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Kagisho Motseme
MOSH Adoption Team Manager: Noise
MHSC Research Workshop
GLENBURN
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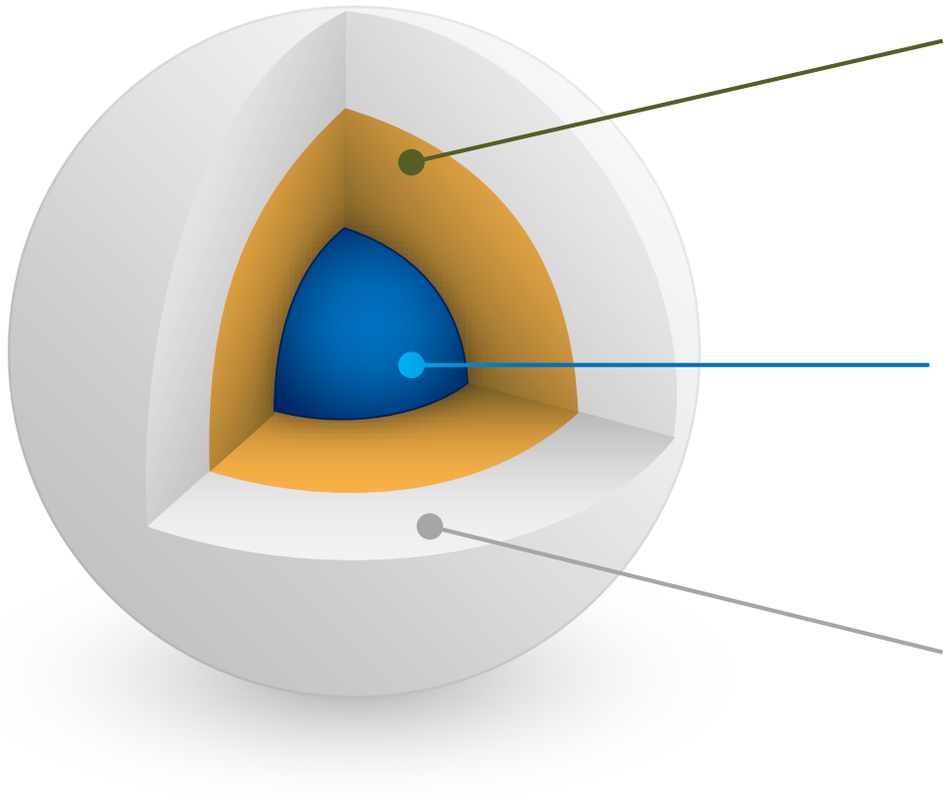
INCORPORATING NOISE PROCUREMENT FRAMEWORKS TO IBMQI

PUTTING SOUTH AFRICA FIRST

Introduction



Purpose

To provide the Mining Industry Leaders with a consolidated industry-wide strategy for an **Industry-wide Buy and Maintain Quiet Initiative** (IBMQI) as well as a practical path-forward to execute the strategy

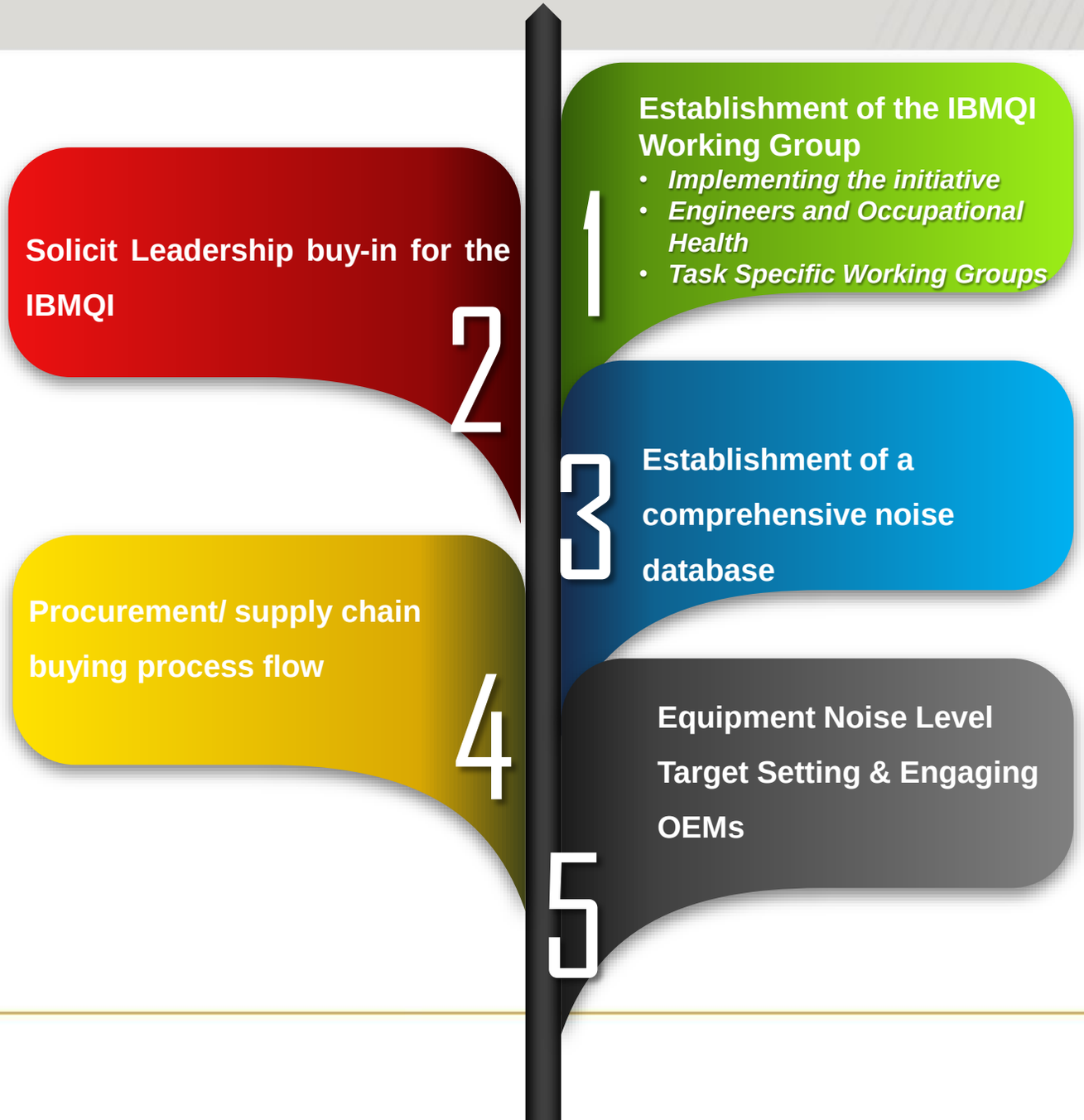
Manage Noise at Source - "*Critical Control*"

- Noise is an Engineering problem
- Its cheaper to manage noise @ source
- Noise source measurements, after-effect analysis etc. – Occupational Health domain

What is it?

A standing decision from mining companies to procure equipment and maintain existing equipment that comply with specific noise emission requirements

IBMQI Road Map Cont…..

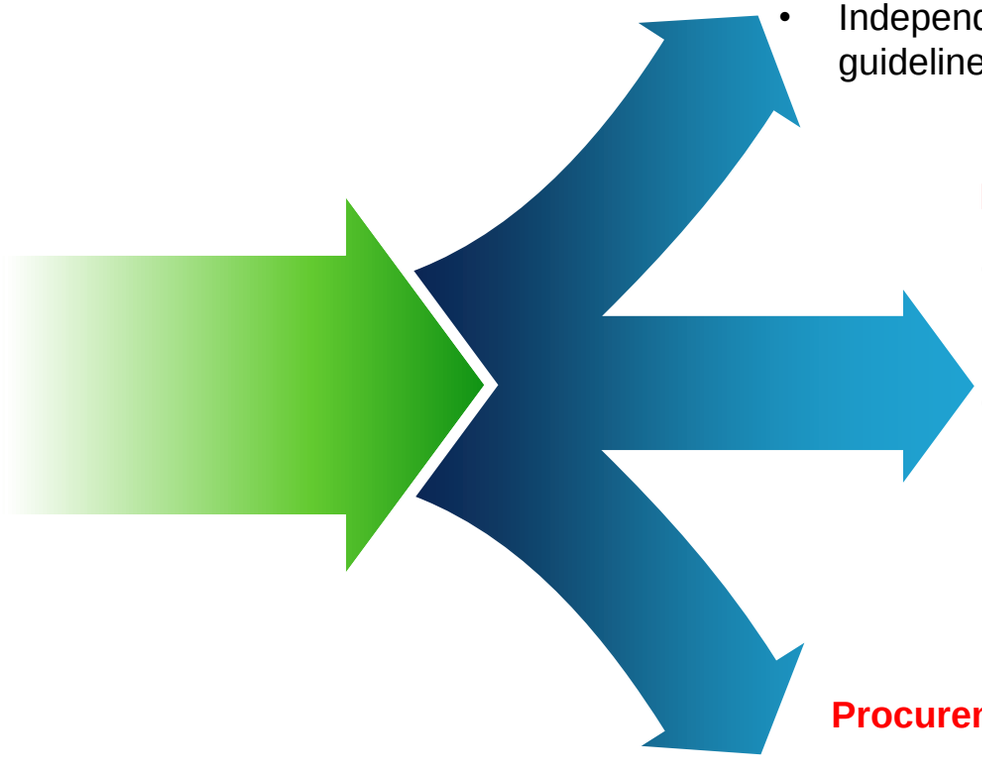


IBMQI Working Groups

IBMQI

Industry-wide Buy and Maintain Quiet Initiative

- 3 Working Groups



Measurements and Standards

- Noise Measurement Methodology Guideline
- Compiling a noise source inventory
- Independent certification and verification guidelines (both for new and old machines)

Research Consolidation

- Review previous and current research and inform future research
- Interview the technology experts

Procurement

- Prioritization of critical equipment; and
- Review critical equipment and identify the noise reduction-target setting

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NOISE REDUCTION PROCESS

Noise Reduction Process

Measure Noise

Measurement Standards Sub Team

- Noise database
- Standardized Noise Measurement

Classify High Noise Equipment

Procurement Sub Team

- Framework to Prioritise Critical Equipment **(SLP)**
- List of Critical Equipment per commodity

Implement the IBMQI

Procurement Sub Team

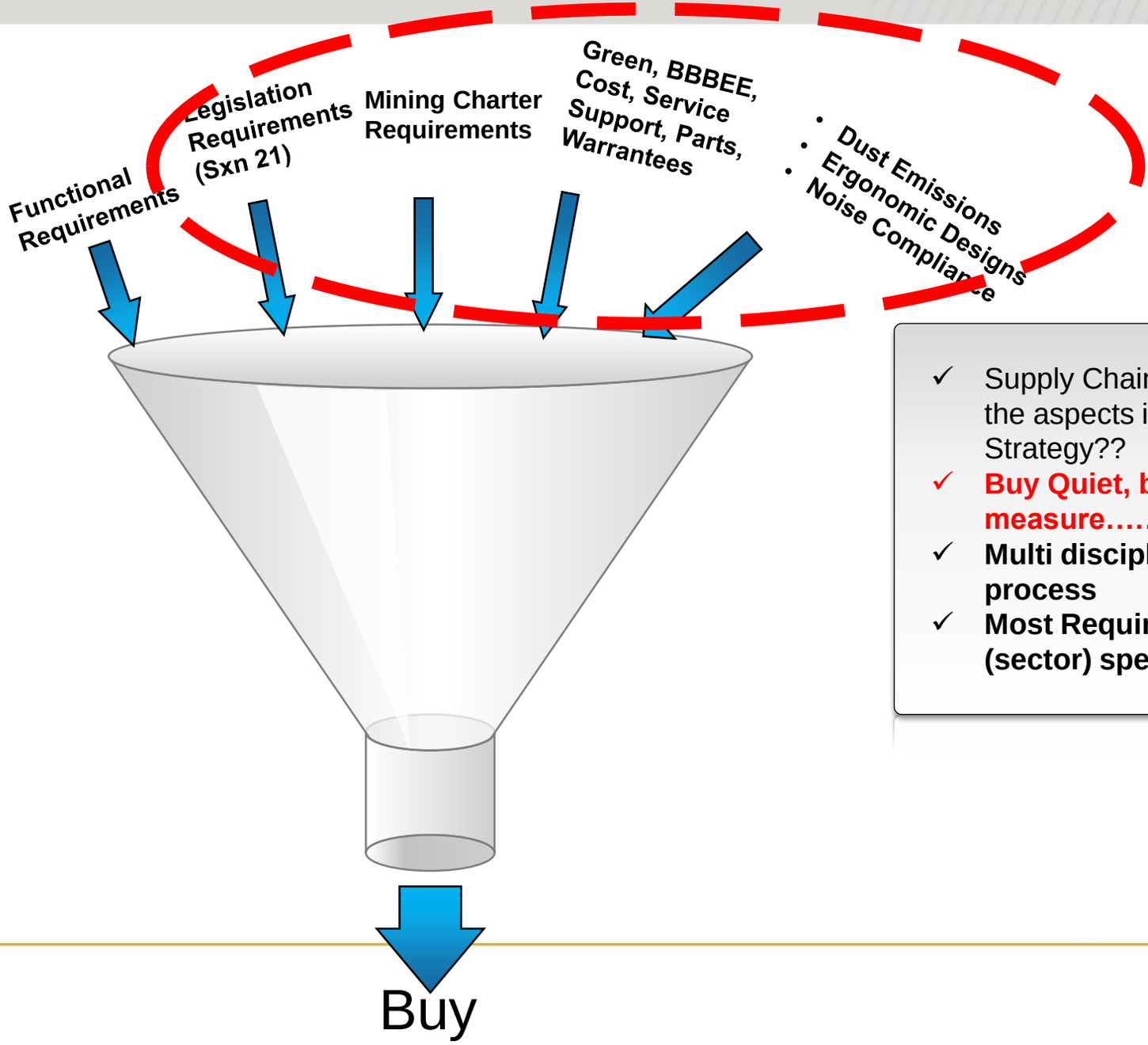
- Framework of factors to consider During Procurement & Maintenance **(SLP)**

Identification of Development Areas

Procurement Sub Team

- Framework to set Industry Noise Reduction Development Targets **(SLP)**
- Set Noise Reduction Targets **(SLP)**
- Test the Developments

Typical Mine Procurement Process



- ✓ Supply Chain Manager to consider ALL of the aspects in line with the Procurement Strategy??
- ✓ **Buy Quiet, becomes another measure…….**
- ✓ **Multi disciplinary and Integrated process**
- ✓ **Most Requirements can be industry (sector) specific**

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PRIORITISATION OF CRITICAL MACHINES

Prioritisation of Critical Machines

Factors to Consider

1. Noise Levels (2024 Milestone)
2. Other noise factors
   - Number of persons exposed
   - Number of machines at work environment
   - Duration of exposure
   - Confined space
   - Machine vibration
   - Wear parameters
   - Previous improvement ideas
   - Effective hearing protection
   - Frequency of noise

- **Numerous factors**
- **Interrelated factors**
- **Complications should not be used as scapegoats & limit innovation**

Equipment Noise Screening Tool

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Screening Process	Weight	Individual Score	Rock Drills - SC215	Trackless mining Equipment	Winch 37 / 55 kW	Fans	Main Pumps	Kempe S36 Diamond Drill Development	Compressor	Equipment	Pumps	Crushers	Sludge pump
dBA Measurement	35		8	8	7	7	7	8	8	6	7	7	7
Noise >107dBA		10											
Noise >104 <107 dBA		9											
Noise >101 <104 dBA		8	x	x				x	x				
Noise >98 <101 dBA		7			x	x	x				x	x	x
Noise >95 <98 dBA		6								x			
Noise >92 <95dBA		5											
Noise >89 <92dBA		4											
Noise >85 <89dBA		2											
No. of Persons	10		10	10	9	10	9	8	8	9	8	9	8
Exposed persons >10		10	x	x		x							
Exposed persons > 5		9			x		x			x		x	
Exposed persons > 2		8						x	x		x		x
Exposed person		7											
No. of Machines	9		10	4	8	8	4	10	4	4	4	4	4
Number of machines >100		10	x					x					
Number of machines >30<100		8			x	x							
Number of machines >10<30		6											
Number of machines >10		4		x			x		x	x	x	x	x
Time of Exposure	9		8	10	8	8	8	8	8	8	4	8	4
Exposure > 4hours		10		x									
Exposure > 1hour < 4 Hours		8	x		x	x	x	x	x	x		x	
Exposure < 1hour		4									x		x
Exposure < 10 min		2											
Exposure < 1 min		1											
Confined Work Space	8		10	10	8	8	8	10	8	10	8	8	8
Multiple sources in confined space		10	x	x				x		x			
Single source in confined space		8			x	x	x		x		x	x	x
Multiple sources inside plant building		6											
Single source inside plant building		4											
Source in open areas		2											
Source in open-pit		1											

Equipment Noise Screening Tool (Continued)

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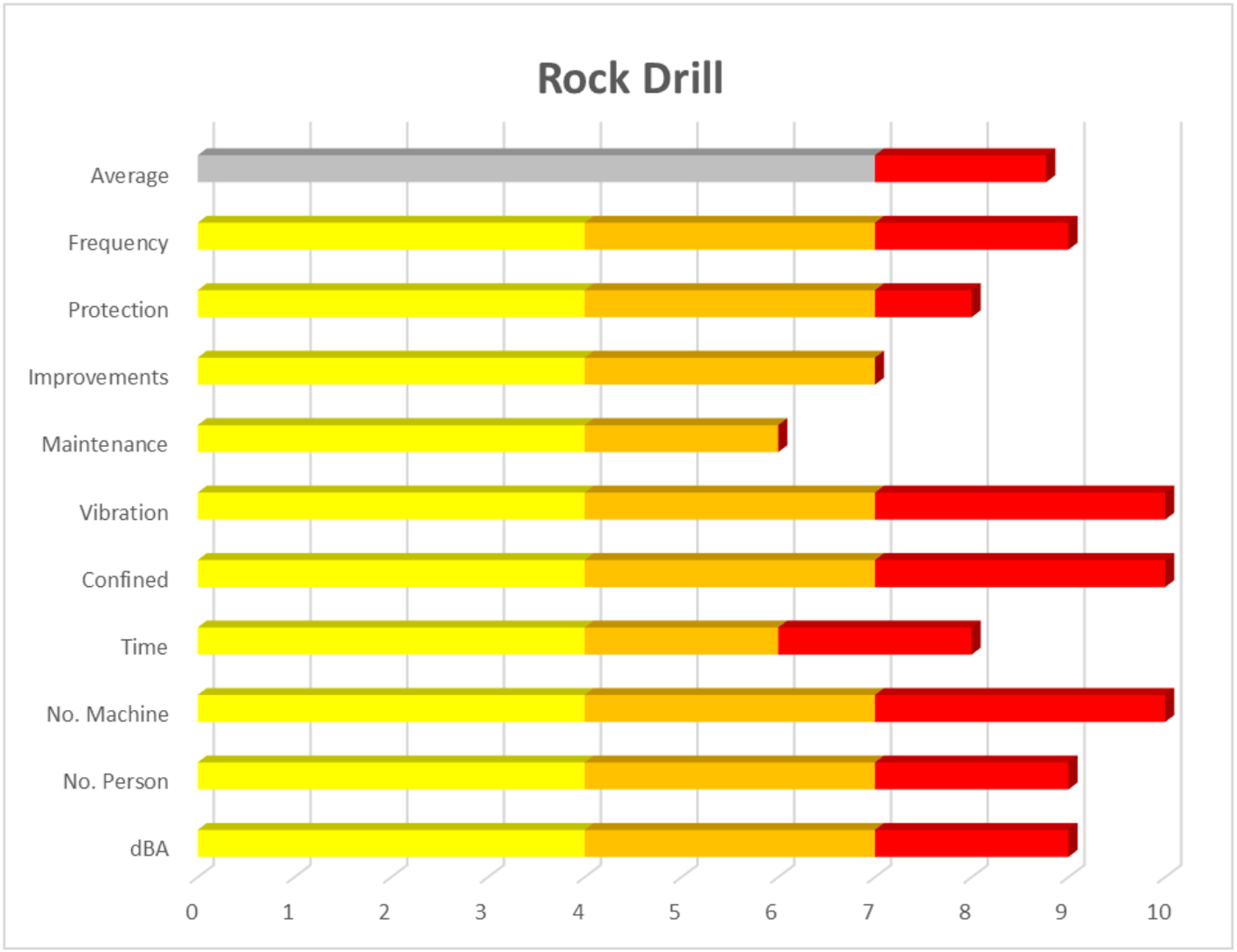
Screening Process	Weight	Individual Score	Rock Drills - SC215	Trackless mining Equipment	Winch 37 / 55 kW	Fans	Main Pumps	Kempe S36 Diamond Drill Development	Compressor	Equipment	Pumps	Crushers	Sludge pump
Machine Vibration	7		10	10	0	0	0	8	0	8	0	0	0
Operator directly exposed to noticable machine vibration		10	x	x									
Operator directly exposed to some machine vibration		8						x		x			
Operator indirectly exposed to machine vibration		4											
Little noticable machine vibration		2											
No exposure to machine vibration		0			x	x	x		x		x	x	x
Maintenance	7		3	3	3	3	3	3	6	6	6	6	6
Noise levels increase significantly as condition deteriorates		10											
Noise levels increase noticeable as condition deteriorates		6							x	x	x	x	x
Noise levels increase marginally as condition deteriorates		3	x	x	x	x	x	x					
No noise variance due to condition		0											
Equipment Improvements & Solutions	6		10	0	10	10	0	10	0	10	0	0	0
Significant effort has been done to reduce noise		10	x		x	x		x		x			
More than two modifications were done previously		7											
One modification done to improve noise level		3											
No action taken		0		x			x		x		x	x	x
Hearing Protection	5		2	2	2	2	2	2	2	2	2	2	2
Hearing protection ineffective		10											
Hearing protection reasonably effective		8											
Require special hearing protection devices		6											
Conventional hearing protection devices effective		2	x	x	x	x	x	x	x	x	x	x	x
No hearing protection required		0											
Critical Frequency Range	4		10	10	10	3	10	10	10	10	10	10	10
Frequency causes increased fatigue		10	x	x	x		x	x	x	x	x	x	x
Excessive resonanse with frequent spikes		9											
Critical 1kHz frequency noise		8											
Less critical noise band frequencies		3				x							
Non desturbing noise		0											
Critical Equipment Risk Ranking	100		8.23	6.57	6.74	6.56	5.78	7.89	6.24	6.96	5.53	5.99	5.53

Development Targets Example 2 - Rock Drill



- **Rock drill noise emissions is a function of the technology, complicated by work environment, and very difficult to influence - Set Targets Accordingly**
- **Approach can be on a SPECIF HPD for Operators**

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CONSIDERING NOISE DURING PROCUREMENT PROCESS

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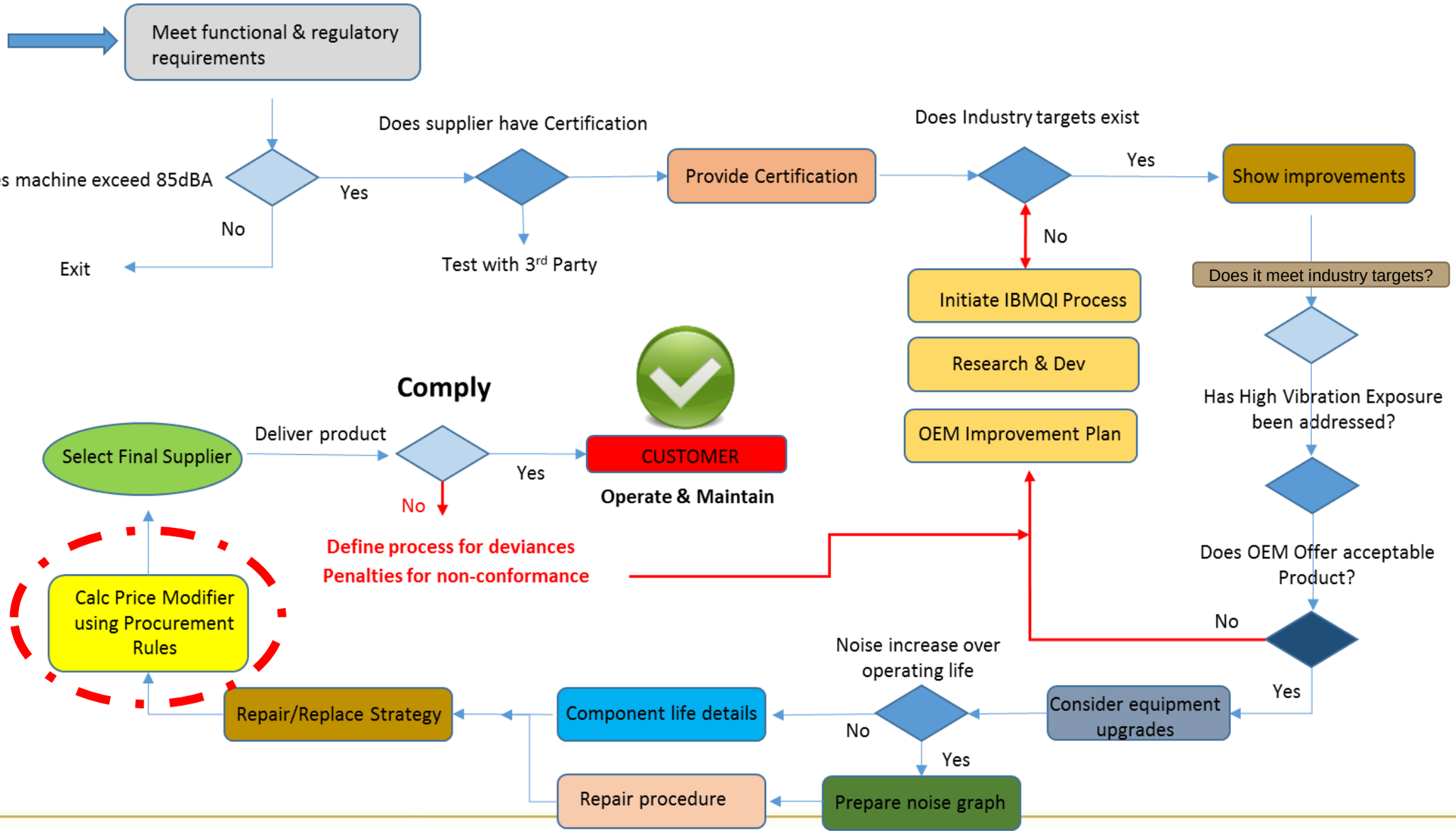

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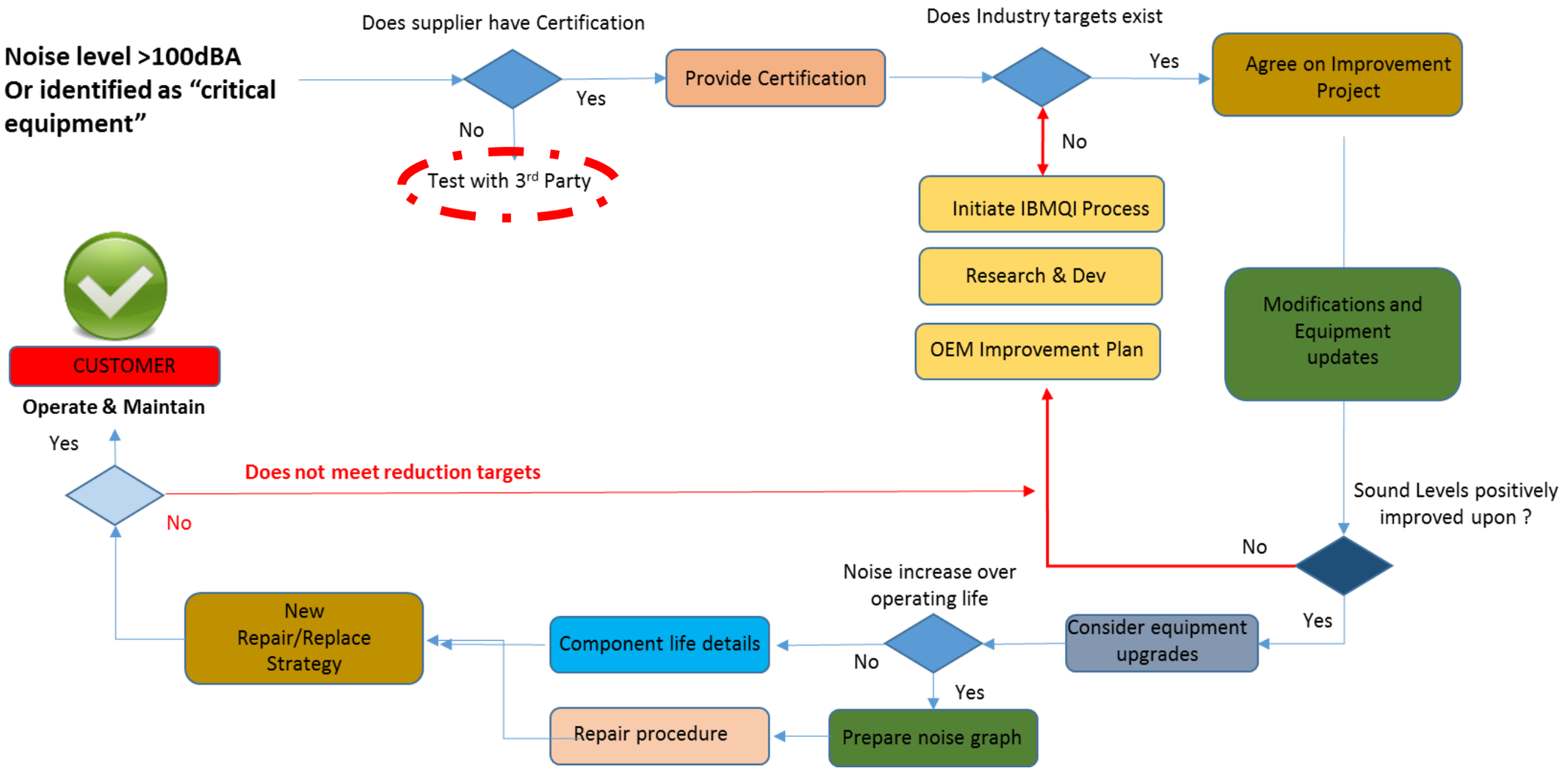
CONSIDERING NOISE REDUCTION OF EXISTING EQUIPMENT

CONSIDERING NOISE REDUCTION OF EXISTING EQUIPMENT



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DISCUSSIONS WITH OEM'S

Discussions with OEM's

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IBMQI PROCESS

GENERAL INFO			OEM DISCUSSION & TARGET SETTING	
Mining House	ABC Mining		1. Do you have certified measures ?	
Commodity	Platinum		2. How do you plan to meet target ?	
Type of Mining	UG Conventional			
Activity of Workplace	Stoping		3. What type of muffler/device do you use ?	
Equipment / Process Category	Rock Drill			
Noise Level (dBA) - Process noise	103dBA		4. Research & Development Plan	
Noise Level (dBA) Max.	106.1dBA			
The Industry target for 2020	105dBA		5. What type of development have been done ?	
Power source (Pneumatic/Electric etc)	Pneumatic			
Manufacturer / Supplier	Victoria Engineering		6. Are the developments successful ?	
Equipment and/or Process Type	SE26		7. Are these development available ?	
Model	SE26		8. By which date ?	
Supply of Complete Units / Components	Components		9. Who do you use for Research & Development ?	
Sub Component Supplier (CAT)			10. Attach Project Plan	
Subcomponent (CAT C15 Engine)			11. Next Steps	
Screening Results			12. Potential cost impact	
dBA Measurement	106	9	13. Can you reduce vibration ?	
No of persons effected per Area	10	9		
No of machines at Site	394	10	14. Have you quanitified the frequency band ?	
Expose time	5hrs	8	15. What is the noise increase due to wear ?	
Confined space	Yes / No	10	16. Have you measured the deteriaration ?	
Significant vibration	Yes / No	10	17. Provide component life details	
Maintenance impact	Yes / No	6	18. Do you have a repair procedure ?	
Silenced	Yes / No	7	19. What is the repair/replace strategy ?	
Hearing protection		8	20. How is deviances dealt with ?	
Frequency band		9	21. What happens in case of non-compliance ?	
Average rating	HIGH	8.77		

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PROGRESS SO FAR

Progress so Far

Measurement Standard Sub working Group

- Noise Measurement Methodology Guideline Finalised and Published
  - Simplified – dealing background noise, rules of thumb, calculation of log averages etc.
  - Adopted by GEEs and proposed to replace the CIoM
  - A day of learning was held on the 28 April 2016
  - Roadshows scheduled from July

Research Consolidation Sub working Group

- Research consolidation document – Draft Report Available
  - The document should inform the ways of engaging OEMs and suppliers
  - The document should inform possible research direction

Procurement Sub working Group

- Framework to Engage OEMs and Suppliers
  - Complete the repository of priority equipment in different commodities – In progress
  - Set the acceptable standards

Conclusion

✓We can measure NOISE consistently across the mining industry

✓Value of these Frameworks

- Lead us to an industry (commodity) specific requirement (Best Achievable Requirement)
- Identification and information on our problematic equipment – this may inform future MHSC milestone setting initiatives and design requirements
  - Avoid ‘Blanket” requirements
  - Unlock Cheap Innovations – e.g. HPD specific for Rock Drill operators

For further information on other MOSH initiatives visit:

www.mosh.co.za/noise/summary

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