Risk Based Quality Auditing – A Value Added Approach

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Abstract *— Project areas and departments to be audited are typically determined on the basis of Quality professionals' experience and judgement as opposed to a systematic value added approach to quality auditing in companies from oil and gas industry. Purpose of this paper is to layout and discuss a systematic and value added risk based approach to quality auditing that can provide significant cost savings (from thousands to millions of US dollars depending on size of companies and projects in oil and gas industry) and companies can get more value out of their quality auditing program.*

Keywords *— Quality auditing, Risk rating, Severity, Probability, Quality audit program, Systematic approach to quality auditing, Risk based quality auditing, and Audit risk rating.*

I. Introduction

Quality professionals in companies in oil and gas industry use their own judgment and/or experience when they decide to audit certain areas, activities or departments within a company or a project. Often, there is a lack of systematic approach to determine what needs to be audited. Since quality audits are proven management tools that assess compliance with the requirements, and effectiveness of company's or project's management system, there is a need to minimize judgement and subjectivity, and to provide adequate confidence in quality auditing to stakeholders via a systematic approach [1]. This paper provides an outline and discusses 'a value added approach' that is systematic to determine quality audits based on the criticality and risks involved.

II. Risk Rating Factors

Across the oil and gas industry and for that matter in many other industries, typically risk is determined by 'severity of the event' and 'probability of occurrence' i.e. Risk rating = Severity X Probability [3].

In this paper, author discusses how this approach can be utilized to determine quality audit risk ratings. While the same risk rating approach can be applied to determine areas to be audited on the projects or departments for a company, severity and probability factors are typically different in project and department areas. Therefore, severity and probability factors should looked thoroughly and carefully. Section A and B discuss and provide an outline how quality professionals shall determine severity and probability factors.

A. Severity

Severity is defined as impact and/or consequences of risk in the event of failure. Typically in oil and gas industry these impacts include cost impact, schedule impact, health, safety and environment (HSE) impact, impact on operation and performance of the equipment, impact on quality and any other challenging areas that might adversely impact performance of project and/or departments. Table I and II provide guidelines to determine severity ratings and list different aspects that should be looked at when assigning severity for areas to be audited on projects and departments respectively. Highest severity shall be selected to determine severity rating.

TABLE I
SEVERITY MATRIX (PROJECTS)

Severity aspect	Rating
1) Cost impact	
Negligible	1
Limited	2
Moderate	3
Significant	4
Major	5
2) Schedule impact	
Negligible	1
Limited	2
Moderate	3
Significant	4
Major	5
3) Impact on Health, Safety and Environment (HSE) during different phases of the project	
Negligible	1
Limited	2
Moderate	3
Significant	4
Major	5
4) Operation and performance impact in the event of failure	
Negligible	1
Limited	2
Moderate	3
Significant	4
Major	5

5) Impact on quality during different phases of the project	
Negligible	1
Limited	2
Moderate	3
Significant	4
Major	5
6) Problematic or challenging areas identified by project management team	
Negligible	1
Limited	2
Moderate	3
Significant	4
Major	5

TABLE II
SEVERITY MATRIX (DEPARTMENTS)

Severity aspect	**Rating**
1) Cost impact	
Negligible	1
Limited	2
Moderate	3
Significant	4
Major	5
2) Schedule impact	
Negligible	1
Limited	2
Moderate	3
Significant	4
Major	5
3) Problematic or challenging areas identified by department functional leads	
Negligible	1
Limited	2
Moderate	3
Significant	4
Major	5
4) Significant lessons learned in the recent past and verification of their implementation	
Negligible	1
Limited	2
Moderate	3
Significant	4
Major	5
5) Impact on quality of deliverables	
Negligible	1
Limited	2
Moderate	3
Significant	4
Major	5

In order to keep things logical and ranking based, severity should be assigned to the project activity, areas or departments as per table I and II above. Severity shall not be assigned by Quality professionals in isolation but a thorough discussion should be held with the key members of project management teams or department functional leads. Based on the discussion outcome, highest severity level shall be selected to assign severity rating to a project activity or a department area.

B. Probability

It is defined as the likelihood of failure of a process, material and/or equipment during project or department execution. Probability rating can be determined as per the Probability matrix provided in table – III for projects and table – IV for departments. Similar to severity ratings, probability ratings shall also be assigned after discussing with key project management team members or department functional leads. Highest probability shall be selected to assign probability rating.

TABLE III
PROBABILITY MATRIX (PROJECTS)

Probability aspect	**Rating**
1) Pre-front end engineering, Front end engineering and Detailed engineering phases	
Requirements and design are standard	1
Design is simple and known with generic changes or customizations to specified requirements	2
Design is established but changes or customizations to specified requirements are specific in nature	3
Design is established but complex with stringent specified requirements	4
Design is non-established, unproven or new with complex specified requirements	5
2) Construction (or fabrication), inspection and testing phases	
Steps and processes are simple and well established	1
Steps and processes are simple and established	2
Steps and processes involve complexity but not to large extent	3
Steps and processes involve complexity to large extent	4
Steps and processes are non-established and unproven	5
3) Installation, Commissioning, Start-up and Operation phases	
Steps and processes are simple and well established	1
Steps and processes are simple and established	2
Steps and processes involve complexity but not to large extent	3
Steps and processes involve complexity to large extent	4
Steps and processes are non-established and unproven	5

TABLE IV
PROBABILITY MATRIX (DEPARTMENTS)

Probability aspect	Rating
1) Complexity of processes	
Steps and processes are simple and well established	1
Steps and processes are simple and established	2
Steps and processes involve complexity but not to large extent	3
Steps and processes involve complexity to large extent	4
Steps and processes are non-established and unproven	5
2) Intra-department involvement Construction (or fabrication), inspection and testing phases	
Simple, less and well established	1
Simple, less but not well established	2
Complex, more and well established	3
Complex, more but not well established	4
Non-established and unproven	5
3) Inputs and outputs	
Simple, less and well established	1
Simple, less but not well established	2
Complex, more and well established	3
Complex, more but not well established	4
Simple, less and well established	5

III. AUDIT RISK RATING

Audit risk rating shall be determined by multiplying Severity and Probability ratings. Table V clearly demonstrates that for high risk areas (audit risk ranking A), exhaustive audit(s) covering entire area or department are required and are non-negotiable. The audit(s) must take place to identify root cause(s) of issues and corrective and/or preventive actions should be taken by respective process owners. Whereas for significant risk areas (audit risk rating B), though the Quality professionals should still conduct audit(s), the focus should be on certain key challenging aspects of project or department. For moderate risk areas (audit risk rating C), the decision of whether to audit or not is based on discussion between Quality professionals and process owner. Lastly, for the areas where risk is negligible (audit risk rating D), an audit is potentially not required. Table V summarizes and comes as a handy tool for Quality professional as to when audits are mandatory and extent of audits for projects or departments.

Audit Risk Rating	Severity X Probability = AR	Audit decision
High (A)	15 =< AR =< 25	Non-negotiable, a must – detailed audit in its entirety is absolutely required
Significant (B)	10 =< AR < 15	Required with focus on few key aspects where project or department is facing challenges
Moderate (C)	5 =< AR < 10	May be. Decision should be made based on discussion with Quality professional and process owner
Negligible (D)	1 <= AR < 5	Not required

IV. CONCLUSIONS

Quality professionals shall use a risk based criteria such as above to provide more value to the company, projects and/or departments from their Quality auditing program. In fact, latest versions of some of the international standards such as ISO 9001 [4] require risk based thinking. Using risk based approach for Quality auditing can provide significant cost savings (from thousands to millions of US dollars depending on size of companies and projects) and risk mitigations to companies in oil and gas industry with a focus on auditing project areas or departments that are deemed more risky than others and will eliminate subjectivity from their Quality auditing program making it more value added.

Disclaimer: This paper does not represent any TechnipFMC position, and it is in no way related to TechnipFMC.

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