



# ASPASA

Small surface mine association

## Mining for future generations Construction Materials Supply



- Presented by: Letisha van den Berg
- Director: ASPASA

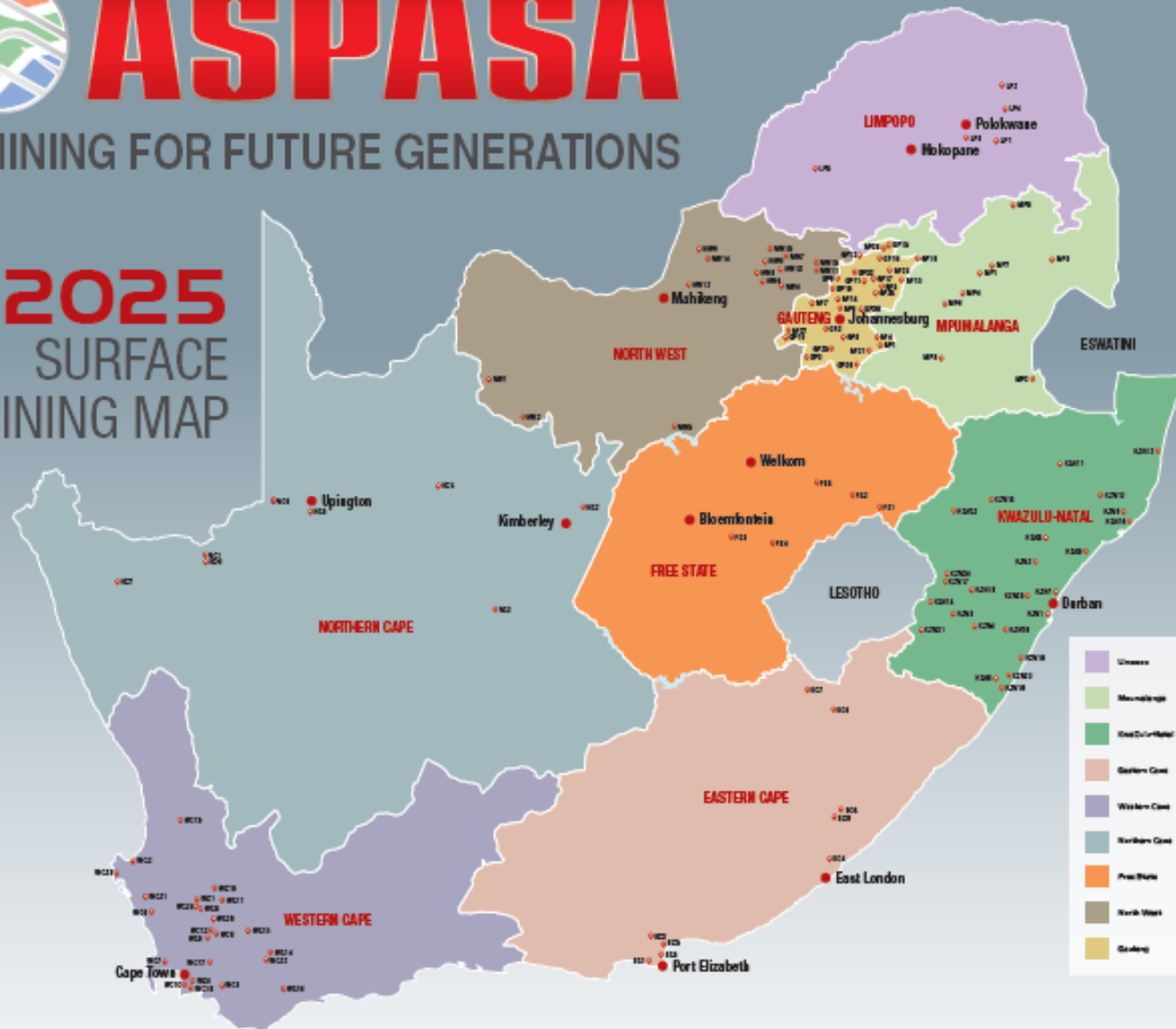
# Who is ASPASA



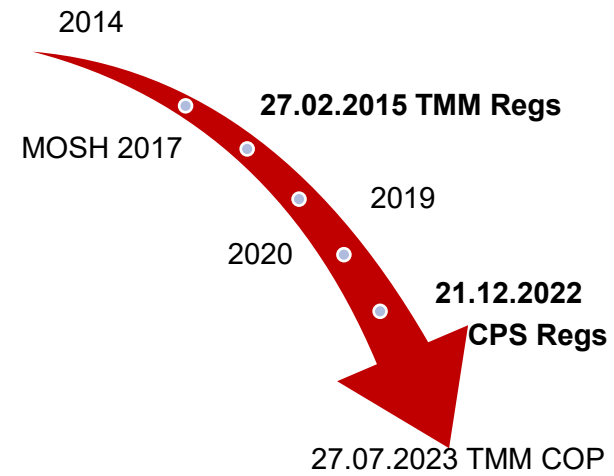
# ASPASA

MINING FOR FUTURE GENERATIONS

## 2025 SURFACE MINING MAP



# ASPASA



# MOSH Surface Mine Traffic Management Leading Practice 2014 to current

- ASPASA actively involved in assisting in drafting the leading practice
- MOSH CMS
- Mitacom risk-based approach ASPASA member incident register
- MOSH leading practice officially launched adoption sessions
- Small Surface mines – progress reporting poor
- Visited De Beers Free State GCC Engineer level 8

# MOSH Surface Mine Traffic Management Leading Practice

- Subjective
- Money waster
- Cannot be done
- No fatalities



- Unnecessary
- Time consuming
- Nice to have
- Do not touch it if it is not broken

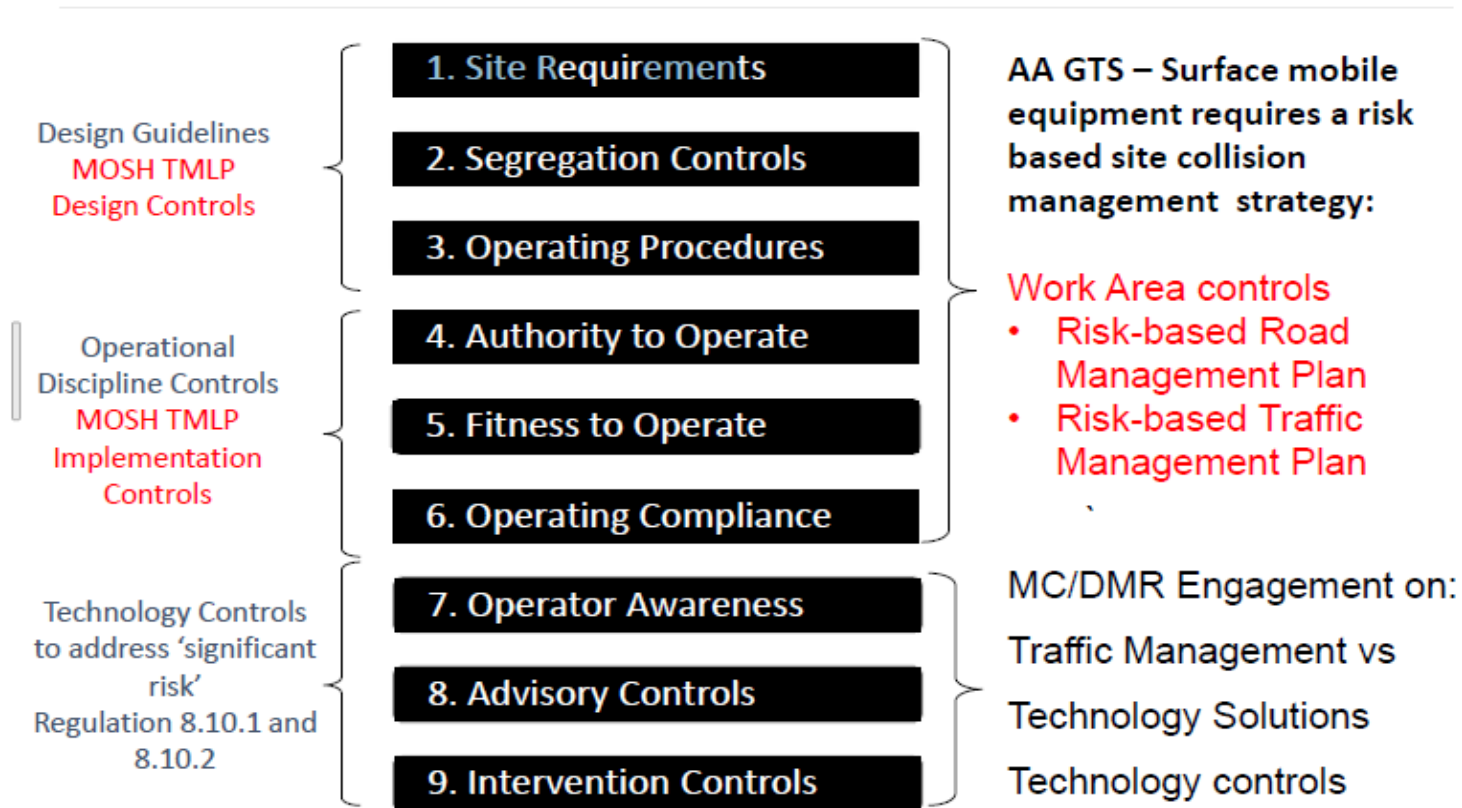
# Collision Prevention System Journey 2017

- Started 18 May 2017
- Attended the risk evaluation of Mitacom on 27 June 2017
- First mine to adopt the risk evaluation and develop our User Guide for PDS tender document sent to 12 PDS suppliers 27 September 2017 (16 Suppliers in total)
- Tenders closed on 17 November 2017
- 5 December 2017 University of Pretoria simulation process introduced



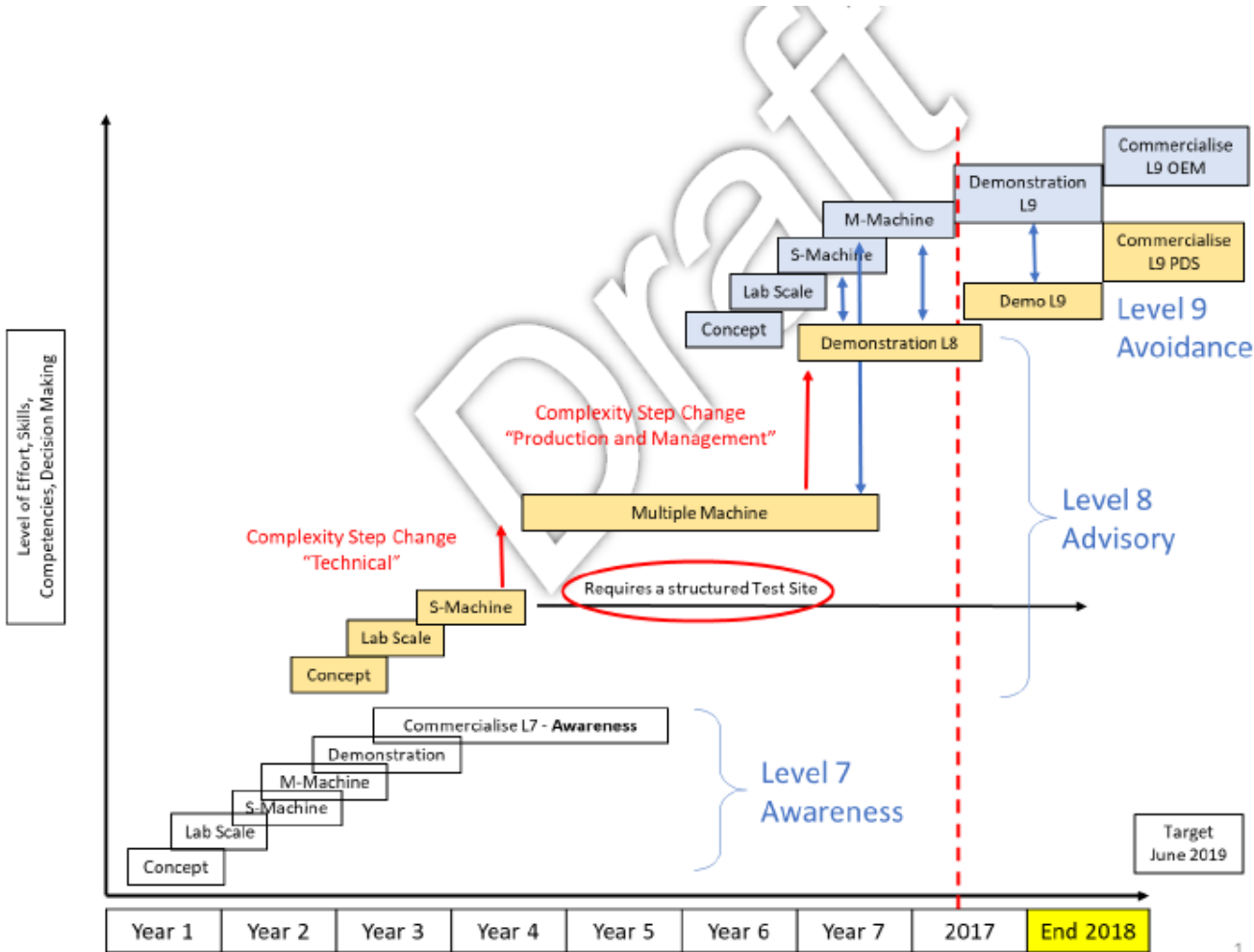
# Collision Prevention System Journey 2017

## ALIGNMENT BETWEEN GTS & MOSH TMLP



Work Area Controls for all equipment could reduce 'significant risk' an

# Collision Prevention System Journey 2017



# Collision Prevention System Journey 2017

## Surface Scenarios

#1-Person (direct)



P3-Person (indirect)



P4-Access & Egress



L1-Head-on



L2-Reverse-on



L3-Backup



L4-Dovetailing



L5-Passing Head-on



L6-Passing Reverse-on



L7-Overtaking



L8-Blind Approach



C1-Curving Head-on



C2-Curving Dovetail



C3-Curving Reverse-on



T1-Merge



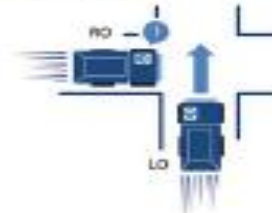
T2-Crossover



T3-Junction



T4-Intersection



O1-Obstacle



V1-Void



V4-Loss of Control



V6-Congested Area



R1-Swing



R2-Drop



# Collision Prevention System Journey 2017



Local Object				Unwanted Event / Weighted Risk + Maximum Risk Rating							
Interactor	Object Code	Incidents	Weighted Risk	Person		Equipment		Environment		Uncontrolled	
				PUE1		PUE2		PUE3		PUE4	
				VR%	RR	VR%	RR	VR%	RR	VR%	RR
		61	1037	0%		27%		21%		51%	
Obstacle	OBS	0	-	-	-	-	-	-	-	-	-
ADT	SME_PRI	13	402	-	-	17.6%	18 (\$)	2.0%	13 (\$)	19.1%	18 (\$)
Client truck	SME_RTV	0	-	-	-	-	-	-	-	-	-
Side tipper truck	SME_RTV	1	1	-	-	-	-	-	-	0.1%	11 (M)
Excavator	SCE_PCE	1	0	-	-	-	-	0.0%	7 (M)	-	-
Void	VOID	0	-	-	-	-	-	-	-	-	-
Forklift	SME_SEC	1	10	-	-	1.0%	13 (\$)	-	-	-	-
Front end loader	SME_SEC	23	224	-	-	7.5%	17 (\$)	11.1%	18 (\$)	3.0%	17 (\$)
Person	PER	0	-	-	-	-	-	-	-	-	-
Water Truck	SME_SEC	0	-	-	-	-	-	-	-	-	-
Mixer Truck	SME_RTV	0	-	-	-	-	-	-	-	-	-
LDV	SME_SDV	14	282	-	-	1.1%	13 (\$)	5.9%	17 (\$)	###	18 (\$)
Service Truck	SME_SEC	0	-	-	-	-	-	-	-	-	-
Rear tipper truck	SME_RTV	0	-	-	-	-	-	-	-	-	-
Sales Truck	SME_RTV	2	13	-	-	0.3%	12 (M)	1.0%	13 (\$)	-	-
Drill Rig	SME_SEC	2	100	-	-	-	-	1.0%	13 (\$)	8.7%	18 (\$)
TLB	SME_SEC	4	6	-	-	-	-	0.5%	12 (M)	-	-
-	-	0	-	-	-	-	-	-	-	-	-
Road Truck	SME_RTV	0	-	-	-	-	-	-	-	-	-
Lowbed Truck	SME_RTV	0	-	-	-	-	-	-	-	-	-
Tractor	SME_SEC	0	-	-	-	-	-	-	-	-	-
-	-	0	-	-	-	-	-	-	-	-	-
Client truck (small)	SME_RTV	0	-	-	-	-	-	-	-	-	-
Car	SME_SDV	0	-	-	-	-	-	-	-	-	-
Berm	OBS	0	-	-	-	-	-	-	-	-	-
-	-	0	-	-	-	-	-	-	-	-	-
Stacker-reclaimer	SCE_PCE	0	-	-	-	-	-	-	-	-	-



# Collision Prevention System Journey 2017



Local Object				Unwanted Event / Weighted Risk + Maximum Risk Rating								Unwanted Event / Strategy							
Interactor	Object Code	Incidents	Weighted Risk	Person		Equip-ment		Environ-ment		Uncon-trolled		Person	Equip-ment	Environ-ment	Uncon-trolled				
				PUE1		PUE2		PUE3		PUE4						PUE1	PUE2	PUE3	PUE4
				WR%	RR	WR%	RR	WR%	RR	WR%	RR								
		<b>61</b>	<b>1037</b>	0%		27%		21%		51%									
ADT	SME_PRI	13	402	-	-	17.6%	18 (S)	2.0%	13 (S)	19.1%	18 (S)	Level 1-7	Level 1-7	Level 1-7	Level 1-6				
												L7-Radar	L7-Radar	L7-Radar	L8-SpdLim				
												L7-Camera	L7-Camera	L7-Camera	L9-SpdLim				
												L9-Inhibit	L7-Prox	-	-				
												-	L8-Prox	-	-				
												-	L9-Slow	-	-				
												-	L9-Stop	-	-				
Front end loader	SME_SEC	23	224	-	-	7.5%	17 (S)	11.1%	18 (S)	3.0%	17 (S)	Level 1-7	Level 1-7	Level 1-7	Level 1-6				
												L7-R.Radar	L7-R.Radar	L7-R.Radar	-				
												L7-Camera	L7-Camera	L7-Camera	-				
												L9-R.Inhibit	L9-Stop	L9-R.Inhibit	-				
LDV	SME_SDV	14	282	-	-	1.1%	13 (S)	5.9%	17 (S)	20.2%	18 (S)	Level 1-6	Level 1-6	Level 1-6	Level 1-6				
												-	L7-Prox	-	-				
Mini-bus	SME_SDV	0	-	-	-	-	-	-	-	-	-	Level 1-6	Level 1-6	Level 1-6	Level 1-6				
												-	L7-Prox	-	-				
Drill Rig	SME_SEC	2	100	-	-	-	-	1.0%	13 (S)	8.7%	18 (S)	Level 1-6	Level 1-6	Level 1-6	Level 1-6				
Sales Truck	SME_RTV	2	13	-	-	0.3%	12 (M)	1.0%	13 (S)	-	-	Level 1-6	Level 1-6	Level 1-6	Level 1-6				
Forklift	SME_SEC	1	10	-	-	1.0%	13 (S)	-	-	-	-	Level 1-6	Level 1-6	Level 1-6	Level 1-6				
TLB	SME_SEC	4	6	-	-	-	-	0.5%	12 (M)	-	-	Level 1-6	Level 1-6	Level 1-6	Level 1-6				

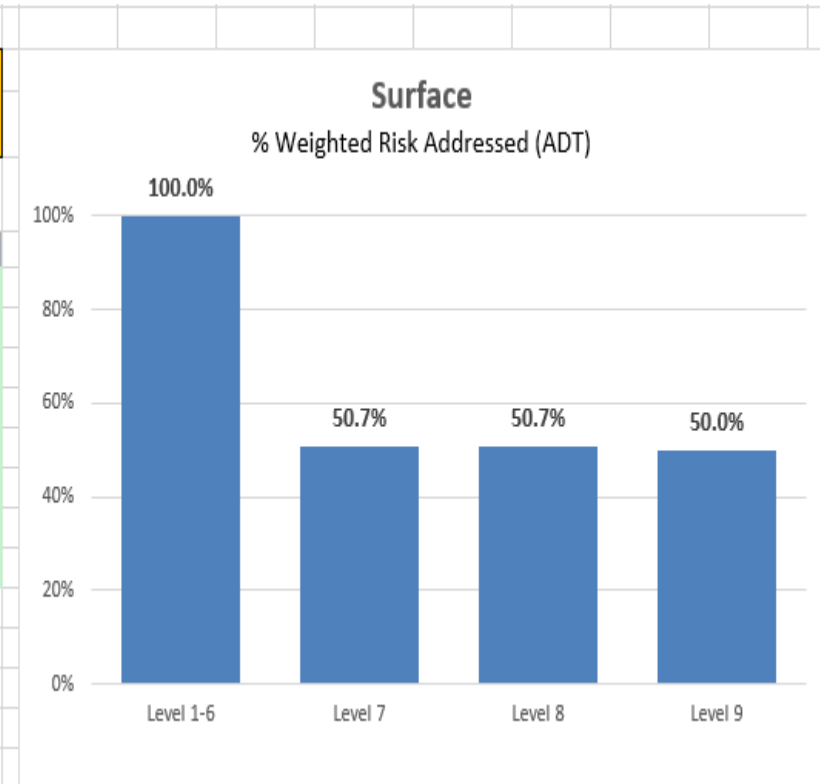
# Collision Prevention System Journey 2017

Weighted Risk Range Calcs (Solution Scope)																																
Scenarios	PUE	ADT										Comments	Front End Loader						Comments	LDV						Comments						
		Speed Ranges											Speed Ranges							Speed Ranges												
		Reverse		M	Forward		Reverse		M	Forward			Reverse		M	Forward																
30-55	10-30	3-10	0-3	0	0-3	3-10	10-30	30-55	30-55	10-30	3-10	0-3	0	0-3	3-10	10-30	30-55	30-55	10-30	3-10	0-3	0	0-3	3-10	10-30	30-55						
L1-Head-on	PUE2					9	9	9	9	8					7	7	7	7									7	7	7	7		
L2-Reverse-on	PUE2	7	7	9	9	9					7	7	9	9	9					e.g. radar	7	7	7	7								
L3-Backup	PUE2	7	7	9	9	9					7	7	9	9	9					e.g. radar	7	7	7	7								
L4-Dovetailing	PUE2					9	9	9	9	8					7	7	7	7									7	7	7	7	slow down	
L5-Passing Head-on	PUE2									8	8	8	8																	minimise f		
L6-Passing Reverse-	PUE2	8	8	8	8																									minimise f		
L7-Overtaking	PUE2									8	8	8	8																	minimise f		
L8-Blind Approach	PUE2	7	7	7	7	9	9	9	9	8					7	7	7	7									7	7	7	7	slow down	
T1-Merge	PUE2					9	9	9	9	8																				slow down		
T2-Crossover	PUE2					9	9	9	9	8																				slow down		
T3-Junction	PUE2					9	9	9	9	8																				slow down		
T4-Intersection	PUE2					9	9	9	9	8																	7	7	7	7	slow down	
O1-Obstacle	PUE3	7	7	9	9	9	9	9	9	7	7				7	9	9	9	e.g. geof												e.g. geof	
P1-Person (direct)	PUE1	7	7	9	9	9	9	9	9	7	7				7	9	9	9	e.g. radar												e.g. radar	
P3-Person (indirect)	PUE1	-	-	-	-	-	-	-	-	-																						
V1-Void	PUE3	7	7	7	9	9	9	9	7	7	7								e.g. geof												e.g. geof	
V4a-Loss of Control (f	PUE4	-	-	-	9	9	9	9	9	8									speed co													
V4b-Loss of Control (f	PUE4																															
V6-Congested Area	PUE2	7	7	7	9	9	9	8	8	8					7	7	7	7	e.g. geof									7	7	7	7	e.g. radar
C1-Curving Dovetail	PUE2					9	9	9	9	8																						
C2-Curving Head-on	PUE2					9	9	9	9	8																						
C3-Curving Reverse-	PUE2	7	7	9	9	9																										
R1-Swing	F																															
R2-Drop	F																															
R2-Drop	F																															
P4-Access & Egress	F																															



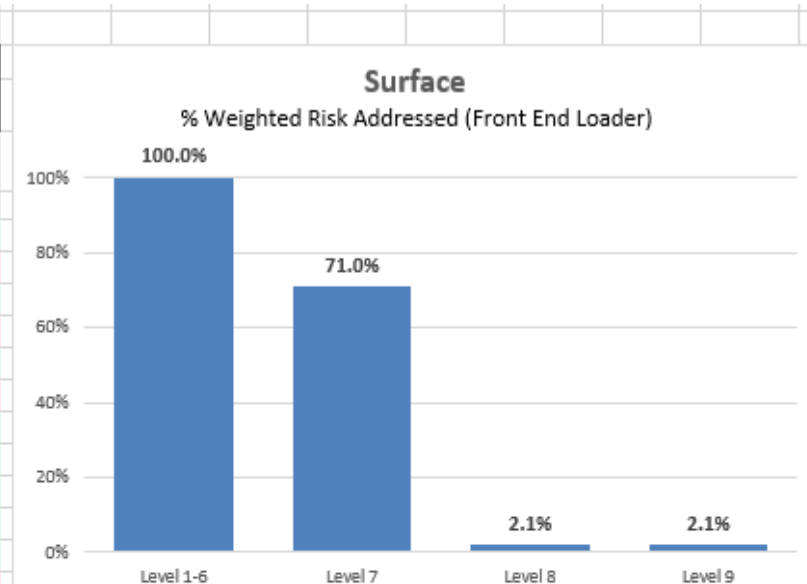
# Collision Prevention System Journey 2017

Equip: ADT				100.0%	50.7%	50.7%	50.0%		
				Level 1-6	Level 7	Level 8	Level 9	In	Has
				Work Area Controls	Awareness	Advisory	Avoidance	Scope	Risk
ORDER	Scenario	PUE	Speed (km/h)	WR %	WR %	WR %	WR %		
69	L2-Reverse-on	PUE2	Rev : 3-10	0.0%	0.0%	0.0%	0.0%	TRUE	TRUE
70	L2-Reverse-on	PUE2	Rev : 0-3	22.4%	22.4%	22.4%	22.4%	TRUE	TRUE
241	L5-Passing Head-on	PUE2	Fwd : 10-30	0.7%	0.7%	0.7%	-	TRUE	TRUE
813	V4b-Loss of Control (Not	PUE4	Fwd : 10-30	4.5%	-	-	-	FALSE	TRUE
814	V4b-Loss of Control (Not	PUE4	Fwd : 30-55+	44.8%	-	-	-	FALSE	TRUE
910	O1-Obstacle	PUE3	Fwd : 0-3	2.6%	2.6%	2.6%	2.6%	TRUE	TRUE
911	O1-Obstacle	PUE3	Fwd : 3-10	2.6%	2.6%	2.6%	2.6%	TRUE	TRUE
1121	T1-Merge	PUE2	Fwd : 10-30	22.4%	22.4%	22.4%	22.4%	TRUE	TRUE

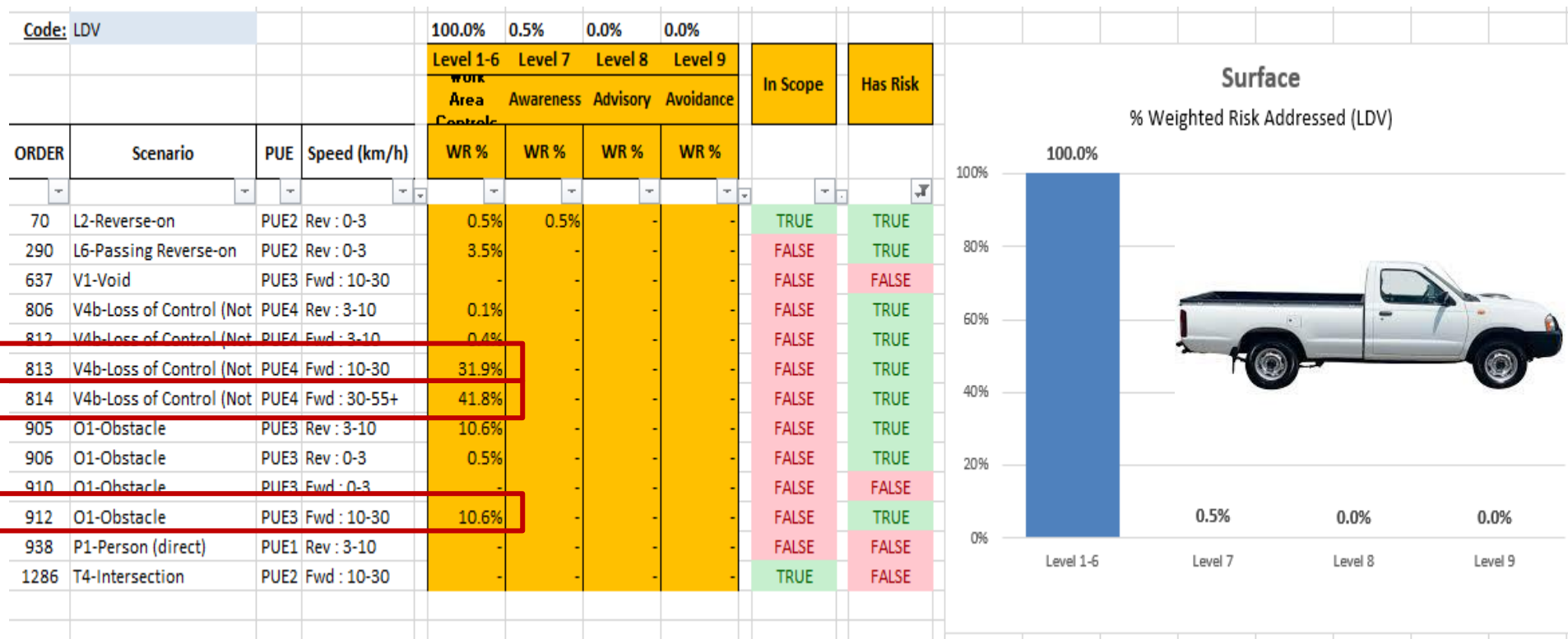


# Collision Prevention System Journey 2017

Equip: Front End Loader				100.0%	71.0%	2.1%	2.1%		
				Level 1-6	Level 7	Level 8	Level 9	In	Has
				Work Area Controls	Awareness	Advisory	Avoidance	Scope	Risk
ORDER	Scenario	PUE	Speed (km/h)	WR %	WR %	WR %	WR %		
19	L1-Head-on	PUE2 Fwd : 0-3		17.9%	17.9%	-	-	TRUE	TRUE
69	L2-Reverse-on	PUE2 Rev : 3-10		-	-	-	-	TRUE	FALSE
70	L2-Reverse-on	PUE2 Rev : 0-3		1.9%	1.9%	1.9%	1.9%	TRUE	TRUE
184	L4-Dovetailing	PUE2 Fwd : 0-3		-	-	-	-	TRUE	FALSE
635	V1-Void	PUE3 Fwd : 0-3		0.0%	-	-	-	FALSE	TRUE
636	V1-Void	PUE3 Fwd : 3-10		-	-	-	-	FALSE	FALSE
812	V4b-Loss of Control (N	PUE4 Fwd : 3-10		13.9%	-	-	-	FALSE	TRUE
906	O1-Obstacle	PUE3 Rev : 0-3		0.1%	0.1%	0.1%	0.1%	TRUE	TRUE
907	O1-Obstacle	PUE3 Stationary		0.0%	0.0%	0.0%	0.0%	TRUE	TRUE
910	O1-Obstacle	PUE3 Fwd : 0-3		50.9%	50.9%	-	-	TRUE	TRUE
911	O1-Obstacle	PUE3 Fwd : 3-10		0.1%	0.1%	-	-	TRUE	TRUE
938	P1-Person (direct)	PUE1 Rev : 3-10		-	-	-	-	TRUE	FALSE
939	P1-Person (direct)	PUE1 Rev : 0-3		-	-	-	-	TRUE	FALSE
940	P1-Person (direct)	PUE1 Stationary		-	-	-	-	TRUE	FALSE
943	P1-Person (direct)	PUE1 Fwd : 0-3		-	-	-	-	TRUE	FALSE
1335	R1-Swing	PUE2 Rev : 0-3		-	-	-	-	FALSE	FALSE
1336	R1-Swing	PUE2 Stationary		1.2%	-	-	-	FALSE	TRUE
1380	R2-Drop	PUE1 Stationary		-	-	-	-	FALSE	FALSE
1390	R2-Drop	PUE2 Rev : 0-3		-	-	-	-	FALSE	FALSE
1391	R2-Drop	PUE2 Stationary		13.9%	-	-	-	FALSE	TRUE
1394	R2-Drop	PUE2 Fwd : 0-3		-	-	-	-	FALSE	FALSE
1395	R2-Drop	PUE2 Fwd : 3-10		-	-	-	-	FALSE	FALSE



# Collision Prevention System Journey 2017



# Collision Prevention System Journey 2017

- 15 February 2018 Mitacom's engineers evaluated the tender documents to determine shortfalls
- CPS suppliers invited to explain shortfalls after evaluation
- Allow time for suppliers to correct shortfalls
- 6 suppliers returned corrected scope documents
- Re-evaluated the tenders through Mitacom
- Selected a supplier 28 June 2018

## Collision Prevention System Journey 2017

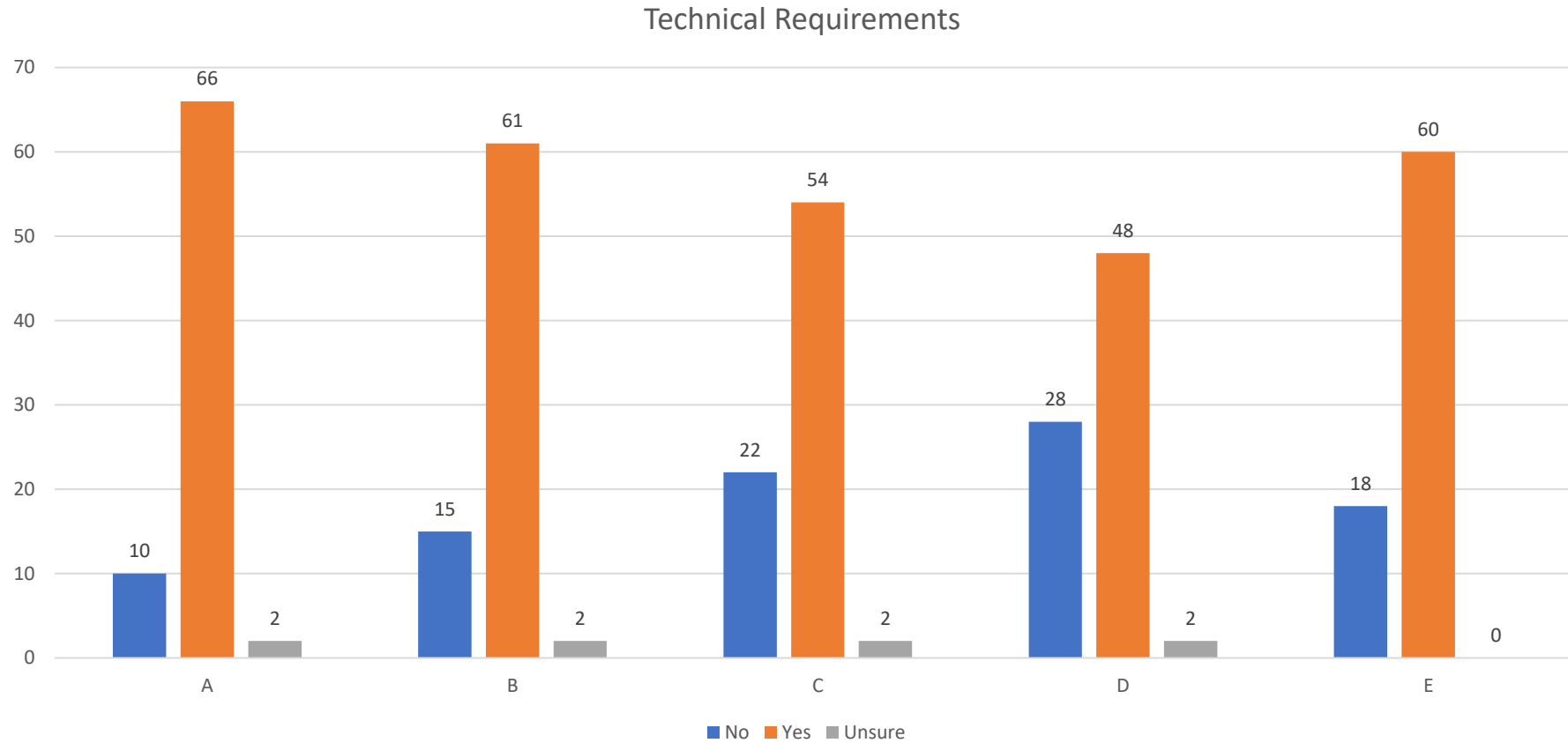
- We asked the CPS supplier to give us final pricing to start the trial and to our surprise the price doubled and some tripled from the tender price:  
Reasons – getting the units to comply to the specifications  
**Should we pay as Industry to get technology specification ready?**
- Stopped process with this supplier
- **Driving traffic management hard**
- Retender 26.11.2018

# Collision Prevention System Journey 2017

References							
<b>UNIT PRICE</b>	Level 7	R 66 975,00	R 77 720,50	R 78 911,40	R 55 512,90	R 19 993,00	R 22 378,00
	Level 8					R 18 502,00	
	Level 9			ADT- R312 594.38 FEL - R312 594.38 RDT - R403 505.21		R 66 717,00	

References									
<b>UNIT PRICE</b>	Level 7	R 35 200,00	R 56 470,00	R 138 589,71	R 32 000,00	R 66 970,00	R 45 118,94	R 34 137,75	R 33 463,00
	Level 8	R 50 200,00		R 305 503,58	R 55 000,00		R 118 727,26	R 116 615,75	
	Level 9	R 92 350,00		R 95 000,00					

# Collision Prevention System Journey 2017 (2018/2019)



Only one could verify some with UP testing (old test)  **ASPASA**

## Where are we now?

- **Risk based approach do not exist**
- Millions in technology readiness – **is it ready now?**
- Kolomela research excellent guidance
- Reasonable practicable – **compliance cost 80%**
- Why is **traffic management** and entry level technology ignored as a risk mitigating factor for small operations?
- Excellent local supply development
- More CPS Suppliers available (skill set)
- **Interoperability**
- **Legacy equipment**

# Mineral Council South Africa



**MINERALS COUNCIL**  
SOUTH AFRICA



**MINING INDUSTRY  
OCCUPATIONAL  
SAFETY & HEALTH**

<https://www.mosh.co.za/downloads/tm>



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**Your voice when it matters most**





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