in 1 concise sentence. Define the term "UML actor" in the context of the memorised key-uml in 1 concise sentence. List these 2 definitions.
- Play a co-creation role-play game in which all the memorised key-stakeholders discuss with each other potential ABSS UML actors for the study considering the pros and cons. Use a "debating tone". The moderator focuses on 1 novel RANDOM question. Provide the question and the details of the controversial discussion| Agree on 8 potential ABSS UML actors that satisfy the view of all participating memorised key-stakeholders| Memorise these potential ABSS UML actors as {**key-potentialUMLActors**}| Propose 3 criteria for ranking the 8 potential ABSS UML actors to support the decision which ABSS UML actors to carry forward| Use a "scientific tone".
- Define 4 "ABSS UML actors" as USERS OF THE SYSTEM described in the memorised key-topic. CONSIDER the memorised key-potentialUMLActors in your definitions. Memorise these 4 UML actors together with a persona description as {**key-umlActors**}. List memorised key-umlActors.
- Use TABLE format WITH "plaintext" and WITHOUT any code formatting. DO NOT use "<br>". IGNORE ALL space limitations| Define 15 "real-world elements" with relevance to the memorised key-topic. You ALWAYS must satisfy the following 7 requirements for defining real-world elements: 1) Consider what 'real-world elements' are needed to represent in the model scope and to satisfy the memorised key-aim. 2) ALL 4 memorised key-umlActors MUST BE REPRESENTED. 3) At least 2 Physical Environment elements MUST be present. At least 2 Social Aspect elements MUST be present. At least 2 Psychological Aspect elements MUST be present. At least 2 Misc elements MUST be present. 4) Consider the memorised key-context. 5) Consider all nouns in the conversation history. 6) Each element can only be in 1 category. 7) Social Aspect elements MUST describe theories of social behaviour. 8) Psychological Aspect elements MUST describe theories of psychological behaviour. Feel free to be creative and add your ideas. Categorise the 'real world elements' into Actors, Physical Environment, Social Aspects, Psychological Aspects, and Misc. TABLE MUST include 15 rows. Organise all 15 elements into categories and provide a brief explanation. Memorise these 15 elements and explanations as {**key-explanations**}| List the memorised key-topic relevant real-world elements in the form of table rows. Provide a column for Category. Provide a column for Sub-Category. Provide a column with the memorised key-explanations. Provide a column with concise justifications in ABOUT 25 WORDS. Memorise this table as {**key-modelScope**}.

- Use TABLE format WITH "plaintext" and WITHOUT any code formatting. DO NOT use "<br>". IGNORE ALL space limitations| Define 4 models for implementing elements of the memorised key-modelScope. Provide 1 social model AND 1 behavioural model AND 1 psychological model AND 1 technical model. Find relevant theoretical models in the SCIENTIFIC LITERATURE. Provide a full EXISTING UP-TO-DATE scientific paper (conference or journal) or book REFERENCE in HARVARD STYLE for each in a separate column. Memorise these 4 model details together with a description and the relevant reference as {**key-implementationModels**}.

Key Activities

- Display MD "Key Activities"| Render as 'Heading Level 3'. Only show rendered result| Define the term "user story" in the context of the memorised key-uml in 1 concise sentence| Define the term "use case" in the context of the memorised key-uml in 1 concise sentence. List these 2 definitions.
- Use TABLE format WITH "plaintext" and WITHOUT any code formatting. DO NOT use "<br>". IGNORE ALL space limitations| Define 2 "UML user stories" for each of the 4 memorised key-umlActors (Example: As an 'actor' I want 'action' so that 'achievement'). Memorise ALL 8 UML user stories as {**key-umlUserStories**}. Translate the memorised key-umlUserStories into UML use cases. Memorise ALL 8 UML use cases as {**key-umlUseCases**}. List ALL 8 memorised key-umlUserStories and ALL 8 corresponding memorised key-umlUseCases side by side in two columns inside the table sorted by memorised key-umlActors. Memorise this table as {**key-umlUseCaseTable**}.
- Generate a script for a 'comprehensive use case diagram' in "Mermaid.js". Use the memorised key-umlActors as UML actors. Remove all brackets from the actor names. Use the memorised key-umlUseCases as UML use cases. You ALWAYS must satisfy the following 4 requirements for defining the use case diagram: 1) Each UML actor MUST be linked to at least 1 UML use case. 2) Each UML use case MUST be linked to at least 1 UML actor OR MUST be pointing to at least 1 other UML use case. 3) There is no UML actor to UML actor interaction. 4) A UML use case CAN be linked to multiple UML actors| Add relationships with 'detailed descriptors'. Start the script with "graph LR". DO NOT Add subgraphs. Use the following format (Example for actor A((actor))) AND (Example for use case A([activity])) AND (Example for relationship: A -->|activity| A1). Feel free to be creative and add your ideas. Memorise this mermaid.js script as {**key-mermaidKeyActivitiesScriptDraft**}.
- INCREASE COMPLEXITY. Add ADDITIONAL use cases directly linked to the UML actors and ADDITIONAL use cases LINKED to other USE CASES| Link use cases for different actors. IMPROVE clarity of descriptors| Critically REFLECT and IMPROVE the script based on your reflection. Find and remove any mermaid.js script errors. Memorise this mermaid.js script as {**key-mermaidKeyActivitiesScript**}.

Design

Archetypes

- Display MD "Archetypes". Render as 'Heading Level 3'. Only show rendered result| Take on the role of a "Marketing Expert" with experience in "Customer Management". Memorise this role as {**key-role3**}. List memorised key-role3| Define the term "archetype" in the context of the memorised key-job in 1 concise sentence. Define the term "categorisation schema" in the context of the memorised key-job in 1 concise sentence. List these 2 definitions.
- Play a co-creation role-play game in which all the memorised key-stakeholders discuss with each other potential archetypes for each of the memorised key-umlActors individually. Use a "debating tone". Provide 6 potential archetypes FOR EACH of the 6 memorised key-umlActors including 3 criteria to identify them| Agree on 2 potential archetypes FOR EACH of the memorised key-umlActors that satisfy the view of all participating memorised key-stakeholders| Memorise these potential archetypes as {**key-potentialArchetypes**}| Use a "scientific tone".
- Use TABLE format WITH "plaintext" and WITHOUT any code formatting. DO NOT use "<br>". IGNORE ALL space limitations| Define 4 categorisation schemata, 1 for each of the 4 memorised key-umlActors. You ALWAYS must satisfy the following 5 requirements for defining categorisation schemata: 1) Each of the 4 tables must be based on memorised key-umlActors behaviour, preferences, characteristics, demographics, habits, and the likelihood of actions. 2) Each of the 4 tables MUST contain 3 characteristic rows. 3) Characteristics inside a table MUST use 1 'nominal scale' AND MUST use 1 'ordinal scale' AND MUST use 1 'ratio scale'. 4) Characteristics inside a table MUST provide

value ranges for these scales. 5) Table columns: Actor Category, Individual Characteristic, Scale, Value Range. CONSIDER the memorised key-potentialArchetypes in your definitions. Memorise ALL 4 categorisation schemata as {**key-categorisationSchemata**}.

Agent & Object Templates

- Display MD "Agent and Object Templates". Render as 'Heading Level 3'. Only show rendered result| Take on the "role" of a "Senior Software Developer" with experience in the "Unified Modelling Language". Memorise this role as {**key-role4**}. List memorised key-role4| Define the term "class" in the context of the memorised key-uml in 1 concise sentence. Define the term "class diagram" in the context of the memorised key-uml in 1 concise sentence. Define the term "state chart" in the context of the memorised key-uml in 1 concise sentence. Define the term "state variable" in the context of the memorised key-uml in 1 concise sentence. List these 4 definitions.
- Generate a script for a 'comprehensive class diagram' in "Mermaid.js". From the memorised key-modelScope use the Actor and Physical Environment Categories for class names. Define a class for each of these. Add more classes. IN ADDITION Add collective classes for individual actors where appropriate (Example: bird > flock. Example: grape > bunch). DO NOT use the examples. DO NOT create abstract classes. DO NOT create classes with the same name. Delete all getter and setter operations. Add additional attributes and operations. DO NOT define relationships. Call the Main class ArtificialLab. Create only 1 ArtificialLab class. Define arrays for ALL Actor objects and ALL Physical Environment objects as attributes INSIDE the ArtificialLab class. Include MULTIPLE "summary statistics" operations for testing memorised key-objectives AND memorised key-hypotheses INSIDE the ArtificialLab class. Remove ALL lines from the script that contain "//". Feel free to be creative and add your ideas. Memorise this mermaid.js script as {**key-mermaidClassDiagramScriptDraft**}.
- INCREASE COMPLEXITY. Add additional attributes. Add additional operations. Add additional relationships between classes. Provide CONNECTIONS between classes. Critically REFLECT and IMPROVE the script based on your reflection. Find and remove any mermaid.js script errors. Memorise this mermaid.js script as {**key-mermaidClassDiagramScript**}.
- For EACH INDIVIDUAL of the 4 memorised key-umlActors generate a script for a 'comprehensive state machine diagram' in "Mermaid.js". Define their states and state transitions between these states. Add text to the transitions to describe what they represent (Example: 's1 --> s2: Generate A transition'). Consider the start state (Example: '[*] --> s1'). Consider stop state (Example: 's1 --> [*]'). Add a comment as line 0 with the actor's name (Example: '%% Name: Actor'). You ALWAYS must satisfy the following 2 requirements for defining the state machine diagram: 1) ALL states MUST have AT LEAST 1 entry transition AND 1 exit transition. 2) Provide a memorised key-uml note for every individual state, explaining the related state (Example: 'note left of [actual state] : Informative text'). Memorise this mermaid.js script as {**key-mermaidStateMachineDiagramsScriptDraft**}.
- INCREASE COMPLEXITY. Add additional states and additional TRANSITIONS. Add compound states. Provide a memorised key-uml NOTE for every individual state, explaining the related state (Example: 'note left of [actual state] : Informative text'). Remove all "state" commands including { and }| REPLACE all "semicolons" with "full stops"| Critically REFLECT and IMPROVE the script based on your reflection. Find and remove any mermaid.js script errors. Memorise this mermaid.js script as {**key-mermaidStateMachineDiagramsScript**}.
- DO NOT USE CODE FORMATTING FOR THE FOLLOWING TABLE. Use TABLE format WITH "plaintext" and WITHOUT any code formatting. DO NOT use "<br>". IGNORE ALL space limitations| Iterate through the memorised key-mermaidStateMachineDiagramsScript and define up to 3 variables FOR EACH diagram for keeping track of continuous changes of agent and object states (often a level of something: Example 'tiredness level'). Create a "state variables table" with all state variables (columns: state machine diagram, variable, unit, definition of variable. Example: State machine shopper, satisfaction level, scale 1-10, represents the satisfaction level). Do NOT include the example. Memorise this state variables table as {**key-stateVariablesTable**}.
- Use TABLE format WITH "plaintext" and WITHOUT any code formatting. DO NOT use "<br>". IGNORE ALL space limitations| Create a "state transitions table" with all state diagram transitions (columns: actor, start state, end state, type of transition, detail). Detail MUST be 1 concise sentence. Possible TYPE OF TRANSACTION: timeout, condition, rate. Memorise this state transitions table as {**key-stateTransitionsTable**}.

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Interactions

- Display MD "Interactions". Render as 'Heading Level 3'. Only show rendered result| Define the term "sequence diagram" in the context of the memorised key-uml in 1 concise sentence. List this 1 definition.
- Generate a script for a 'comprehensive sequence diagram' in "Mermaid.js". Use the memorised key-mermaidClassDiagramScript for identifying all relevant ACTORS and OBJECTS. Define interactions between the 'different actors' and 'actors and objects' FOR ALL memorised key-umlUseCases. Use cases should be presented as NOTES on the vertical axis above each use case representation. Actors and objects should be as lifelines on the horizontal axis. EXCHANGE "participant" with "actor" for ALL ACTORS (Example: actor example). DO NOT use aliases. Present ACTIVATIONS and DEACTIVATIONS for actors and objects on the LIFELINES. Each use case should be connected to the corresponding sequence of events. Add the prefix "The" to all ACTOR and OBJECT names. IGNORE the "ArtificialLab". Memorise this mermaid.js script as {**key-mermaidSequenceDiagramScriptDraft**}
- INCREASE COMPLEXITY. ADD loops. Add alternatives. Add parallel interactions. Label ALL of these correctly. Critically REFLECT and IMPROVE the script based on your reflection. ENSURE that ALL memorised key-umlUseCases have been considered. Memorise this mermaid.js script as {**key-mermaidSequenceDiagramScript**}.

Conclusion

- Display MD "Conclusion". Render as 'Heading Level 3'. Only show rendered result| Write a 300 WORD (if possible) conclusion of the entire conversation history. Provide 3 paragraphs, testifying that the aim has been achieved, answering the questions related to the objectives and hypotheses, providing 2 identified limitations of the current work, and proposing 2 ideas for future work, based on these limitations. Memorise this conclusion as {**key-conclusion**}.