Copilot

P1: Analyze the system description for ambiguities, incompleteness, and contradictions

- Unstructured
  - Validity: 1-0/6 =1
  - Completeness: Missing “popular”, “trigger”, 2 contradictions. 1-4/6 = 0.333
  - Consistency: “conflicting commands”, “user data and privacy” are not mentioned. 1-2/6 = 0.666
- Structured
  - Validity: 1-0/9 = 1
  - Completeness: Missing “seamless”, “centralized”. 1-2/6 = 0.666
  - Consistency: 1-0/9 = 1

P2: Identify and categorize the functional and non-functional requirements of the system description

- Unstructured
  - Validity: “Friendly User Interface”, “Enhanced Comfort and Convenience” “Energy Savings”, “Potential Home Security Boost” not FR. 1-4/(7+4) = 0.636
  - Completeness: 1-0/6 = 1
  - Consistency: “Privacy and Data Security” and “Conflict Resolution” are not explicit. 1-2/11 = 0.818
- Structured
  - Validity: “Support user-friendly interfaces” not FR. 1-1/(4+8) = 1
  - Completeness: 1-0/6 = 1
  - Consistency: “Security”, “Maintainability”, “Performance”, “Reusability”, “Flexibility” was not explicit. 1-5/12 = 0.583

P3: Create a use case model for the smart home system

- Unstructured
  - Validity: No system boundary (-0.1). No separation of primary and supporting actors (-0.1). Unclear actors for “Handle Conflicting Commands” and “Energy Optimization” (-0.1). “Scenarios” defined, but unclear differences from UCs. 1-(2*0.1) /8-0.1-0.1 = 0.775
  - Completeness: Missing integration. “Voice Assistant Integration” is not actually about integration, but about sending voice commands. 1-1/3 = 0.666
  - Consistency: 1-0/8 = 1
- Structured
  - Validity: Clear system boundary. Separation of Primary and Supporting actors. 1-0/6 = 1
  - Completeness: 1-0/3 =1
  - Consistency: 1-0/6 =1

P4: Create use case specifications for every use case

- Unstructured
  - Validity: Invalid actors in 5 & 7 – System (-0.1). Unclear primary & supporting actors in 1&3 (-0.1). No alternative flows (-0.2). 1-(2*0.1+4*0.1+8*0.2)/8 = 0.725
  - Completeness: Missing integration. 1-1/3 = 0.666
  - Consistency: 1-0/8 = 1
- Structured
  - Validity: Descriptive reference to basic flows in alterative flows. 1-0/4 = 1
  - Completeness: 1-0/3 = 1
  - Consistency: 1-0/4 = 1

P5: Identify domain concepts and their relationships from the created use case specifications.

- Unstructured
  - Validity: Unclear ownership of attributes (-0.2). No multiplicities (-0.2). 1-(5*0.2+5*0.2)/(5+5) = 0.8
  - Completeness: Missing Interface, Ecosystem. 1-2/6 = 0.666
  - Consistency: 1-0/5= 1
- Structured
  - Validity: Descriptive multiplicities. 1-0/(8+9) = 1
  - Completeness: Missing Interface, Trigger. 1-2/6 = 0.666
  - Consistency: Sensor Device not explicitly mentioned. 1-1/8 = 0.875

P6. Identify system operations from use case specifications of the smart home system.

- Unstructured
  - Validity: Descriptive with no parameters (-0.1). 1/8 not actor-initiated operations (Handle Conflicting Commands). 1-(1+7*0.1)/8 = 0.787
  - Completeness: Missing integration. 1-1/3 = 0.666
  - Consistency: 1-0/8 = 1
- Structured
  - Validity: Descriptive with no parameters (-0.1). 1-(15*0.1)/15 = 0.9
  - Completeness: 1-0/3 = 1
  - Consistency: 1-0/15 = 1

P7: Create design sequence diagrams for system operations of the smart home system.

- Unstructured
  - Validity: 8 SDs defined. Control Devices, Program Automation, Voice Assistant Integration, View System Status, Handle Conflicting Commands, Enhance Security, Energy Optimization, Privacy Settings Configuration. 1-0/8 = 1
  - Completeness: Missing integration. 1-1/3 = 0.666
  - Consistency: 1-0/8 = 1
- Structured
  - Validity: 6 SDs defined - Control Lights, Set Thermostat Temperature, Lock/Unlock Doors, Create Automation Rules, Voice Control via Voice Assistant, Integrate with Smart Home Ecosystems. No clear operations defined (-0.1). 1-(6*0.1) /6 = 0.9
  - Completeness: 1-0/3 = 1
  - Consistency: 1-0/8 = 1

P8: Create design class diagrams based on the domain model and sequence diagrams of the smart home system.

- Unstructured
  - Validity: 9 classes defined - User, Device, Sensor, Scheduled, DeviceController, SensorReader, Scheduler, EnergyOptimizer, SecurityManager. Missing relationships (-0.3). Missing attributes (-0.2) & operations (-0.4). 1-(9*0.2+9*0.3)/9-0.3 = 0.2
  - Completeness: Missing UserInterface, Trigger, VoiceAssisntant, Ecosystem. 1-4/6 = 0.333
  - Consistency: Missing 1 MDC class - Voice Assistant. System from SD not defined (1 class). No operations in all 8 DSDs defined. 1-(1+8)/(9+1+8) = 0.5
- Structured
  - Validity: 11 classes & 10 relationships defined. Missing data types (-0.1) for 5 classes. Missing multiplicity (-0.1) on 5 associations. No visibility. 1-(5*0.1+5*0.1)/21 = 0.952
  - Completeness: Missing Interface. 1-1/6 = 0.833
  - Consistency: All 8 MCD classes present. Smart Home System in 3/6 DSD (4-6) not defined. 1-3/(11+6) = 0.823

P9. Develop a Java implementation for the system as specified in the class diagram and sequence diagrams.

- Unstructured
  - Validity: Mostly empty. No even getters and setters. Only addDevice(), TurnOnDevice() in DeviceController, addSensor() in SensorReader, addSchedule() in Scheduler implemented. Driver implemented. 1- (0.7*8)/8 = 0.3
  - Completeness: Missing Interface, VoiceAssistant, Ecosystem. 1-3/6 = 0.5
  - Consistency: Missing 2/9 DCD classes – EnergyOptimizer, SecurityManager. Missing 7/8 DSDs (2-8). 1-(2+7)/(9+8) = 0.47
- Structured
  - Validity: Mostly empty. Some getters and setters (Room, Sensor, Schedule, VoiceAssistant, SmartAppliance) (7 classes). Driver declared, but not implemented - SmartHomeSystem. 1- (2*0.9+5*0.7+1*0.9)/8 = 0.225
  - Completeness: Missing Interface, Ecosystem. 1-2/6 = 0.666
  - Consistency: Missing 4/11 DCD classes (Smart Lights, Smart Thermostat, Smart Locks, Ecosystem). Missing all 6 DSDs. 1-(4+6)/(8+11+6) = 0.6

Prompt 10:Develop tests including unit tests, integration tests, and system tests for the implementation of the smart home system.

- Unstructured
  - Validity: No declaration (-0.1). No test code (-0.6).1-(0.6*7+0.1*7)/7 = 0.3
  - Completeness: Missing 4 classes. 1-4/(6+3) = 0.555
  - Consistency: Missing 5 classes. 1-5/(3+5) = 0.375
- Structured
  - Validity: No test code in system tests (-0.6) 1-(0.6*1)/3 = 0.8
  - Completeness: Missing 4 classes. 1-4/(6+3) = 0.555
  - Consistency: SmartLights and User considered. Missing 5 classes. 1-5/(2+5) = 0.285