

QAM 12090: Software Quality Assurance Grading & Inventory Procedure

Revision History

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1.0 INTRODUCTION

This procedure provides the instructions for grading and inventorying applications for Fermilab's Software Quality Assurance (SQA) program. The program details and requirements for the SQA program can be found within [Quality Assurance Manual 12003 – Fermilab's SQA Program](#), specifically Appendix A – Quality Assurance Level descriptions, and Appendix B – Quality Control Measure requirements.

The scope of this procedure encompasses all applications that are in use at the laboratory. Per the SQA Program, all applications used at the Laboratory shall be considered for applicability to the SQA program. See the Acronyms and Definitions section for definitions of software vs. application

2.0 ACRONYMS & DEFINITIONS

- **Software** – all non-hardware items associated with the operation and use of a computing system. Software examples include operating systems, programming languages, spreadsheets, word processors, databases, and digital media files.
- **Application** – a form of software developed or configured to perform a specific task or range of tasks.
- **Application Owner** - The individual or group with the responsibility to ensure that the program or programs which make up the application accomplish the specified objective or set of user requirements established for that application.
- **Collaboration Applications** – Applications developed by other organizations in collaboration with Fermilab and utilized on-site. 2 types of collaboration applications are identified:
 - **Data analysis collaboration applications** – Code written to analyze scientific data.
 - **Data collection collaboration applications** – Code written to acquire or collect scientific data.
- **CMDB** – Configuration Management Database
- **COTS** – Commercial Off The Shelf
- **SQA** – Software Quality Assurance

3.0 RESPONSIBILITIES

3.1 Environment, Safety, Health and Quality Section – Quality Assurance Group and Information Management

- Provide support to the laboratory within the scope of this procedure
- Assume responsibility for the content and maintenance of this procedure

3.2 Division/Section Heads and Project Managers

- Ensure the process defined in this document is followed within their organization

3.3 Application Owners/Managers

- Ensure compliance with this procedure
- Report results of the grading process and completed inventory for applications under their control

4.0 PROCEDURES

All applications that are applicable to the SQA program are to be inventoried, graded, and the data uploaded into CMDB. Application owners should use the [Inventory Template Spreadsheet](#) located on the SQA SharePoint page to complete the tasks outlined in this procedure.

4.1 Identify all applications that need to be evaluated for applicability under the SQA Program. Applications are a type of software developed or configured to perform a specific task or range of tasks, and are used for different purposes across the laboratory. All applications including scripts, spreadsheets, and databases shall be considered for applicability under the SQA program.

4.2 Determine what kind of application is being evaluated and if it is applicable under the SQA program. (For further explanation of applications covered by other QA programs see the QAM 12003, SQA Program section 1.0 Exclusions and Special Provisions.)

4.2.1 Applications covered under other QA programs

- a. Applications and computer configurations designed to operate, test or control experiments, accelerator components, and associated equipment, including PLC logic, Field Programmable Gate Arrays and embedded software, are covered under the Fermilab Engineering Manual – Section 4: System Design.
- b. Applications that are developed to support the generation of scientific results, including applications known as Data Analysis Collaboration Applications that are used to analyze scientific data, are covered under the American National Standards Institute/American Society for Quality Z1.13-1999 Quality Guidelines for Research Standard (ANSI/ASQ Z1.13-1999). This standard acknowledges peer review as a primary mechanism for assuring quality.

4.2.2 Applications not applicable to SQA Program

a. Applications performing miscellaneous tasks:

These are applications developed or purchased to perform minor non-critical miscellaneous tasks to make work more efficient. For example, an application used to look up pressure-to-temperature refrigerant conversions.

b. Applications for individual use:

These are applications typically developed for individual or personal use. Examples include developing applications for phones so that data can be accessed remotely.

4.2.3 Included Applications

a. Applications that support laboratory functions:

Applications that support laboratory functions have any of the following characteristics:

- provide an important lab capability or function
- are part of a business process
- their mission criticality or impact can be identified
- are subject to external compliance reviews (e.g. audits, regulatory reviews, etc.)

These applications are applicable to the SQA Program. Grade the application per step 4.3.

b. Data Collection Collaboration Applications:

These are collaboration applications defined as code written to acquire or collect scientific data. Any application that is developed and used for data collection shall be graded and inventoried under the SQA Program. Grade the application per step 4.3.

4.3 Determine what grade to assign to applications that fall under the SQA Program. Application owners should be able to justify why they choose to grade their applications in a certain way.

4.3.1 Review the SQA Program Document – Appendix A: Quality Assurance Levels and assign one of the three following grades:

- (1) HIGH – The highest risk possible that may be realized should the application fail to perform as intended. High should be chosen if at least one of the following consequences applies if the application does not perform as intended:

- Causes injury

- Causes an evacuation
- Causes environmental hazard including medium-high potential for reportable radiological release, groundwater contamination, or regulatory violation
- Causes a significant disruption in laboratory operations or business operations
- Causes significant disruption of an experiment or program, or has significant impact on a contractor or DOE mission or program
- Compromises data integrity: total loss of or severe reduction in data quality, experimental data or equipment output
- Causes a release of DOE sensitive information

Assigning an application with a High QA Level means that any loss of functionality within the application has a great impact to the laboratory, whether it is in terms of safety, environmental hazard, disruption to laboratory operations, damage to laboratory reputation, or compromising data.

(2) MODERATE – Moderate risk possible should the application fail to perform as intended. Moderate should be chosen if at least one of the following consequences applies if the application does not perform as intended:

- Causes environmental hazard including low/small potential for reportable radiological release, groundwater contamination, or regulatory violation
- Causes minor program downtime
- Causes a minor disruption in laboratory operations or business operations
- Incurs a minor loss of experimental data or equipment output
- Causes minor disruption to an experiment or program, or has minor impact on a contractor or DOE mission or program
- Causes public release of information not authorized by DOE for public release
- Causes minor reduction in data quality or equipment output
- Can lead to compromises in systems or can cause the release of passwords or credentials that can lead to compromise of such systems
- Can lead to compromises in systems with personal identifiable information (PII).

An application that is assigned a Moderate QA Level means that any loss of functionality within the application still has an impact on the laboratory, just not as severe as a loss of functionality within an application that has been graded as High.

Examples of applications that should be graded with a Moderate QA Level include:

- **Kerberos** – An open sourced computer network authentication protocol to allow authorized Fermilab employees and collaborators access to Fermilab computer systems and applications in a secure manner. The risk of Kerberos failing would allow non-Fermilab (outside) access to Fermilab computers and applications causing potential damage to these systems and applications.
- **Train-ITNA** – A custom built application that tracks employee training records for the lab based on established training requirements. The risk of Train-ITNA failing is the potential exposure of Personal Identifiable Information (PII).

(3) **LOW** – The lowest risk possible should the application fail to perform as intended. Low should be chosen if all of the following apply:

- Does not cause a worker safety-hazard
- Does not result in any evacuation
- Does not cause environmental hazards, or impact
- No program downtime
- No/Negligible disruption in laboratory operations or business operations
- No/Negligible loss of experimental data or equipment output
- No adverse public impact
- No unplanned release of information to the public.
- Negligible reduction in data quality or equipment output

Applications assigned a Low QA Level means that any loss of functionality within the application has negligible impact on the laboratory.

Examples of applications that should be graded with a Low QA Level include:

- **FermiDash** – Custom built application for the Fermilab executive dashboard, a web based business intelligence application. Risks of FermiDash failing include failure to provide business metrics in a timely fashion or the display of inaccurate data.
- **Teammate** – Commercial off the shelf (COTS) audit management tool. The risk of Teammate failing would result in manual methods of audit management such as reverting to using Microsoft Excel or Microsoft Word to capture an audit.

- 4.4 Complete the fields in the [Inventory Spreadsheet](#) located on the SQA SharePoint page.

The following pieces of information are required on the inventory spreadsheet for each application:

- **Name:** name of the application
- **Short Description:** brief description of what the application does and is used for at the laboratory
- **Managed By:** This is the Fermilab employee's name taking ownership of the application
- **SQA Level:** Enter the grade assigned to the application – High, Moderate or Low
- **Technology Category:** Choose from a list in the inventory workbook that describes the category the application is used for. For example, is it for running the accelerator, running business functions at the laboratory, is it a scientific tool, etc.
- **Technology Classification:** Choose from a list in the inventory workbook that describes the appropriate class for the application. For example, is it a purchased software like commercial off the shelf (COTS), open source, or was it created in-house at the laboratory (Custom), etc.

- 4.5 Create a request in ServiceNow to have the data logged into the Inventory Spreadsheet loaded into CMDB. First, login to [ServiceNow](#).

- 4.5.1 Login using your Fermilab Services username and password.
- 4.5.2 Click on the “[Self Service](#)” menu, and under the “Request Things” tab click on “[General Request](#)”.
- 4.5.3 On the “General Request” screen, click on “[General Request](#)” once again.
- 4.5.4 Once on the submittal form, complete the fields “[Short Description](#)” and “[Please describe your request below.](#)”
- 4.5.5 Click Submit.
- 4.5.6 Once on the “Requested Items” screen, click on the “[Number](#)” assigned to your request to re-open the form.
- 4.5.7 Once in the form, find the “Paperclip” icon in the upper right corner of the screen “[Attachments](#)” and click on it.
- 4.5.8 Browse for the saved and completed Inventory Spreadsheet and click “[Attach](#)”.
- 4.5.9 Then click “[Save & Exit](#)” at the bottom of the screen.
- 4.5.10 Once the request has been completed and the Inventory Spreadsheet has been attached to the request in ServiceNow, the ticket will be assigned to the Configuration Management group for entry into CMDB.

5.0 REFERENCES

Software Quality Assurance Program – QAM 12003:

<https://esh-docdb.fnal.gov:440/cgi-bin/ShowDocument?docid=2819>

Software Quality Assurance SharePoint Site:

<https://fermipoint.fnal.gov/organization/cs/ocio/opm/QA/SoftwareQA/SitePages/Home.aspx>

Software Quality Assurance Inventory Spreadsheet:

<https://fermipoint.fnal.gov/organization/cs/ocio/opm/QA/SoftwareQA/SitePages/Home.aspx>