1. PURPOSE

Process modeling is used to clearly identify the activities that, when performed, will satisfy Project/Task requirements. In a development or major enhancement Project, Process Modeling is performed concurrently with data modeling and together, the two modeling techniques provide the design of the solution system at the conceptual, logical, and physical levels.

2. APPLICABILITY

Process modeling is required of all Projects/Tasks subject to the SDLCM Methodology. However, Projects/Tasks that involve the packaging of commercial off-the-shelf (COTS) products may require only conceptual and logical modeling. Those that involve planned enhancement of an existing system to incorporate a new technology may only require updates of the existing logical process model and upgrade or regeneration of the physical model.

3. REFERENCE PUBLICATIONS

The following publications contain related information:

- SDLCM Methodology Handbook
- SDLCM Methodology Procedure P–3101, Data Modeling
- SDLCM Methodology Standard S–3161, Process Models
- SDLCM Methodology Standard S–3162, Context Diagrams
- SDLCM Methodology Standard S–3163, Data Flow Diagrams
- SDLCM Methodology Standard S–3051, System Requirements Specification
- SDLCM Methodology Standard S–3053, System Operations Concept
- SDLCM Methodology Standard S–3171, Logical Design Document
- SDLCM Methodology Standard S–3172, Physical Design Document
- SDLCM Methodology Procedure P–2101, Peer Review
4. **PROCEDURE**

Conceptual process modeling is performed as a Component 1 activity to clarify the Project/Task definition and set the business problem in context for solution. Logical and physical process modeling are performed as activities of Components 3 and 4 to support the logical and physical design of the proposed solution to the business problem.

4.1. **Data Flow Diagram**

The process modeling procedure comprises the three major steps identified in the data flow diagram shown in Figure 3111–1.

4.2 **Entry Criteria**

Process modeling begins after the draft Project/Task definition is in place. The draft Project/Task definition, functional requirements, and external interface information are all inputs to the procedure.
4.3 Steps  

Perform the following steps to complete process modeling:

1. Develop conceptual process model.
   - Review Project/Task definition, functional requirements that must be satisfied by the Project/Task to solve the identified business problem, and external interfaces. Identify the major functions needed to satisfy the functional requirements.
   - Develop a context diagram, following the guidance provided in SDLCM.
Methodology Standard S–3162, Context Diagrams. If applicable, use the Project/Task approved CASE tool to develop the diagram.

- Peer Review the Context Diagram following SDLCM Methodology Procedure P–2101, Peer Review.
- After the Context Diagram has been approved, place it under configuration control in the Project/Task data repository.
- Include the context diagram in the System Requirements Specification.

2. Develop logical process model
- Review system requirements documented in the SRS and any additional information developed as a result of Component 2 activities. Retrieve context diagram from Project/Task Data repository, review, and update if necessary.
- Decompose each of the major functions into a level of activity that will provide the logical design of the selected solution to the problem. This is the system-level design.
- Use data flow diagrams to decompose the activities that make up each major function and to depict the inputs and products of each. Follow the guidance provided in SDLCM Methodology Standard S–3163, Data Flow Diagrams, in developing data flow diagrams. If applicable, use the Project/Task approved CASE tool to develop the data flow diagrams.
- Optionally, use process flow diagrams to depict the activities that make up each major function. Use an approved drawing tool to support creation of process flow diagrams.
- Create a role-activity table to identify the roles responsible for performing, supporting, reviewing, and approving each major function identified. If any function is to be performed as a non-automated function, provide a role-activity table to the lowest level identified in the data flow diagrams.
- Peer Review the Data Flow Diagrams and associated role-activity tables following SDLCM Methodology Procedure P–2101, Peer Review.
- Place approved Process Flow Diagrams, Data Flow Diagrams and role-activity tables under configuration control in the Project/Task data repository.
- Include the Logical Design Model (data flow diagrams, process flow diagrams, and role-activity tables) in the Logical Design Document.

3. Translate the logical process model to a physical design. For each software or hardware component:
- Review the requirements allocated to the software or hardware component being designed and any other information that was generated during logical design activities that may impact the component. Retrieve the applicable data flow diagrams and role-activity tables from the
Project/Task Data repository, review and update them if necessary.

- Decompose the component into software units or hardware components. Develop the software unit-level design, documenting it in unit prologs and program design language. Document any hardware components that will be fabricated with engineering drawings.

- Peer Review the software unit designs or engineering drawings following SDLCM Methodology Procedure P–2101, Peer Review.

- Place approved unit designs or engineering under configuration control in the Project/Task software or hardware library.

- Include the Physical Design Model in the Physical Design Document.

4.4 Exit Criteria

When process modeling is complete, the design of the software or hardware components that make up the selected solution to the business problem addressed by the Project/Task will be at a level that software or hardware can be built and tested. The conceptual process model will have been documented in the SRS, the Logical Process Model in the Logical Design Document, and the Physical Process Model, DFD and Conceptual Model in the System Operations Concept.

4.5 Verification

Use the peer review procedure to verify process models at each level (conceptual, logical, and physical).
4.6 Roles

Table 3111–1 is a Step-Role Table for the process modeling procedure.

**Table 3111–1. Step-Role Table for Process Modeling**

<table>
<thead>
<tr>
<th>Steps:</th>
<th>Roles:</th>
<th>Overall PM</th>
<th>Tech PM</th>
<th>System Analyst</th>
<th>Software or Hardware Designer</th>
<th>QA</th>
<th>CM</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Develop Conceptual Process Model</td>
<td>Review functional requirements and identify major functions.</td>
<td>S</td>
<td>P</td>
<td>S</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Develop context diagram (conceptual process model).</td>
<td>R</td>
<td>P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peer Review Context Diagram.</td>
<td>A</td>
<td>S</td>
<td>P</td>
<td>R</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Put conceptual process model under configuration control.</td>
<td>S</td>
<td></td>
<td></td>
<td>P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Include conceptual process model in SRS.</td>
<td>A</td>
<td>P</td>
<td></td>
<td>R</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Develop Logical Process Model</td>
<td>Review system requirements and context diagram.</td>
<td>S</td>
<td>S</td>
<td>P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decompose system-level design into software or hardware design</td>
<td>R</td>
<td></td>
<td></td>
<td>P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Develop data flow diagrams or process flow diagrams</td>
<td>P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Create Role-Activity Tables</td>
<td>P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peer Review logical process model (DFDs, PFDs, and Role-Activity Tables).</td>
<td>A</td>
<td>P</td>
<td>S</td>
<td>R</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Put logical process model under configuration control.</td>
<td>S</td>
<td></td>
<td></td>
<td>P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Include logical process model in Logical Design Document.</td>
<td>A</td>
<td>P</td>
<td></td>
<td>R</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Translate Logical Process Model into Physical Process Model. For each component:</td>
<td>Review software or hardware requirements allocated to the component.</td>
<td>S</td>
<td></td>
<td>P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decompose system-level design to software units or hardware components for each identified system component.</td>
<td>R</td>
<td></td>
<td>P</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Develop software unit designs or hardware engineering drawings.</td>
<td></td>
<td></td>
<td></td>
<td>P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peer Review physical process model</td>
<td>A</td>
<td>P</td>
<td>S</td>
<td>R</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Steps:</td>
<td>Roles:</td>
<td>Overall PM</td>
<td>Tech PM</td>
<td>System Analyst</td>
<td>Software or Hardware Designer</td>
<td>QA</td>
<td>CM</td>
</tr>
<tr>
<td>-------</td>
<td>--------</td>
<td>------------</td>
<td>---------</td>
<td>----------------</td>
<td>-------------------------------</td>
<td>----</td>
<td>-----</td>
</tr>
<tr>
<td>Put physical process model under configuration control.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>S</td>
<td>R</td>
</tr>
<tr>
<td>Include physical process model in Physical Design Document.</td>
<td></td>
<td></td>
<td>A</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Legend: P = Performs, R = Reviews, A = Approves, S = Supports