Principles of Computer Systems Validation

Roberto Bertini, Executive Consultant & Operations Manager, PQE Group
The most quoted definitions of process validation come from the FDA:

“The collection and evaluation of data, from the process design state through commercial production, which establishes scientific evidence that a process is capable of consistently delivering quality product.”


“Establishing documented evidence which provides a high degree of assurance that a specific process will consistently produce a product meeting its pre-determined specifications and quality attributes.”

FDA “Guideline on general principles of process validation, May, 1987”

Computerized Systems Validation is the documented proof enabling to conclude with a high degree of assurance that a computerized system operates as defined in its specifications, as well as according to quality and regulatory requirements, in a constant and reproducible manner.

In addition, the Validation process shall provide documented evidence that the system includes the automated functionalities oriented to ensure that the GMP critical Electronic Records meet the ALCOA+ requirements.
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GAMP 5
A Risk-Based Approach to Compliant GxP Computerized Systems
Life Cycle Phases

Potential Migration → Requirements → Release → GxP Assessment → Changes → Potential Retention, Migration, Destruction → Retirement

PHASE

Concept → Project → Operation → Retirement

Supplier Involvement*

* - This could be a complex supply chain
- Supplier may provide knowledge, experience, documentation, and services throughout lifecycle

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Validation: A PROCESS NOT AN EVENT

The *virtuous* System life cycle

- Controlled Retirement
- NEED FOR BUSINESS IMPROVEMENT
- Requirements
- Supplier Evaluation & System Selection
- Documentation
- Specify & Design
- Build
- Supplier Testing
- Validation Testing
- Operation
- GO LIVE
- VALIDATION
- ACCEPTANCE
- RETIREMENT

REGULATED COMPANY

SYSTEM INTEGRATOR

REGULATED COMPANY
# APPENDIX M4: Categories Of Software And Hardware

<table>
<thead>
<tr>
<th>SW Category</th>
<th>Description</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - Infrastructure Software</td>
<td>⇨ Layered software (i.e., upon which applications are built)</td>
<td>⇨ Operating Systems</td>
</tr>
<tr>
<td>1 - Infrastructure Software</td>
<td>⇨ Software used to manage the operating environment</td>
<td>⇨ Database Engines</td>
</tr>
<tr>
<td>1 - Infrastructure Software</td>
<td></td>
<td>⇨ Middleware</td>
</tr>
<tr>
<td>1 - Infrastructure Software</td>
<td></td>
<td>⇨ Programming languages</td>
</tr>
<tr>
<td>1 - Infrastructure Software</td>
<td></td>
<td>⇨ Statistical packages</td>
</tr>
<tr>
<td>1 - Infrastructure Software</td>
<td></td>
<td>⇨ Spreadsheet</td>
</tr>
<tr>
<td>1 - Infrastructure Software</td>
<td></td>
<td>⇨ Network monitoring tools</td>
</tr>
<tr>
<td>1 - Infrastructure Software</td>
<td></td>
<td>⇨ Scheduling tools</td>
</tr>
<tr>
<td>1 - Infrastructure Software</td>
<td></td>
<td>⇨ Version control tools</td>
</tr>
<tr>
<td>2 - Firmware</td>
<td></td>
<td>THIS CATEGORY IS NO LONGER USED</td>
</tr>
<tr>
<td>3 - Non-Configured</td>
<td>Run-time parameters may be entered and stored, but the software cannot be configured to suit the business process</td>
<td>Firmware-based applications</td>
</tr>
<tr>
<td>3 - Non-Configured</td>
<td></td>
<td>COTS software</td>
</tr>
<tr>
<td>3 - Non-Configured</td>
<td></td>
<td>Instruments</td>
</tr>
</tbody>
</table>
### APPENDIX M4: Categories Of Software And Hardware

<table>
<thead>
<tr>
<th>SW Category</th>
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</thead>
<tbody>
<tr>
<td>4 - Configured</td>
<td>Software, often very complex, that can be configured by the user to meet the specific needs of the user’s business process. Software code is not altered</td>
<td>LIMS, Data Acquisition Systems, SCADA, ERP, Clinical Trial Monitoring, DCS, Building Managements Systems, CRM, Spreadsheets, Simple Human Machine Interface</td>
</tr>
<tr>
<td>5 - Custom</td>
<td>Software custom designed and coded to suit the business process</td>
<td>Internally and externally developed IT applications</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Internally and externally developed process control applications</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Custom firmware</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Spreadsheets (macro)</td>
</tr>
</tbody>
</table>
Documentation should be *commensurate* with the *complexity / criticality* of the system

Documentation for any system should contain all the required elements to *demonstrate* that it has been *validated* and is in a *state of Control*

How many documents is unimportant provided all required elements are present

<table>
<thead>
<tr>
<th>SW Category</th>
<th>Typical Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Record version number, verify correct installation by following approved installation procedures</td>
</tr>
<tr>
<td></td>
<td>See the GAMP Good Practice Guide: IT Infrastructure Control and Compliance</td>
</tr>
</tbody>
</table>
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SYSTEM RISK ASSESSMENT

FUNCTIONAL RISK ANALYSIS

VALIDATION EFFORT

TESTING EFFORT
Non-Configured Product (Category 3)

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- Configured Product (category 4)

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Custom Application (Category 4)
Qualification vs. Validation

- Infrastructure Qualification
- Equipment Qualification
- Control System Validation
- Quality Management System
- Process Validation
Acknowledgements

References

• ISPE GAMP Forum - GAMP 5 - A Risk-Based Approach to Compliant GxP Computerized Systems