

Integrated and structured verification scheme for Reliability and Integrity Assessment: A case study on Refinery plant



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BV value proposition

ASSET INTEGRITY ASSURANCE AUDIT



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OUR SOLUTION: Asset Integrity Assurance Audit

- A **robust** audit process, tested and improved over more than 5 years with multiple operators in Malaysia
- Applicable in an **Operational Excellence** framework and for **Due-Diligence** (asset transfer)
- A **clear reporting** focused on **high risk** items
- Support for Gap Closure

OUR DELIVERY CAPABILITIES

- Highly qualified team with extensive operational experience in all disciplines,
- Management of findings through BV digital solution*,
- Additional support for local follow-up

* BV Compliance module to be developed

BVS VALUE PROPOSITION

Immediate ROI through compliance and AI&R improvement

Bureau Veritas Solutions offers a complete and integrated audit solution covering all disciplines and all asset types





OVERVIEW

ASSET INTEGRITY ASSURANCE AUDIT

Operators must demonstrate the continuous efficiency and effective implementation of their management systems and the safe operations of their assets.

Mechanical integrity and systems reliability are periodically audited to provide such evidence.

Audits can be performed at different levels and by different entities:

- **Operator itself**
- **Owner / shareholders (if different from operator) or their representative**
- **Regulator or their representative**

Such audits can also be part of Due Diligence process by potential buyers.

Bureau Veritas can be mandated to perform or support any of the parties above.

Our auditing methodology keeps focus on Asset Critical Elements:

- **Safety**
- **Environmental**
- **Business**

WHY CHOOSE BUREAU VERITAS SOLUTIONS FOR ASSET INTEGRITY ASSURANCE AUDIT

- ✓ **MULTIDISCIPLINE TEAMS WITH DEMONSTRATED OPERATIONAL EXPERIENCE**
- ✓ **PROVEN METHODOLOGICAL APPROACH**
- ✓ **FLEXIBILITY OF AUDIT FRAMEWORK**
- ✓ **DIGITAL REPORTING***
- ✓ **WORLDWIDE APPLICABILITY**



RAI Assessment INTRODUCTION

REFINERY PLANT



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- ❑ A structured verification scheme was implemented to evaluate Reliability and Integrity system effectiveness in process industrial for a Refinery Plant in South East Asia.
- ❑ Using goal setting oriented approach, Bureau Veritas (BV) had been commissioned for details situational study and gap assessment on the current Reliability & Integrity (RAI) management system and performance with the main objective of further improvement based on recognized good engineering practice in similar industries.
- ❑ BV smart checklist was used to facilitate and qualitatively quantify results and linked toward assessment scoring.
- ❑ The score was derived based on the level of compliance i.e. in full, partially and none, with the specified requirements.
- ❑ This then illustrate clearly the performance, strength and areas for improvement.
- ❑ Results were derived based on scored assessments.



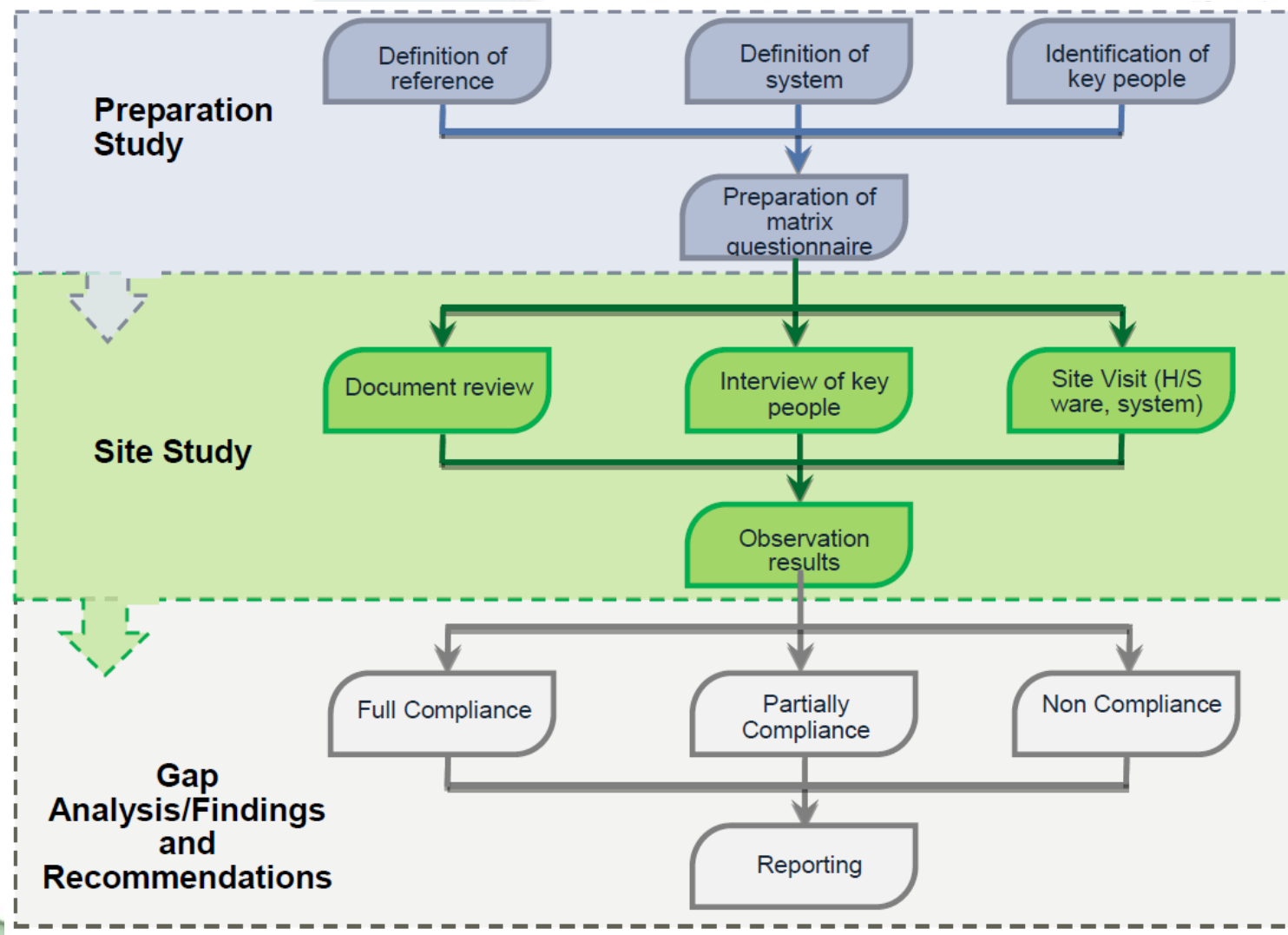
Methodology

RAI REFINERY PLANT



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RAI Assessment SCOPE

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General	1. Reliability Policy
	2. EN Manpower and Organization
	3. Procurement
	4. Document Control
Engineering	5. Engineering Request
	6. Technical Request
	7. Hazard and Operability Study (HAZOPS) 8. Engineering Quality Team
Fabrication	9. Project management (Fabrication)
	10. Quality Assurance and Quality Control (QA/QC) (Fabrication)
Construction	11. Project Management (Construction)
	12. Quality Assurance and Quality Control (QA/QC) (Construction)
	13. Job Safety Analysis & Quality Control Analysis
Operation	14. Operation Control and Monitoring
	15. Integrity Operating Window
Maintenance	16. Corrective Maintenance (CM)
	17. Preventive maintenance (PM)
	18. CM from PM
	19. Inspection
	20. Risk Assessment (RCM/RBI/SIL)
	21. Spare Part management
	22. Breakdown Record and Bad Actor Elimination
	23. Failure Analysis/Root Cause Analysis
24. Management of Change	
Disposal	25. Idle Equipment



01

Preparation Stage:
 Documents collection & review, ToR, checklist,



02

Situational Assessment:
 Office & Site visit mob, validation, verification



03

Gap analysis, findings & recommendations: scoring, recommendations, compliance



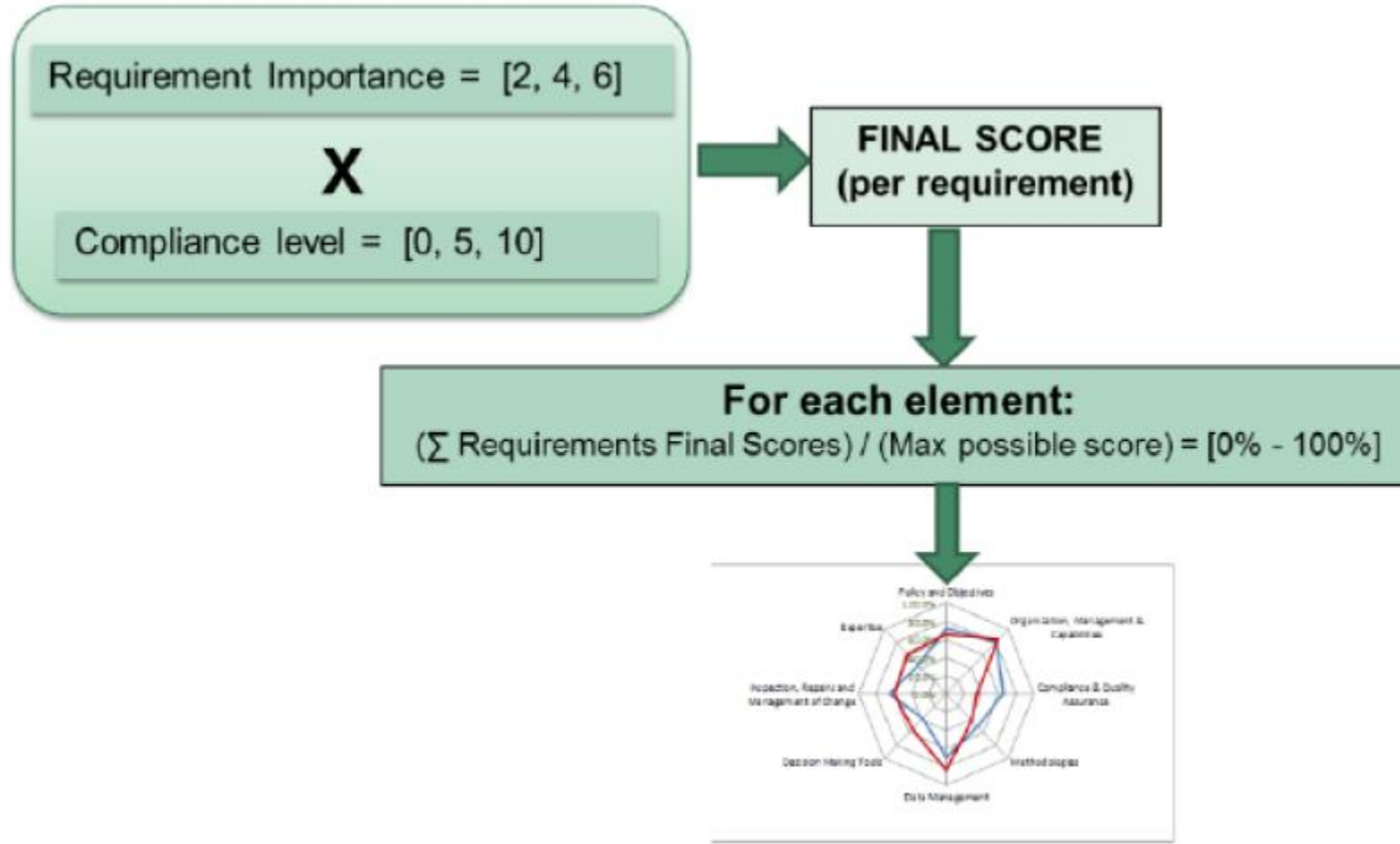
SCORING System

PART 1



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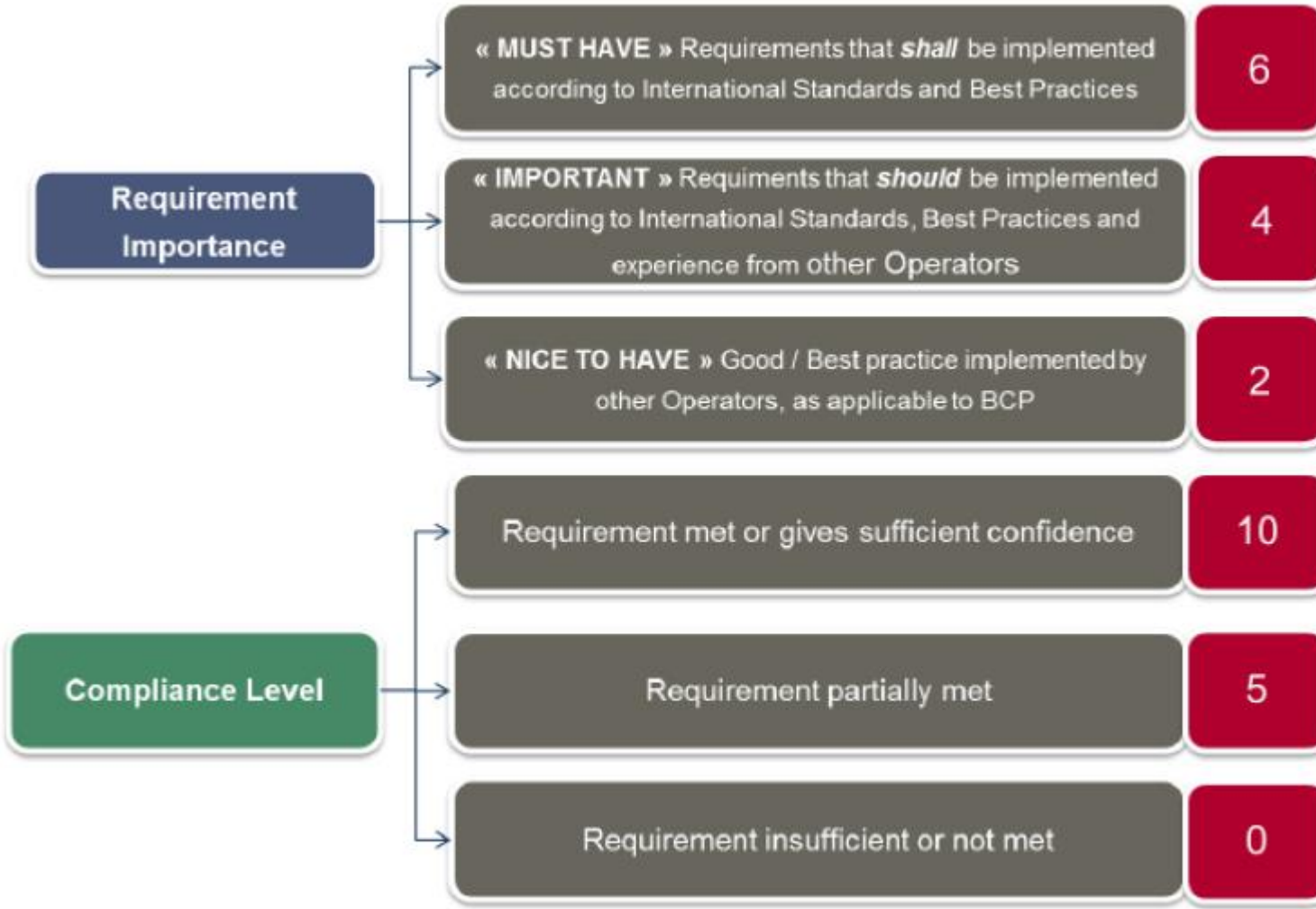
SCORING System

PART 2



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Assessment RESULTS

PROFILE & ELEMENTS SCORE



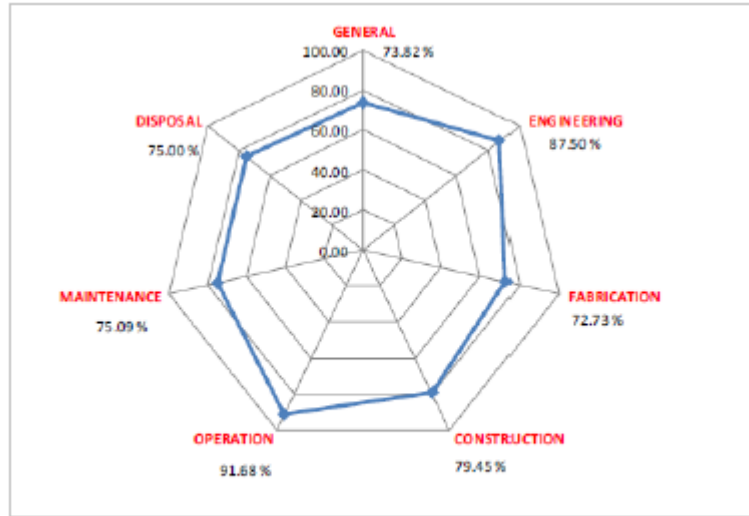
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Element Score Results



OVERALL SCORE
(Out of 100%): **79.32**

Profile Score Assessment Result - the lower the score, the more criteria which are not fully compliant, i.e. require larger improvements to be made.

Category	Score	Criteria	Score
General	73.82	1. Reliability Policy	66.18
		2. EN Manpower and Organization	64.58
		3. Procurement	87.5
		4. Document Control	75
Engineering	87.50	5. Engineering Request (shared with No. 6 and No. 8)	91.67
		6. Technical Request (shared with No. 5 and No. 8)	91.67
		7. Hazard and Operability Study (HAZOPS)	75
		8. Engineering Quality Team (shared with No. 5 and No. 5)	91.67
		9. Project management (Fabrication) (shared with No. 10, No. 11, and No. 12)	72.73
Fabrication	72.73	10. Quality Assurance and Quality Control (QA/QC) (Fabrication) (shared with No. 9, No. 11, and No. 12)	72.73
		11. Project Management (Construction) (shared with No. 9, No. 10, and No. 12)	72.73
Construction	79.45	12. Quality Assurance and Quality Control (QA/QC) (Construction) (shared with No. 9, No. 10, and No. 11)	72.73
		13. Job Safety Analysis & Quality Control Analysis	92.9
Operation	91.68	14. Operation Control and Monitoring	91.67
		15. Integrity Operating Window	91.7
Maintenance	75.09	16. Corrective Maintenance (CM) (shared with No. 17, No. 18, and No. 19)	69.13
		17. Preventive maintenance (PM) (shared with No. 16, No. 18, and No. 19)	69.13
		18. CM from PM (shared with No. 16, No. 17, and No. 19)	69.13
		19. Inspection (shared with No. 16, No. 17, and No. 18)	69.13
		20. Risk Assessment (RCM/RBI/SIL)	81.3
		21. Spare Part management	78.57
		22. Breakdown Record and Bad Actor Elimination	86.36
		23. Failure Analysis/Root Cause Analysis	86.36
Disposal	75.00	24. Management of Change	66.67
		25. Idle Equipment	75

To give more sense in identifying gaps and recommendations, an assessment of impact was further carried out. As overall, the gaps are classified into two main areas:

i. Gap findings on addressing RAI requirements – focus on the unavailability of RAI requirements which must be established and clearly addressed in RAI governance document.

ii. Gap findings on the RAI implementation – focus on the condition of which current practice does not comply with RAI requirements.



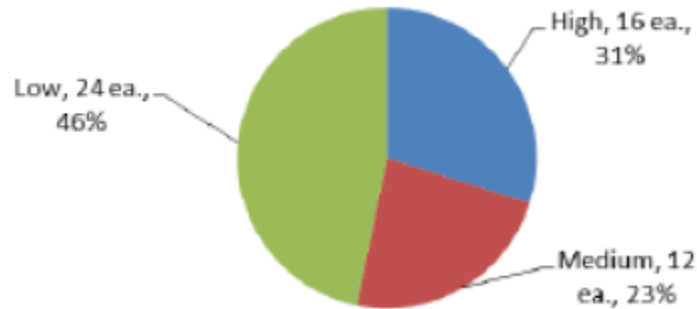
Conclusion

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□ Distributions of gap findings & recommendation results

- ✓ The proposed improvements and strategies to achieve full implementation of RAI in line with applicable standards and codes, as well as industry best practice in similar industries were recommended based on assessment results.
- ✓ Scoring system was established to illustrate the assessment results. The gaps and findings profiles
- ✓ In addressed context of findings and priority level of rectifying recommendations, associated action plan for all recommendations were prioritized into three categories, i.e. High, Medium, and Low Priority.





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Thanks and Questions

