Human-AI Agent Software Development Process - Details

- **Design**
  - Human describes the system, and what the system is supposed to do.
  - Agent creates draft of the Data Dictionary and pseudocode that describes the logical flow of the code.
  - The Data Dictionary would contain:
    - Proposed variable name(s).
    - Data type.
    - What it means/does/represents.
    - Whether the variable is global, or if it is limited to a single function, the pseudocode name of that function.
  - The pseudocode would contain
    - Proposed function names.
    - The purpose of the function.
    - All inputs and outputs of the function.
    - The logic of execution: which function calls which, and the sequence of function calls needed to complete the overall actions of the program.

  - Repeat:
    - Agent asks Human if there are any concerns/issues, or changes desired to make the names more 'human readable' and/or pseudocode more 'human logical'
    - Human responds with any concerns.
    - Agent adjusts the Data Dictionary and pseudocode.
    - For AI traceability, whether the name or description was AI-generated or Human-modified.

    Until Human is OK with all names.

  - Human reports acceptance of program design to SQA.

  - Repeat:
    - Agent creates first draft of code; with comments.
    - Agent asks Human to read code, section by section, and asks if there are any concerns/issues, or changes desired to make the code more 'human readable'.
    - Agent creates first draft of unit, integration, and system tests, and asks if there are any concerns/issues, or changes desired to make the tests clearer or more 'human readable'.
    - Human responds with any concerns.
    - Agent creates first draft of system documentation, and asks if there are any concerns/issues, or changes desired to make the documentation clearer or more 'human readable'.

    Until Human is OK with readability of the code and proposed test cases, understands how it works, and how it is commented.

  - Optional Practice: Function-Level Pseudocode Annotation
    - While not mandatory, it is strongly recommended that each function be preceded by a finalized pseudocode comment describing its intended behavior. This supports clarity, traceability, and alignment between design and implementation.

- Benefits:
  - Enhances readability for human collaborators
  - Facilitates agent interpretability during audits or refinement
  - Creates a semantic anchor point for test case alignment
- Usage Guidelines:
  - Apply to core functions, shared modules, and agent-critical logic
  - Comment should immediately precede the function declaration
  - Pseudocode must reflect the finalized design version from the collaboration phase
- Note: During refinement cycles or PR reviews, agents may flag missing or inconsistent annotations for further attention.
  - Human reports acceptance of program design and test bank to SQA.

- Implementation and Pre-Integration Testing
  - Code is implemented in the system.
  - Repeat:
    - Issues identified are reported to Agent.
    - Agent proposes changes.
    - Agent asks Human to read code, section by section, and asks if there are any concerns/issues, or changes desired to make the code more 'human readable'.
    - Human responds with any concerns.
    - Changes made.

    Until Human is OK with readability of the code, understands how it works, how it is commented, and test results.

  - Human reports acceptance of program design to SQA.

- Integration & System Testing
  - During testing, Human reports anomalous results to Agent.
  - Repeat:
    - Issues identified are reported to Agent.
    - Agent proposes changes.
    - Agent asks Human to read code, section by section, and asks if there are any concerns/issues, or changes desired to make the code more 'human readable'.
    - Human responds with any concerns.
    - Changes made.

    Until Human is OK with readability of the code, understands how it works, how it is commented, and test results.

  - Human reports acceptance of program design to SQA.

- Post-Release Issues
  - After release to production, Human reports anomalous results to Agent.
  - Repeat:
    - Issues identified are reported to Agent.
    - Agent proposes changes.
    - Agent asks Human to read code, section by section, and asks if there are any concerns/issues, or changes desired to make the code more 'human readable'.
    - Human responds with any concerns.

- - Changes made.

    Until Human is OK with readability of the code, understands how it works, how it is commented, and test results.
  - o Human reports acceptance of program design to SQA.

- Configuration Management (CM)
  - o All Human-approved versions of the Data Dictionary, Commented Code, and Test Results are maintained by CM.

- Software Quality Assurance (SQA)
  - o Maintain the Human-Agent Process.
  - o Monitor development teams' use of Human-Agent Process.
  - o Report non-compliance with the Human-Agent Process:
    - Initially, to Project Manager (PM) for software.
    - If not corrected, to Engineering Management.