

NOVEMBER 21, 2024

The FDESLT

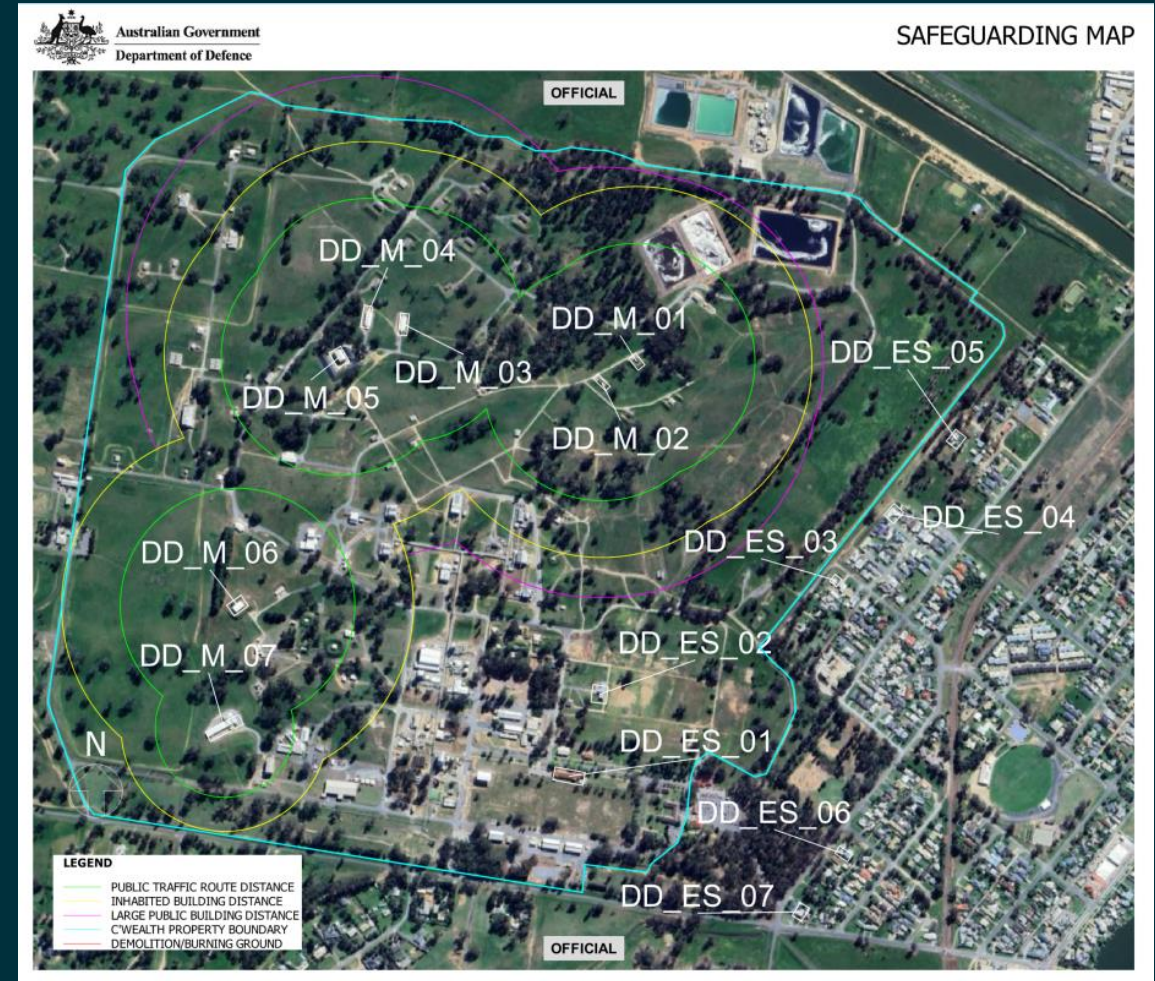
A Solution for Rapid Siting and Licensing Assessments of EO Facilities

Rhys Centin

Project Engineer

Thornton Tomasetti Pty Ltd

Thornton Tomasetti



THORNTON TOMASETTI GLOBALLY



1,800+

ENGINEERS,
ARCHITECTS,
SCIENTISTS
AND OTHER
PROFESSIONALS

150+

COUNTRIES
WORKED IN

45+

OFFICES

TT - AUSTRALIA

- Over 20 Staff Across 3 Sites – Melbourne, Canberra & Perth
- Melbourne and Canberra – Defence Portfolio
 - Advanced Analysis Capabilities
 - Air Blast, UNDEX CFD
 - Solid mechanics FEA, shock, vibration, impact, etc.
 - Protective Design
 - Magazine design and certification
 - Safety case development, consulting services
 - Test and Evaluation Capabilities
 - Naval shock testing – JASSO
- Perth – Complimentary Portfolios
 - Nuclear, Oil and Gas and Other Hazardous Industries

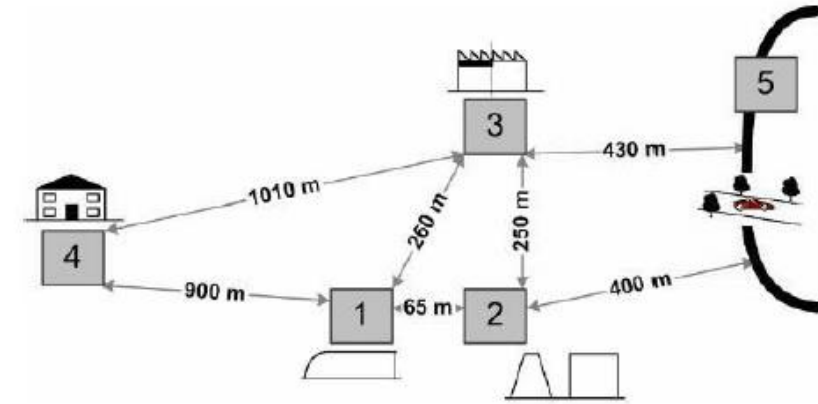
PRESENTATION OVERVIEW

1. Background Information – Why the FDESLT?
2. Roadmap, Current State of Play
3. Primary Build Released to Defence – Phase 1
4. Phase 1 Capability Demo
5. Phase 2 Capability Delivery
6. Future Capability & Stakeholder Engagement

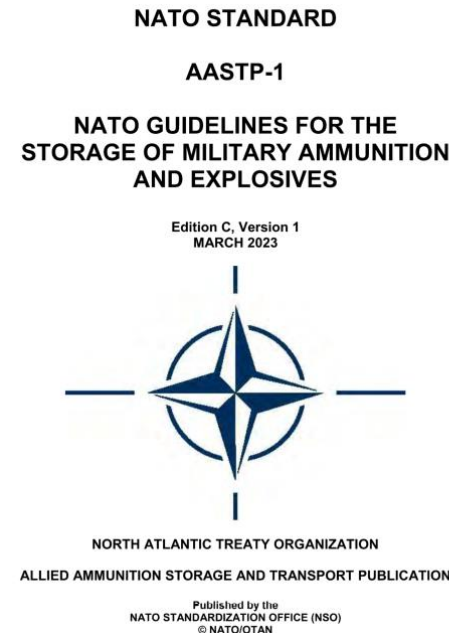
FDESLT BACKGROUND

Why the FDESLT?

- DOS Identified requirement for a EO safety software tool
- 'Field Deployable': rapid + automated EO siting and licensing
- Examples of requirements:
 - Enable rapid assessments of magazine siting in theatre
 - Different functionality for different users
 - DPN compatible, windows OS, minimum GPU intensity
 - Incorporate AU (DEOP101) and International (AASTP) standards/best practices

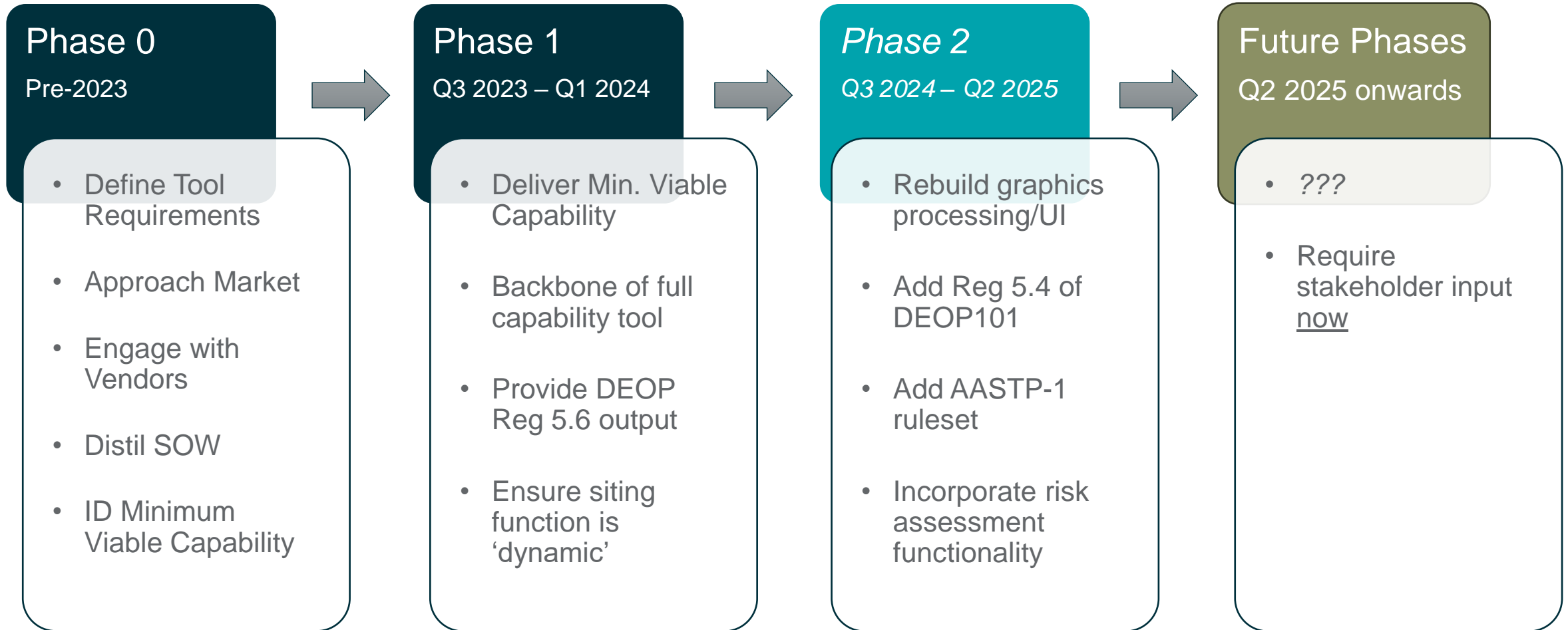


'Layout of Example Storage Complex' from DEOP101 [1]



EO Siting and Licensing Publications – AASTP-1 [2] (left) and DEOP101 [1] (right)

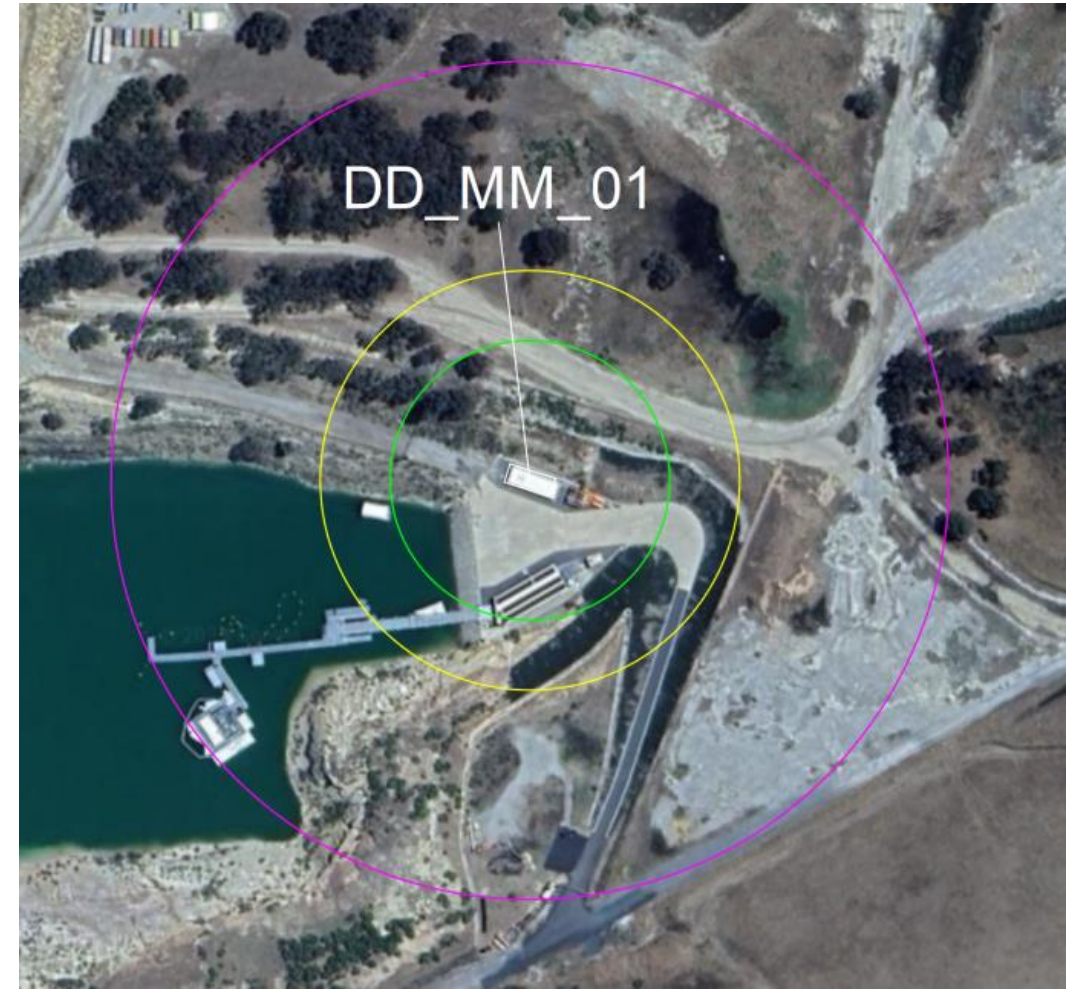
FDESLT TIMELINE



FDESLT: PHASE 1

Minimum Viable Capability

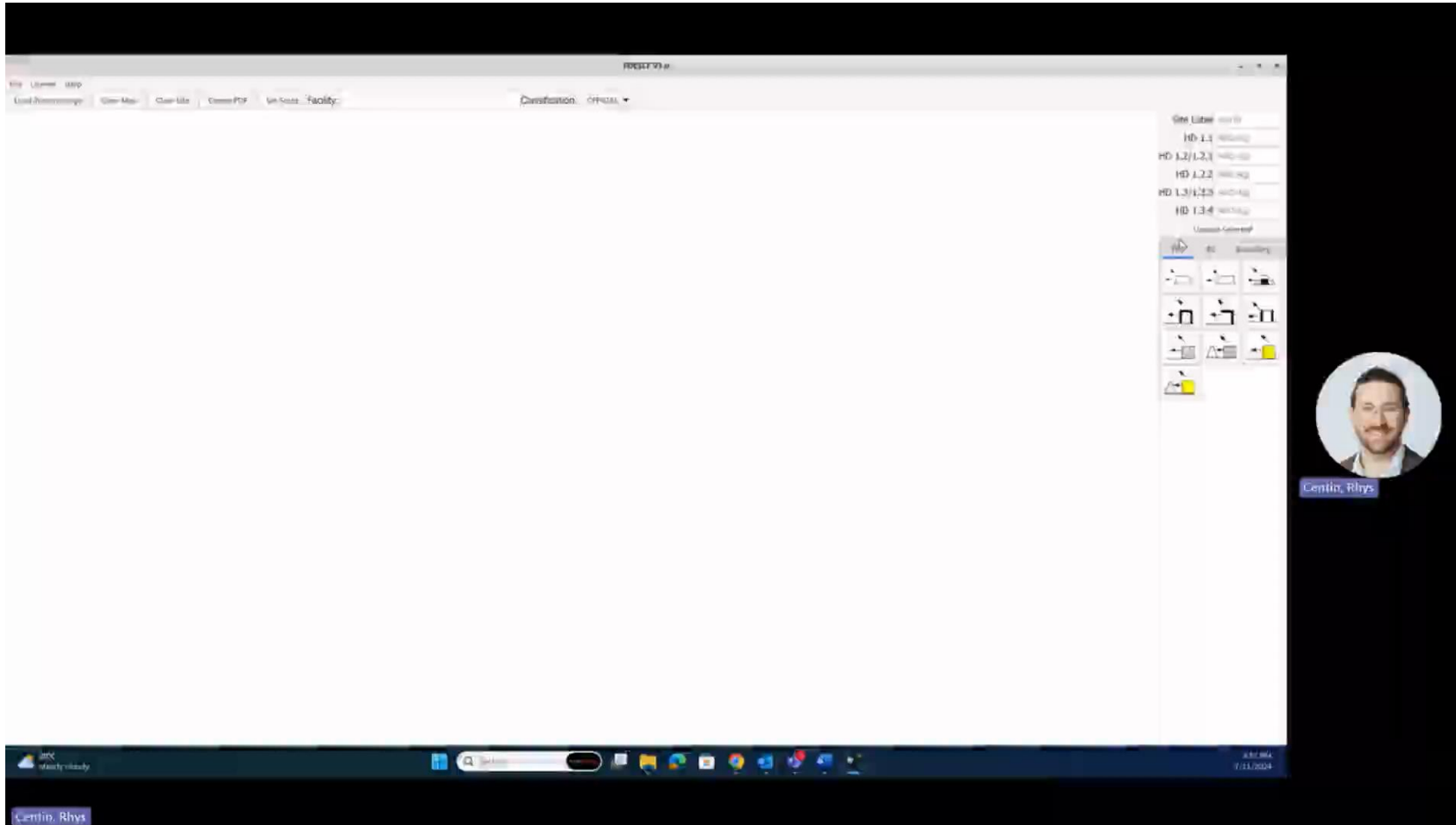
- Capable of importing image files as siting overlay
- ‘Dynamic’ user functionality
 - Click and drag PES/ES positions
 - Update PES/ES properties
- Produce DEOP Reg 5.6 Safeguarding Output
 - Green (PTRD), Yellow (IBD) & Purple Lines (VBD)
 - .PDF summary file output



Safeguarding in Regional VIC, Demo Output from FDESLT

FDESLT: PHASE 1

Safeguarding Demo Video – Defence Establishment Orchard Hills

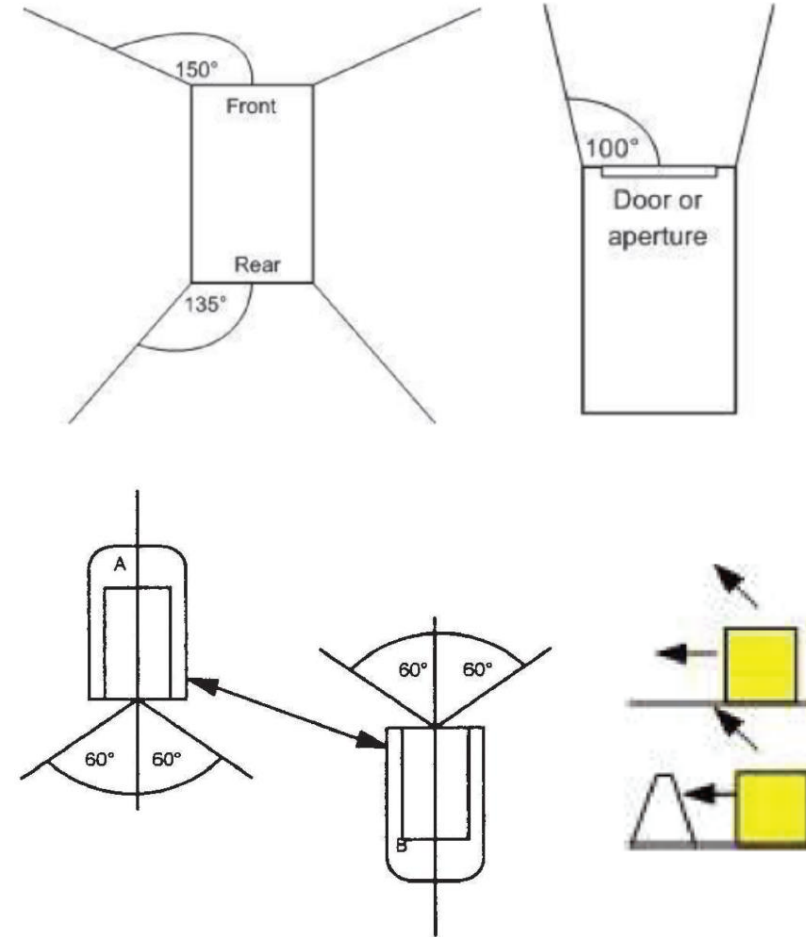


FDESLT: PHASE 2

Key Feature – New Graphics Engine

Phase 1 was a good proof of capability, BUT

- New graphics engine for better raytracing between PES-ES
- Auto-detect distance between PES-ES
- Detect angles between front, side, rear walls of ECB and ES
- Retain 'dynamic' click + drag functionality for siting

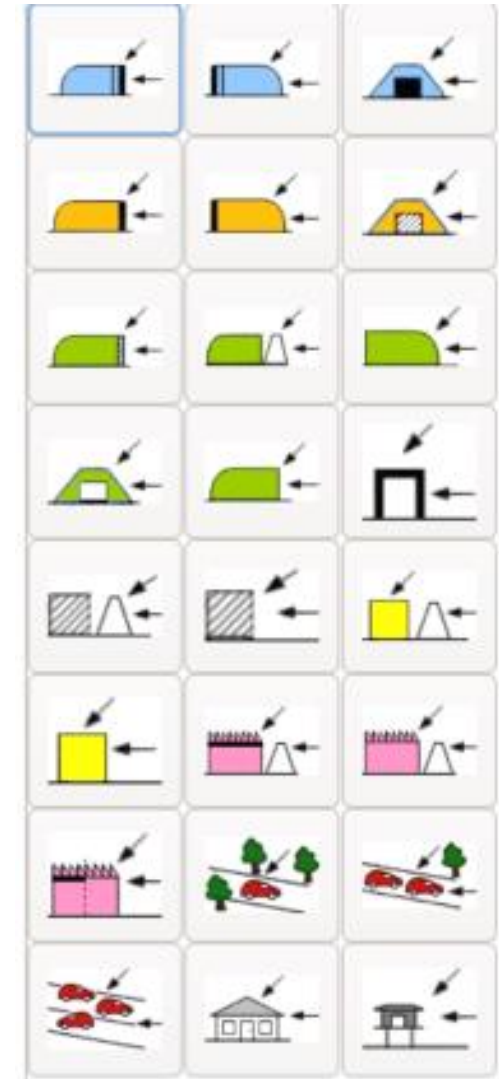


Excerpts from DEOP101 ^[1] Reg 5.4

FDESLT: PHASE 2

Updated Rulesets

- Phase 1 – only contained Reg 5.6 distances (PTRD, IBD, VBD)
- Inclusion of the following regulations:
 - DEOP101 [1], Reg 5.4 Annex A – QDs for Aboveground Storage
 - DEOP101 [1], Reg 5.4 Annex H – QDs for Field Storage
 - AASTP-1 [2], Part I Annex I-A – Aboveground Storage
 - AASTP-5 [3], Paragraph 2.6 – Field Distances



Pictographs of ES, taken from the FDESLT

[1] – DOS, 2024, DEOP 101 – Defence Explosive Ordnance Publication 101.

[2] – MSIAC, 2023, AASTP-1 ed C ver 1





[3] – MSIAC, 2016, AASTP-5 ed 1 ver 3

FDESLT: PHASE 2

New AASTP-1 Aboveground Storage Distances

- BD, DFD, P1D, P2D and TD all included

Table 1 – Earth Covered Magazine from AASTP-1 [2]

PES → E S ↓	EFFECT	 Earth covered magazine. Directional effects through the door and headwall are away from an Exposed Site. (a)	 Earth covered magazine. Directional effects through the door and headwall are perpendicular to the direction of an ES. (b)	 Earth covered magazine. Directional effects through the door and headwall are towards an Exposed Site (c)	See introduction for full instructions and calculation tables for full formula. 1. Select correct PES/ES interaction. 2. Use HD/SsD table to determine applicable calculations 3. Use HD/SsD table to determine quantity, either NEQ or MCE 4. Use associated formula for min Distance or max Quantity.						
		HD / SsD									
		1.1	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.6			
 1 Standard NATO ECM, designed for 7 bar in accordance with Part 2, with the door facing away from PES	BLAST	BD3 Virtually complete protection	BD3 Virtually complete protection	BD4 Virtually complete protection	NEQ	MCE		MCE			MCE
	DEBRIS & FRAG	1.3.3.5 No primary explosives	1.3.3.5 No primary explosives	1.3.3.5 No primary explosives	NEQ	MCE		MCE			MCE
	PROG' 1.2.1	Not applicable (see 1.3.1.11)	Not applicable (see 1.3.1.11)	Not applicable (see 1.3.1.11)		NEQ					
	PROG' 1.2.2	Not applicable (see 1.3.1.11)	Not applicable (see 1.3.1.11)	Not applicable (see 1.3.1.11)			NEQ				
	THERMAL 1.3.1	No QD Virtually Complete Protection	No QD Virtually Complete Protection	25m Virtually Complete Protection 10m High degree of protection					NEQ		
THERMAL 1.3.2	No QD Virtually Complete Protection	No QD Virtually Complete Protection	No QD Virtually Complete Protection				NEQ		NEQ	NEQ	

FDESLT: PHASE 2

Quantitative Explosive Risk Assessments (Semi or Fully)

- If QD cannot be met?
- We need to quantify the residual levels of risk
- Incorporate AASTP-4 Part II ^[5] Info.
- Risk assessment info in AASTP-5 ^[3] for field use
- Work in progress to align with Defence Policy

Defence WHS Risk Matrix from the DPN Intranet ^[4]

Consequence descriptors		Minor (A)	Moderate (B)	Major (C)	Critical (D)	Catastrophic (E)
		Minor injury or illness that is treatable in the workplace (first aid) OR by a registered health practitioner, with no follow up treatment required.	Injury or illness causing no permanent disability, which requires non-emergency medical attention by a registered health practitioner OR 10 or more injuries or illnesses categorised as 'minor'.	Serious injury or illness requiring immediate admission to hospital as an inpatient and/or permanent partial disability OR 10 or more injuries/illnesses categorised as 'moderate'.	Single fatality and / or permanent total disability OR 10 or more injuries or illnesses categorised as 'major'.	Multiple fatalities OR 10 or more injuries / illnesses categorised as 'critical'.
Likelihood descriptors	Almost certain (5)	(A5) LOW	(B5) MEDIUM	(C5) HIGH	(D5) VERY HIGH	(E5) VERY HIGH
	Probable (4)	(A4) LOW	(B4) MEDIUM	(C4) HIGH	(D4) HIGH	(E4) VERY HIGH
Occasional (3)	Improbable (2)	(A3) VERY LOW	(B3) LOW	(C3) MEDIUM	(D3) HIGH	(E3) HIGH
	Rare (1)	(A2) VERY LOW	(B2) VERY LOW	(C2) LOW	(D2) MEDIUM	(E2) MEDIUM
		(A1) VERY LOW	(B1) VERY LOW	(C1) VERY LOW	(D1) LOW	(E1) LOW
Activity: Expected to occur during the planned activity. Is known to occur frequently in similar activities. System: Expected to occur several times a year or often during the system life-cycle. Is known to occur frequently in similar systems being used in the same role and operating environment.	Activity: Expected to occur in most circumstances, but is not certain. Is known to have occurred previously in similar activities. System: Expected to occur one or more times per year or several times in the system life cycle. Is known to occur previously but is not certain to occur.	Activity: Not expected to occur during the planned activity. Sporadic but not uncommon. System: Expected to occur less than once per year or infrequently during system life cycle.	Activity: Not expected to occur during the planned activity. Occurrence conceivable but considered uncommon. System: Not expected to occur, but possible to experience one or more events during the system life cycle.	Activity: Not expected to occur during the planned activity. Occurrence conceivable but not expected to occur. System: Only expected to occur in rare or exceptional circumstances or no more than once during the system life cycle.		

FUTURE PHASES

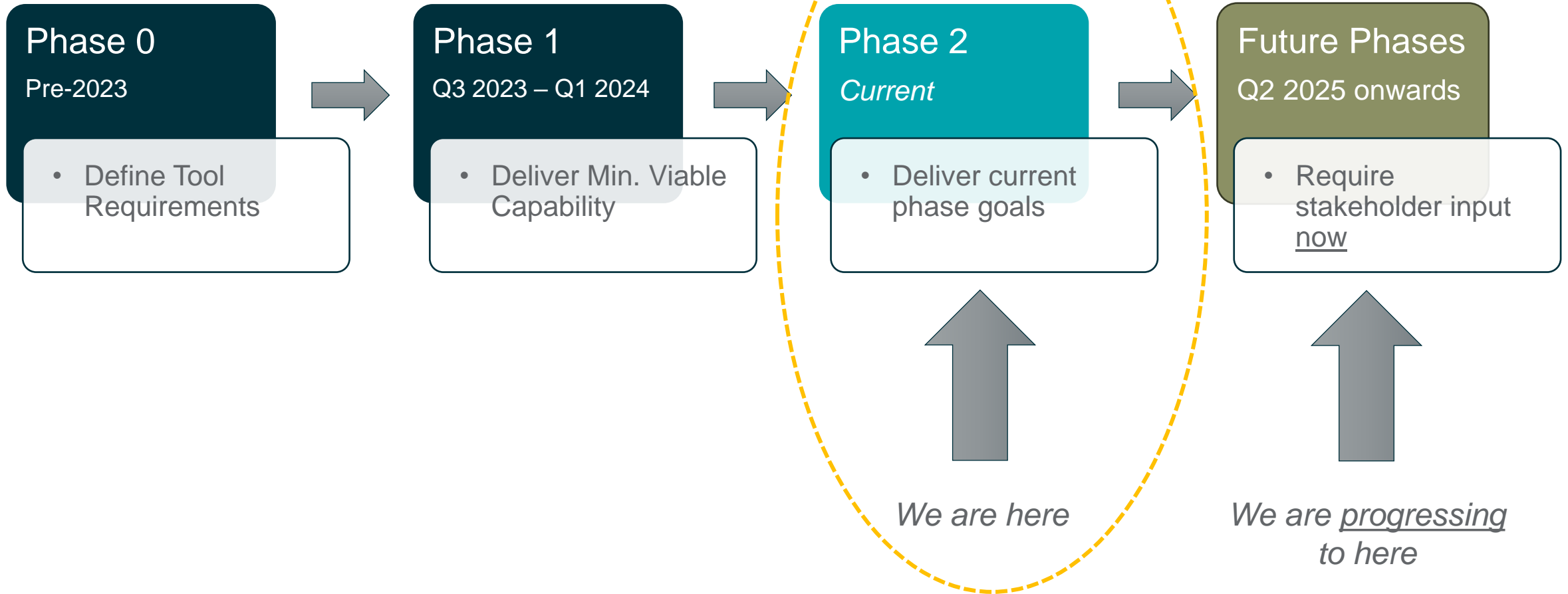
- Require engagement to define direction of software
- Wider consultation with EO stakeholder community:
 - Software Users
 - Policy Setters
 - Safety Regulators
 - Etc.
- If you have an idea, get in touch.



Image taken from consultantsreview.com^[6]

Email: AusDefence@ThorntonTomasetti.com

FDESLT SUMMARY



REFERENCES

1. Australian Department of Defence – Directorate Ordnance Safety, 2024, DEOP101 – Defence Explosive Ordnance Publication 101.
2. Munitions Safety Information Analysis Centre, 2023. AASTP-1: NATO Guidelines for the Storage of Military Ammunition and Explosives, ed. C ver. 1, NATO Standardization Office, Brussels, Belgium
3. Munitions Safety Information Analysis Centre, 2016. AASTP-5: NATO Guidelines for the Storage, Maintenance and Transport of Ammunition on Deployed Missions or Operations, ed. 1 ver. 3, NATO Standardization Office, Brussels, Belgium
4. Department of Defence, 2024. Work Health and Safety Risk Matrix, accessed from: <http://drnet/People/WHS/SafetyMan/risk/Pages/WHS-Risk-Matrix.aspx> on 18OCT2024
5. Munitions Safety Information Analysis Centre, 2016. AASTP-5: NATO Guidelines for the Storage, Maintenance and Transport of Ammunition on Deployed Missions or Operations, ed. 1 ver. 3, NATO Standardization Office, Brussels, Belgium
6. ConsultantsReview.Com, 2024. accessed from: https://www.consultantsreview.com/news/what-is-the-importance-of-having-a-business-consultant-nwid-1065.html#google_vignette on 18OCT2024

THANK YOU



Rhys Centin

Project Engineer
RCentin@ThorntonTomasetti.com
+61.3.9724.3705