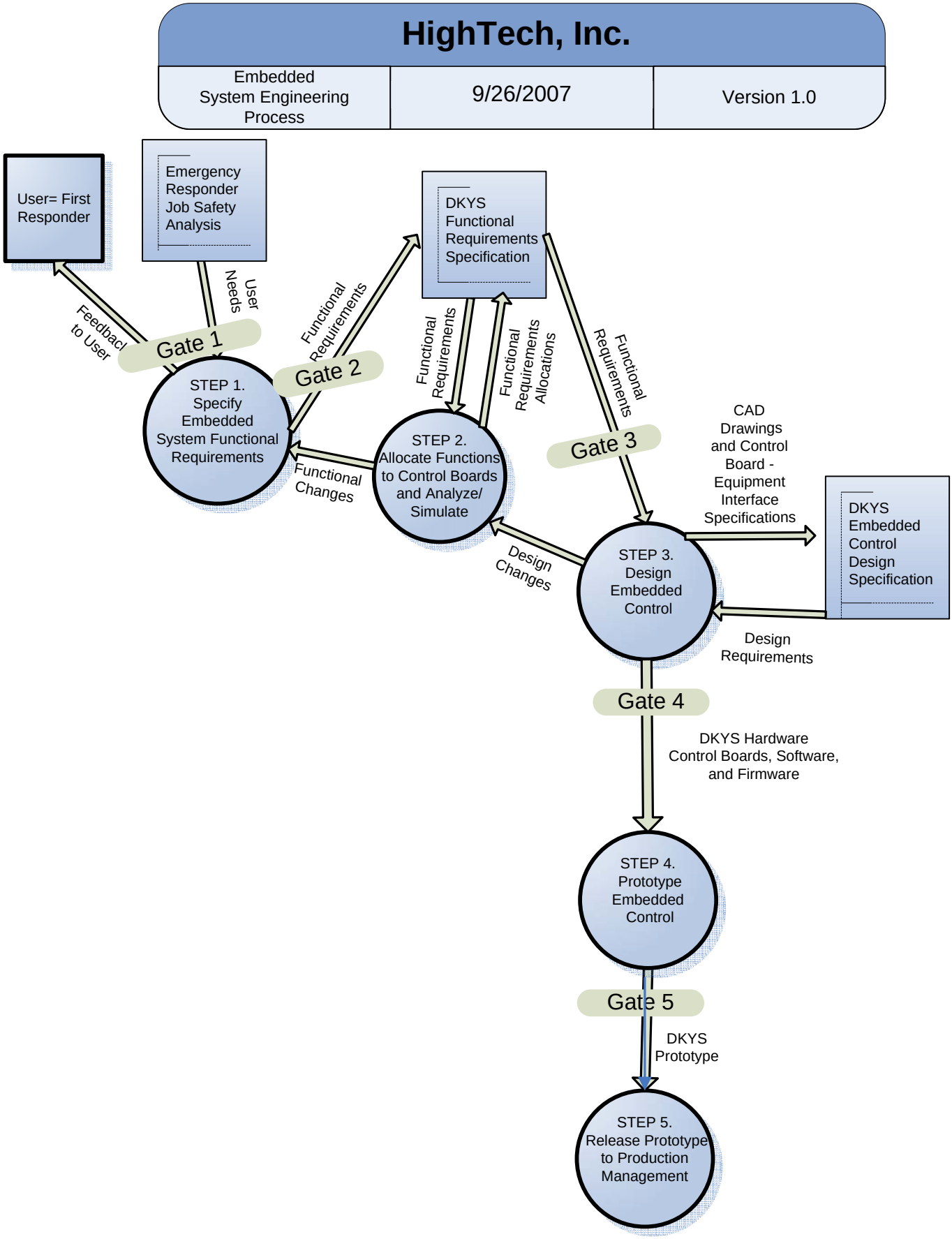
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Embedded System Engineering Process
9/26/2007
Version 1.0
User= First Responder
Emergency Responder Job Safety Analysis
DKYS Functional Requirements Specification
Feedback to User
User Needs
Gate 1
Functional Requirements
Gate 2
Functional Requirements
Functional Requirements Allocations
Functional Requirements
Gate 3
CAD Drawings and Control Board - Equipment Interface Specifications
DKYS Embedded Control Design Specification
STEP 1. Specify Embedded System Functional Requirements
Functional Changes
STEP 2. Allocate Functions to Control Boards and Analyze/ Simulate
Design Changes
STEP 3. Design Embedded Control
Design Requirements
Gate 4
DKYS Hardware Control Boards, Software, and Firmware
STEP 4. Prototype Embedded Control
Gate 5
DKYS Prototype
STEP 5. Release Prototype to Production Management

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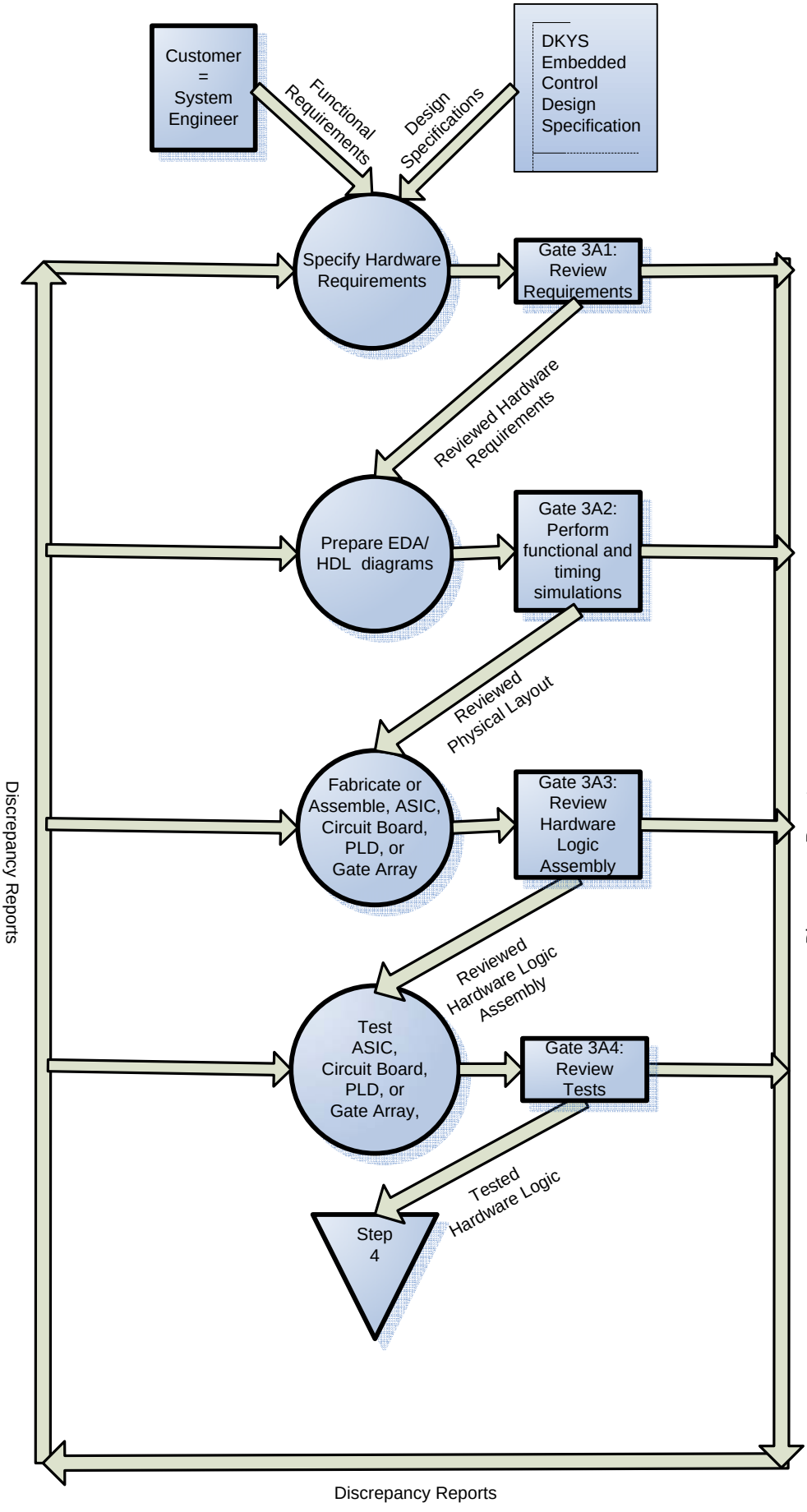
STEP 3A. Electronic Hardware Development Process	9/26/2007	Version 1.0



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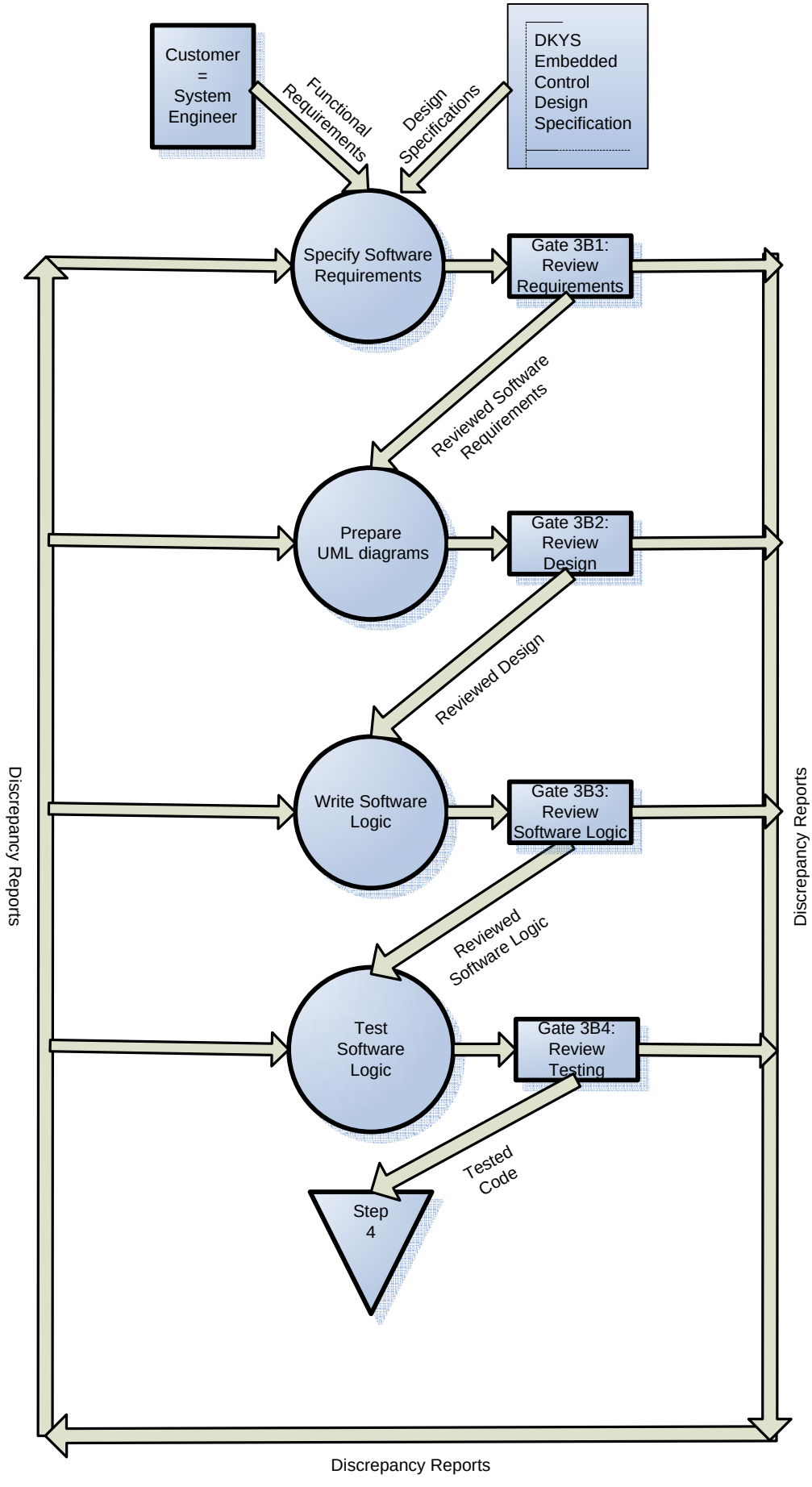
STEP 3B. Embedded Software/Firmware Development Process	9/26/2007	Version 1.0



Requirements Review

Assess requirements for completeness:
* input/output data ranges, units, and accuracy,
* safety critical variables identification and use,
* TBD's addressed

Computer-Aided Software Engineering (CASE) Diagrams

Data dictionary
Control flow digrams
Data flow diagrams
State transition diagrams
Calling Structure

Coding Conventions

Follow code writing conventions, for example:
* variable initialization and naming,
* In-line documentation,
* module size and fan in/fan out limitations,
* Disallowed constructs (e.g. use of pointer arithmitic),
* use of assertions such as pre-conditions and post-conditons, exception handling

Test Procedures

* static analysis of code
  - safety-critical data flow
  - adherence to coding conventions
* dynamic execution of code
  - multiple condition coverage
  - boundary value
  - sequencing/state transition tests
  - nominal and off-nominal tests
  - timing tests

Test Levels

* function/utility libraries
* unit (subroutine)
* module or object
* sub-frame (part of a Sense-Process-Actuate) sequence
* frame (all of a Sense-Process-Actuate) sequence

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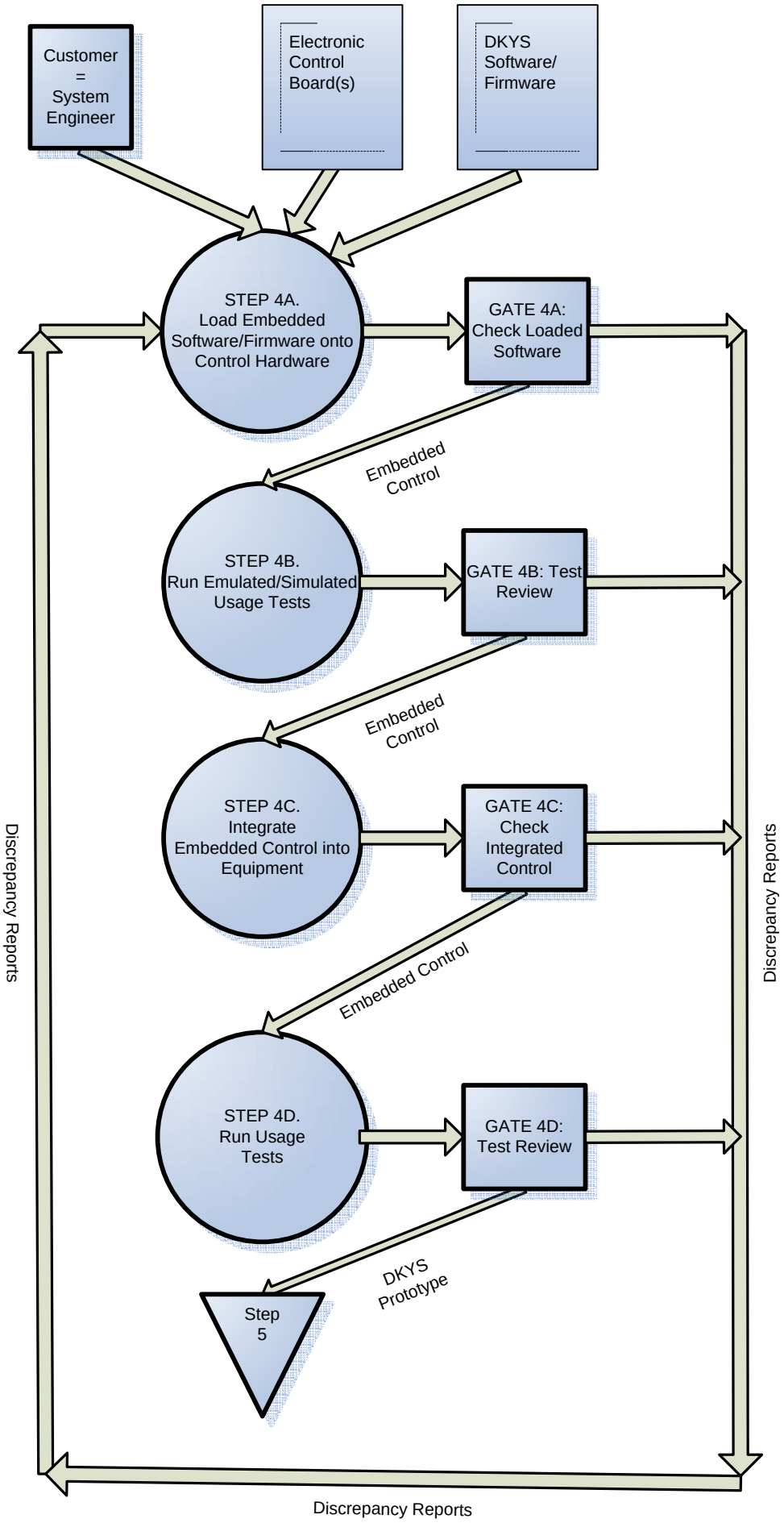
STEP 4. PROTOTYPE DEVELOPMENT PROCESS	9/26/2007	Version 1.0