



Libby Mae Jones
222538

Level 5 ACDA5022
Work Based Group Project

University of Wales Trinity Saint David
BEng Bachelor of Engineering Program, Ordnance, Munitions and
Explosives (Safety)

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Abstract

This report presents the outcomes of a work-based group design project conducted alongside the ACDA5021 Systems Engineering module, focused on developing a viable Ordnance, Munitions, and Explosives (OME) system in response to a customer-defined problem. The project was delivered from the perspective of the Project Manager with responsibility for design safety oversight. Core systems engineering tools, including Functional Failure Modes and Effects Analysis (FFMEA), Quality Functional Deployment (QFD), and the Hierarchy of Controls are mentioned to support design decisions and safety assurance throughout the CADMID lifecycle.

Key activities included role delegation, risk management, and integration of stakeholder requirements with regulatory compliance, notably JSP815 and the Defence Safety Authority (DSA) regulations. Hazard identification and mitigation were conducted using structured methods such as THERP and engineered safeguards (e.g., SAU redundancy and ENDS methodologies). The project also involved cross-functional collaboration, trade-off analysis, and iterative refinement based on midpoint review feedback.

Despite interpersonal challenges the project team successfully delivered a final concept, demonstrating alignment between performance, safety, and manufacturability. The report reflects the practical application of systems engineering principles in a team environment and highlights lessons in professional conduct, resilience, and communication under pressure, essential competencies for future OME safety practitioners.

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1 Introduction

This report documents the work-based group design project conducted concurrently with the ACDA5021 Systems Engineering module. The task required the team to develop a viable OME (Ordnance, Munitions, and Explosives) solution to a customer-defined problem.

Considering performance, manufacturability, reliability, and safety. This report will be from the perspective of the project manager lead with specific responsibility for product design safety oversight. Outlined is the approach to development processes, role specific contributions made within the team, interactions with other roles, and reflections on team dynamics.



Figure 1 Systems Engineering CADMID Cycle [1]

2 Design Project Management

As Project Manager, responsibility such as coordinating team activities, scheduling design milestones, and ensuring the team-maintained momentum throughout the module were facilitated through a Plan on a page (POAP). Adopting an organisational structure but assigned clear role leads for each team member, and system engineering tool sets.

Members	Initials	Roles
Gareth James	GJ	R&D
Rachel Mccolm	RM	Safety of the process
Libby Jones	LJ	Safety of the Product
Charles Hadley	CH	Test and Eval
Dan Garton	DG	Manufacturing
Lewis Gray	LG	Disposal

Table 1 Role Delegation

The first in-person team meeting began with a roundtable discussion initiated by the project manager, who asked each member to share their preferred learning and working styles. Team members were also invited to discuss their familiarity with the systems engineering tools, helping to build a clearer picture of individual strengths and areas for development [2].

Weekly meetings were conducted via MS Teams, supported by collaborative tools such as shared Microsoft Team folders and group chat channels this enacted as a version-controlled repository for design documentation.

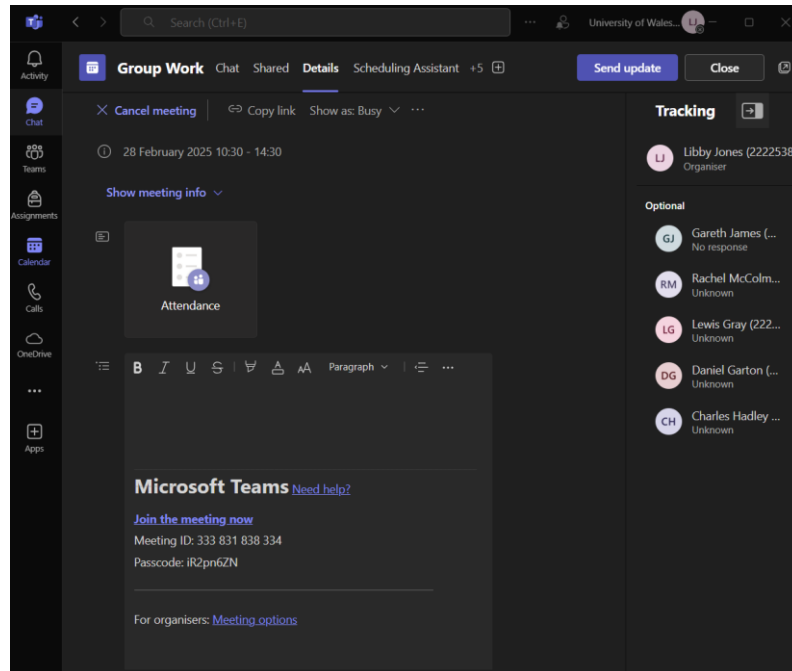


Figure 2 Online Meeting

Communication was observed to have improved attendance in person to the online meetings, seen in the below figure.

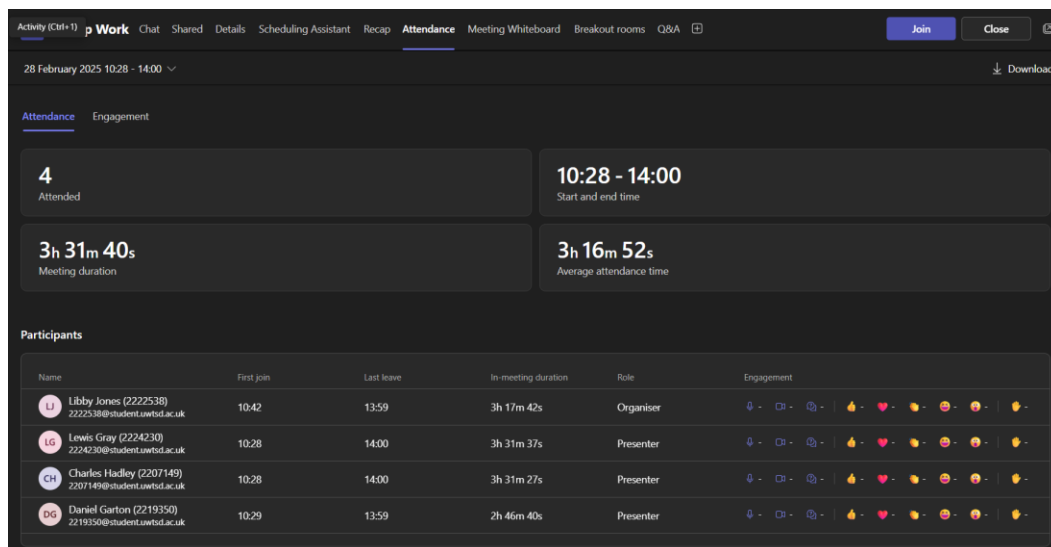


Figure 3 Online Attendance

Decision making was consensus based, guided by criteria derived from customer requirements and systems engineering analysis tools such as but not limited to, Quality Function Deployments (QFD) and Functional Failure Modes Effects Analysis (FFMEA).

A POAP was created in the first week to establish major milestones, culminating in a midpoint design review and final presentation. The role as project manager required balancing team inputs with maintaining alignment to customer priorities and safety-critical parameters.

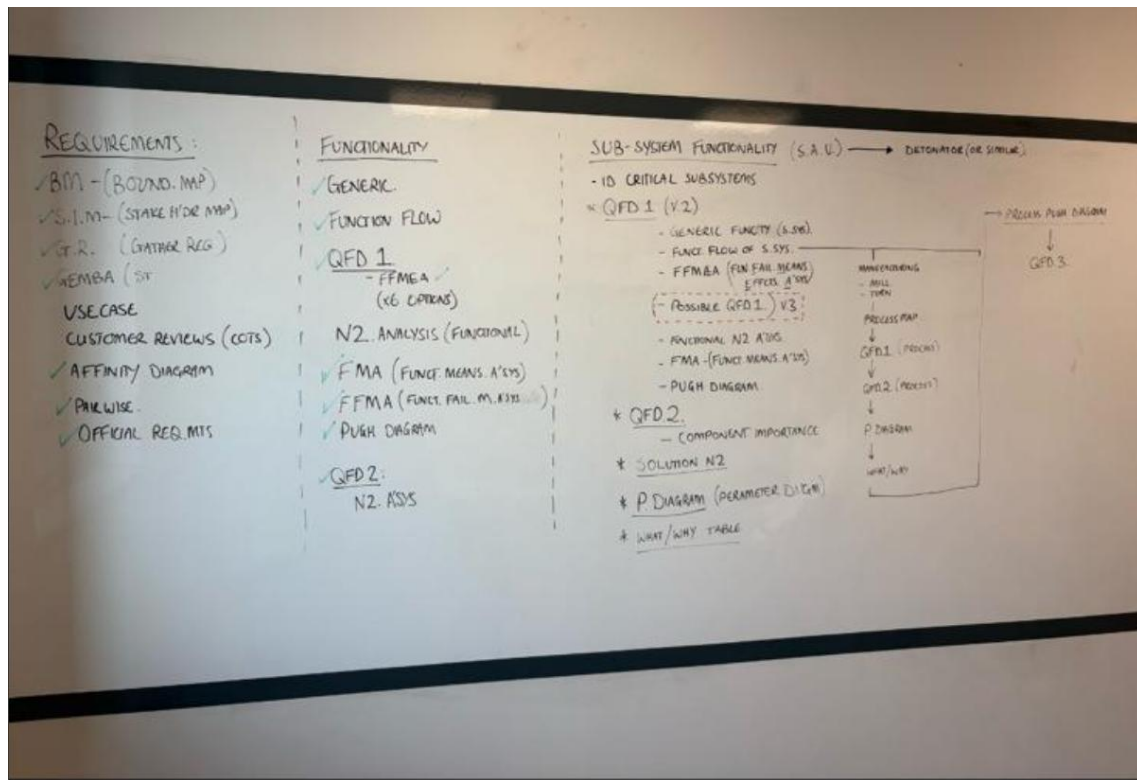


Figure 4 Daily Schedule

Regular updates were provided to the team to keep all members informed with the formal processes.

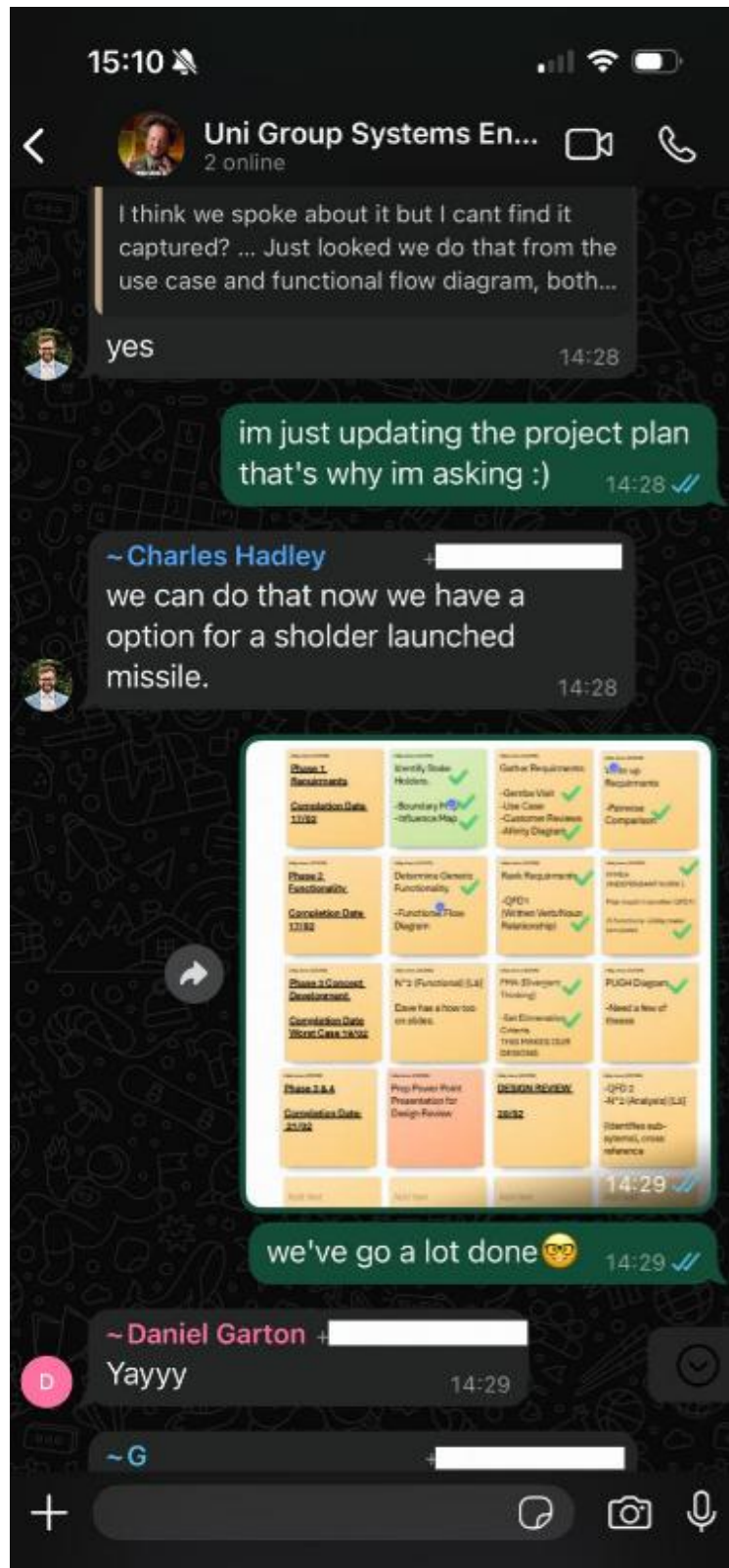


Figure 5 Group Communication Channel



Figure 6 Project Management POAP

3 Role Within the Team (Product Safety)

In addition to project management, responsibility for the safety assurance of the system design development was considered to ensure the users safety.

3.1 Understanding Safety Requirements

For a system involving ordnance, munitions, and explosives (OME), the safety requirements must align with both regulatory compliance and operational integrity. Based on the nature of the project, the key safety requirements can be summarised in the table below [3].

Requirement Stakeholder	Requirement Type	Safety By Design Requirement	Safety Manufacturing Requirement Description
Safety Managers	Operational Requirement	Define safety objectives	Must establish clear, measurable safety goals for the safety critical systems.
Safety Managers	Non-Functional System Requirement	Identify hazards	Must recognise potential internal and external environmental hazards.
Risk Management Teams, Process Safety Engineers	Non-Functional Implementation Requirement	Evaluate risks	Must assess the likelihood and severity of each hazard to prioritise risk controls
Process Engineers, Quality Assurance Teams	Non-Functional Implementation Requirement	Implement control measures	Must design and integrate robust controls (e.g., insulation, shielding) to mitigate identified risks.
EHS Officers, Operations Managers	Non-Functional Performance Requirement	Monitor environmental conditions	Shall continuously track risks to safety.
Electrical Engineers, Process Safety Officers	Non-Functional System Requirement	Control electrostatic discharge	Should establish measures (e.g., grounding, proper material selection) to prevent stray energy inputs.
Supplier Quality Teams	Non-Functional Performance Requirement	Ensure material integrity	Shall specify and verify that all materials (e.g., gold wire, insulating components) meet strict safety and performance criteria.
Design Engineers, Reliability Specialists	Non-Functional Performance Requirement	Verify design robustness	Shall confirm that the design tolerates manufacturing variances and environmental stresses without accidental initiation.
Technical Writers, Compliance Officers	Operational Requirement	Document procedures	Must develop and maintain comprehensive safety work instructions and guidelines.
Training Managers, HR/Safety Coordinators	Functional Requirement	Train personnel	Shall provide regular and documented training on safety protocols and handling procedures.
Internal Auditors, Regulatory Compliance Teams	Operational Requirement	Audit safety performance	Must regularly review production practices and safety systems to ensure continuous compliance with applicable legislation.
In-Service Team, Safety Managers	Non-Functional Implementation Requirement	Review incident data	Will analyse near-misses and incident reports to update risk assessments and refine controls.
Test Engineers, Quality Control	Functional Requirement	Validate test procedures	Must confirm through rigorous testing that the bridgewire only responds to the intended firing signal under controlled conditions.
Process Engineers, Facility Managers	Functional Requirement	Enforce process isolation	Shall separate critical components from external energy sources and accidental impacts during manufacturing.

Figure 7 Safe by Design Requirements

The stakeholder requirements and legal/regulatory obligations exhibited a reciprocal relationship, often informing and reinforcing one another throughout the design process.

3.2 Hazard Identification and Risk Analysis

A key deliverable was the identification of hazards specific to the munition, which involved structured brainstorming with other key stakeholders, such as research and development (RD). From these sessions, data outputs would be applied to a techniques such as FFMEA. This enabled early-stage identification of risks related to unintended detonation, human error, and environmental operating conditions. Using methodologies such as the Hierarchy of Controls, ENDS (Engineered Non-Detonable Systems), THERP techniques (Technique for human error-rate prediction) and appropriate LODs (Lines of Defence) to adequately mitigate risks whilst remaining compliant with all relevant legislative and regulative requirements. Communications were then undertaken with Test and Evaluation (TE) to certify new risk management design changes.

The diagram below reflects the structured risk management process applied throughout the project.



Figure 8 Risk Management Framework [1]

To support the structured safety analysis and validate the design against regulatory expectations, detailed hazard identification and risk classification tables were developed. These outputs, identified by tools previously mentioned, provided a clear, traceable framework for understanding potential failure modes, their causes, and the corresponding risk mitigation strategies [2].

Hazard Number	Hazard Title	Hazard Description	Accident Number	Accident(s)	Cause Number	Cause Title(s)	Cause Descriptions
H1	Breach Explosion	The pressure from an initiated round causes catastrophic failure to the Weapon System.	A1	Burns	Z1	Human Factors	Users ability to use system is affected by physical, psychological or environmental factors.
			A2	Death or Major Injury	Z2	Material Failure of Manufactured Components	Manufacture has failed to meet material specifications
			A4	Cuts and Bruises	Z3	Incorrect Assembly	User or manufacturer has incorrectly assembled system
			A7	Ocular Injuries	Z4	Incorrect Component(s) fitted	Original Equipment Manufacturer incorrectly assemblys system
					Z5	Lack of Training	User has received lack of training
					Z6	Faulty Munition	Munition has been incorrecly manufactured and/or assembled
H2	Failure of Weapon System Components	A component of the Weapon System fails during use or handling of the weapon system (eg. SAU and EBW)	A1	Burns	Z2	Material Failure of Manufactured Components	Manufacture has failed to meet material specifications Human Factors have Failed to meet assembly requirments
			A2	Death or Major Injury	Z3	Incorrect Assembly	User or manufacturer has incorrectly assembled system
			A4	Cuts and Bruises	Z4	Incorrect Component(s) fitted	Original Equipment Manufacturer incorrectly assemblys system
			A7	Ocular Injuries	Z7	SAU Failure	The safety aiming unit has failed causing the potential for the missile to detonate / fail.
					Z8	EBW Failure	Explosive Bridge wire is faulty the munition will be inoperable
					Z9	GPS Failure	GPS malfunctions and sends missile to an unintended target
					Z10	Damaged Equipment	Equipment has been damaged in combat or from transportation
H3	Hazardous Substances	Equipment and materials can contain hazardous substances	A6	Occupational Injuries	Z5	Lack of Training	User has received lack of training
					Z11	Hazardous Materials	System contains hazardous materials
					Z12	Incorrect handling	User has incorrectly handled sysetm
					Z13	Misuse	The individual has been trained to operate the system but has unitensionally or intensionally used sysetm incorrecly
H4	Hot/Cold Components	Components and surfaces of weapon systems/sights can get extremely hot/cold.	A1	Burns	Z5	Lack of Training	User has received lack of training
					Z12	Incorrect handling	User has incorrectly handled sysetm
					Z13	Misuse	The individual has been trained to operate the system but has unitensionally or intensionally used sysetm incorrecly
					Z14	Environmental Conditions	Weather conditions have the ability to affect the safe use of the sysetm
					Z15	Untrained Personnel	User has not been trained to use sysetm
H5	Noise	Exposure to noise (impulse noise >137dB(C), steady state noise >85 dB(A) exceeding statutory limits).	A5	Permanent Hearig Loss	Z1	Human Factors	Users ability to use system is affected by physical, psychological or environmental factors.
					Z4	Incorrect Component(s) fitted	Original Equipment Manufacturer incorrectly assemblys system
					Z5	Lack of Training	User has received lack of training
					Z12	Incorrect handling	User has incorrectly handled sysetm
					Z13	Misuse	The individual has been trained to operate the system but has unitensionally or intensionally used sysetm incorrecly
					Z15	Untrained Personnel	User has not been trained to use sysetm
					Z16	Design of Equipment	System is designed in a way that noise levels cannot be controlled
					Z17	Hearing Protection	Hearing Protection PPE is correctly manufactured resulting in it being defective

Figure 9 Pre-Mitigation Hazard Identification (PART ONE)

H6	Projectile does not follow intended direction (intentional shot)	The projectile does not follow the intended direction, which has the potential to lead to blue-on-blue or 3rd party incidents.	A2	Death or Major Injury	Z1	Human Factors	Users ability to use system is affected by physical, psychological or environmental factors.
					Z2	Material Failure of Manufactured Components	Manufacture has failed to meet material specifications
					Z3	Incorrect Assembly	User or manufacturer has incorrectly assembled system
					Z4	Incorrect Component(s) fitted	Original Equipment Manufacturer incorrectly assembled system
					Z5	Lack of Training	User has received lack of training
					Z6	Faulty Munition	Munition has been incorrectly manufactured and/or assembled
					Z7	SAU Failure	The safety aiming unit has failed causing the potential for the missile to detonate / fail.
					Z8	EBW Failure	Explosive Bridge wire is faulty the munition will be inoperable
					Z9	GPS Failure	GPS malfunctions and sends missile to an unintended target
					Z10	Damaged Equipment	Equipment has been damaged in combat or from transportation
					Z12	Incorrect handling	User has incorrectly handled system
					Z13	Misuse	The individual has been trained to operate the system but has unintentionally or intentionally used system incorrectly
					Z15	Untrained Personnel	User has not been trained to use system
					Z18	Damaged or Mis-aligned sighting aids	Sight has been previously damaged or has been incorrectly operated
H7	Recoil forces	Operation of the weapon system generates recoil forces.	A2	Death or Major Injury	Z1	Human Factors	Users ability to use system is affected by physical, psychological or environmental factors.
			A4	Cuts and Bruises	Z3	Incorrect Assembly	User or manufacturer has incorrectly assembled system
			A7	Ocular Injuries	Z4	Incorrect Component(s) fitted	Original Equipment Manufacturer incorrectly assembled system
					Z5	Lack of Training	User has received lack of training
					Z10	Damaged Equipment	Equipment has been damaged in combat or from transportation
					Z12	Incorrect handling	User has incorrectly handled system
					Z13	Misuse	The individual has been trained to operate the system but has unintentionally or intentionally used system incorrectly
					Z15	Untrained Personnel	User has not been trained to use system
H8	Physical Characteristics	The physical characteristics of the equipment affecting the user/operator either during operation/transportation	A3	Crushing Injuries	Z1	Human Factors	Users ability to use system is affected by physical, psychological or environmental factors.
			A4	Cuts and Bruises	Z3	Incorrect Assembly	User or manufacturer has incorrectly assembled system
			A7	Ocular Injuries	Z5	Lack of Training	User has received lack of training
					Z12	Incorrect handling	User has incorrectly handled system
					Z13	Misuse	The user has been trained to operate the system but has unintentionally or intentionally used system incorrectly
					Z15	Untrained Personnel	User has not been trained to use system
					Z19	Collapsible Missile Tube Failure	component failure of the Collapsible Missile Tube resulting in inoperable system.

Figure 10 Pre-Mitigation Hazard Identification (PART TWO)

Hazard Number	Hazard Title	Accident Number	Accident Title	Cause Number	Cause Title(s)	Severity	Probability	Pre-mitigated Risk Class	Risk Reduction / Controls	Post-mitigated severity	Post-mitigated Probability	Post-mitigated Risk Class	Overall Hazard Risk Class
H1	Breach Explosion	A1	Burns	Z1	Human Factors	Catastrophic	Improbable	C	Controlled numbers of trained personnel in vicinity	Catastrophic	Incredible	C	C
		A2	Death or Major Injury	Z2	Material Failure of Manufactured Components	Catastrophic	Improbable	C	Strict OEM Quality Assurance Processes & Material Data Sheets	Catastrophic	Incredible	C	
		A4	Cuts and Bruises	Z3	Incorrect Assembly	Catastrophic	Improbable	C	Strict OEM Quality Assurance Processes	Catastrophic	Incredible	C	
		A7	Ocular Injuries	Z4	Incorrect Component(s) fitted	Catastrophic	Improbable	C	Strict OEM Quality Assurance Processes	Catastrophic	Incredible	C	
		Z5	Lack of Training	Catastrophic	Improbable	C	Constantly review Training Packages & Processes to ensure they are as up to date and effective as possible.	Catastrophic	Incredible	C			
		Z6	Faulty Munition	Catastrophic	Incredible	C	Strict OEM Quality Assurance Processes	Catastrophic	Incredible	C			
H2	Failure of Weapon System Components	A1	Burns	Z2	Material Failure of Manufactured Components	Catastrophic	Improbable	C	Strict Personnel Assembly Processes & Verification Checks	Catastrophic	Incredible	C	C
		A2	Death or Major Injury	Z3	Incorrect Assembly	Catastrophic	Improbable	C	Strict OEM Quality Assurance Processes	Catastrophic	Incredible	C	
		A4	Cuts and Bruises	Z4	Incorrect Component(s) fitted	Catastrophic	Improbable	C	Strict OEM Quality Assurance Processes	Catastrophic	Incredible	C	
		A7	Ocular Injuries	Z7	SAU Failure	Catastrophic	Improbable	C	Strict OEM Quality Assurance Processes	Catastrophic	Incredible	C	
		Z8	EBW Failure	Catastrophic	Improbable	C	Strict OEM Quality Assurance Processes	Catastrophic	Incredible	C			
		Z9	GPS Failure	Catastrophic	Improbable	C	Strict OEM Quality Assurance Processes	Catastrophic	Incredible	C			
		Z10	Damaged Equipment	Catastrophic	Improbable	C	Strict OEM Quality Assurance Processes	Catastrophic	Incredible	C			
H3	Hazardous Substances	A6	Occupational Injuries	Z5	Lack of Training	Critical	Improbable	C	Constantly review Training Packages & Processes to ensure they are as up to date and effective as possible.	Critical	Incredible	C	C
		Z11	Hazardous Materials	Critical	Improbable	C	Hazardous Materials Training	Critical	Incredible	C			
		Z12	Incorrect handling	Critical	Improbable	C	Manual Handling Processes	Critical	Incredible	C			
		Z13	Misuse	Critical	Improbable	C	Controlled numbers of trained personnel in vicinity	Critical	Incredible	C			
H4	Hot/Cold Components	A1	Burns	Z5	Lack of Training	Marginal	Improbable	D	Constantly review Training Packages & Processes to ensure they are as up to date and effective as possible.	Marginal	Incredible	D	D
		Z12	Incorrect handling	Marginal	Improbable	D	Manual Handling Processes	Marginal	Incredible	D			
		Z13	Misuse	Marginal	Improbable	D	Controlled numbers of trained personnel in vicinity	Marginal	Incredible	D			
		Z14	Environmental Conditions	Marginal	Improbable	D	Plan Mission Dates	Marginal	Incredible	D			
		Z15	Untrained Personnel	Marginal	Improbable	D	Controlled numbers of trained personnel in vicinity	Marginal	Incredible	D			
H5	Noise	A5	Permanent Hearig Loss	Z1	Human Factors	Marginal	Improbable	D	Controlled numbers of trained personnel in vicinity	Marginal	Incredible	D	D
		Z4	Incorrect Component(s) fitted	Marginal	Improbable	D	Strict OEM Quality Assurance Processes	Marginal	Incredible	D			
		Z5	Lack of Training	Marginal	Improbable	D	Constantly review Training Packages & Processes to ensure they are as up to date and effective as possible.	Marginal	Incredible	D			
		Z12	Incorrect handling	Marginal	Improbable	D	Manual Handling Processes	Marginal	Incredible	D			
		Z13	Misuse	Marginal	Improbable	D	Controlled numbers of trained personnel in vicinity	Marginal	Incredible	D			
		Z15	Untrained Personnel	Marginal	Improbable	D	Controlled numbers of trained personnel in vicinity	Marginal	Incredible	D			
		Z16	Design of Equipment	Marginal	Improbable	D	Sufficient User training packages	Marginal	Incredible	D			
		Z17	Hearing Protection	Marginal	Improbable	D	Strict OEM Quality Assurance Processes	Marginal	Incredible	D			

Figure 11 Hazard Mitigation (PART ONE)

H6	Projectile does not follow intended direction (Intentional shot)	A2	Death or Major Injury	Z1	Human Factors	Catastrophic	Improbable	C	Controlled numbers of trained personnel in vicinity	Catastrophic	Incredible	C	C		
				Z2	Material Failure of Manufactured Components	Catastrophic	Improbable	C	Strict OEM Quality Assurance Processes & Material Data Sheets	Catastrophic	Incredible	C			
				Z3	Incorrect Assembly	Catastrophic	Improbable	C	Strict OEM Quality Assurance Processes	Catastrophic	Incredible	C			
				Z4	Incorrect Component(s) fitted	Catastrophic	Improbable	C	Strict OEM Quality Assurance Processes	Catastrophic	Incredible	C			
				Z5	Lack of Training	Catastrophic	Improbable	C	Constantly review Training Packages & Processes to ensure they are as up to date and effective as possible.	Catastrophic	Incredible	C			
				Z6	Faulty Munition	Catastrophic	Improbable	C	Strict OEM Quality Assurance Processes	Catastrophic	Incredible	C			
				Z7	SAU Failure	Catastrophic	Improbable	C	Strict OEM Quality Assurance Processes	Catastrophic	Incredible	C			
				Z8	EBW Failure	Catastrophic	Improbable	C	Strict OEM Quality Assurance Processes	Catastrophic	Incredible	C			
				Z9	GPS Failure	Catastrophic	Improbable	C	Strict OEM Quality Assurance Processes	Catastrophic	Incredible	C			
				Z10	Damaged Equipment	Catastrophic	Improbable	C	Strict OEM Quality Assurance Processes	Catastrophic	Incredible	C			
				Z12	Incorrect handling	Catastrophic	Improbable	C	Manual Handling Processes	Catastrophic	Incredible	C			
				Z13	Misuse	Catastrophic	Improbable	C	Controlled numbers of trained personnel in vicinity	Catastrophic	Incredible	C			
				Z15	Untrained Personnel	Catastrophic	Improbable	C	Controlled numbers of trained personnel in vicinity	Catastrophic	Incredible	C			
				Z18	Damaged or Mis-aligned sighting aids	Catastrophic	Improbable	C	Strict OEM Quality Assurance Processes & sufficient training in adjusting sights	Catastrophic	Incredible	C			
H7	Recoil forces	A2	Death or Major Injury	Z1	Human Factors	Catastrophic	Improbable	C	Controlled numbers of trained personnel in vicinity	Catastrophic	Incredible	C	C		
		A4	Cuts and Bruises	Z3	Incorrect Assembly	Catastrophic	Improbable	C	Strict OEM Quality Assurance Processes	Catastrophic	Incredible	C			
		A7	Ocular Injuries	Z4	Incorrect Component(s) fitted	Catastrophic	Improbable	C	Strict OEM Quality Assurance Processes	Catastrophic	Incredible	C			
				Z5	Lack of Training	Catastrophic	Improbable	C	Constantly review Training Packages & Processes to ensure they are as up to date and effective as possible.	Catastrophic	Incredible	C			
				Z10	Damaged Equipment	Catastrophic	Improbable	C	Strict OEM Quality Assurance Processes	Catastrophic	Incredible	C			
				Z12	Incorrect handling	Catastrophic	Improbable	C	Manual Handling Processes	Catastrophic	Incredible	C			
				Z13	Misuse	Catastrophic	Improbable	C	Controlled numbers of trained personnel in vicinity	Catastrophic	Incredible	C			
H8	Physical Characteristics			Z15	Untrained Personnel	Catastrophic	Improbable	C	Controlled numbers of trained personnel in vicinity	Catastrophic	Incredible	C	D		
				A3	Crushing Injuries	Z1	Human Factors	Marginal	Improbable	D	Controlled numbers of trained personnel in vicinity	Marginal		Incredible	D
				A4	Cuts and Bruises	Z3	Incorrect Assembly	Marginal	Improbable	D	Strict OEM Quality Assurance Processes	Marginal		Incredible	D
				A7	Ocular Injuries	Z5	Lack of Training	Marginal	Improbable	D	Constantly review Training Packages & Processes to ensure they are as up to date and effective as possible.	Marginal		Incredible	D
				Z12	Incorrect handling	Marginal	Improbable	D	Manual Handling Processes	Marginal	Incredible	D			
				Z13	Misuse	Marginal	Improbable	D	Controlled numbers of trained personnel in vicinity	Marginal	Incredible	D			
				Z15	Untrained Personnel	Marginal	Improbable	D	Controlled numbers of trained personnel in vicinity	Marginal	Incredible	D			
Z19	Collapsible Missile Tube Failure	Marginal	Improbable	D	Durability proven process	Marginal	Incredible	D							

Figure 12 Hazard Mitigation (PART TWO)

This approach ensured that all foreseeable hazards, ranging from catastrophic mechanical failures to marginal occupational exposures, were systematically identified, evaluated, and mitigated through evidence-based controls. By applying structured tools such as the hazard matrix and pre/post-mitigation risk classification tables, a demonstration of compliance with defence safety standards, improved system reliability, and effectively fulfil the safety oversight responsibilities. The integration of these practices into early design phases not only enhanced hazard visibility but also strengthened the traceability and defensibility of the future safety case for stakeholders.

3.3 Legal and Regulatory Safety Requirements

Safety legislation and regulations were gathered for the design at system, sub system and component levels, by accessing JSP815 to find the defence Safety Management Systems (SMS). This framework provided a holistic approach considering how control, manage and response would be taken to relevant safety risks.



Figure 13 Defence Safety Management System (SMS) Framework -12 Elements [2]

Legislation forms the foundation of legal requirements in the UK, establishing what must be done to protect people and the environment. A key example is the Health and Safety at Work Act 1974, which places a legal duty on employers to ensure the health, safety, and welfare of employees and others who may be affected by work activities [7]. This was something safety by design had to consider in all working activities.

Regulations are secondary, derived from legislation. In the context of defence, regulations are empowered by the Secretary of State for Defence and are enforced by regulatory bodies such as the Defence Safety Authority (DSA). The DSA issues specific policies which each of their 8 regulators utilise giving more detailed specific Regulations, Policy and Guidance to ensure safety across all areas. Defence Ordnance Safety Regulators (DOSR) oversee all activities for the shoulder launched missiles Ordnance, Munitions, and Explosives (OME) systems

The DSA's role is to uphold the MOD's legal obligations under UK legislation by publishing and maintaining safety regulations, including the DSA 02.OME Regs and DSA 03.OME series. These form the regulatory framework that governs safe design, handling, storage, and disposal of OME.

From these top-level regulations, a structured hierarchy of Safety Compliance Documents were derived.

These documents support compliance and ensure that safety is embedded throughout the systems engineering lifecycle these can be found in the below table:

Safety Compliance Documents	
DSA 02.OME Regs	
HSE Manual Handling	
DSA 03.OME	
Def Stan 00-056	Safety Management Requirements
AOP-4518	Disposal
AOP-21	Initiation system
AOP-4187	Fuzing
AASTP-05	Storage Ops
AASTP-1	Storage/Transport
AQAP-2110	Quality Assurance
DSA 03.OME 108	Initiation system Quality Assurance
AEP-4685	Human Integration
DSA 03.OME 101	Design Requirements
DSA 03.OME Pt 2	Facility Safety
JSP 815	Safety Management Systems Framework

Table 2 Safety Compliance Documents

This layered structure ensures that safety is not treated as an afterthought but is a core part of system design, development, and operation.

E1 Leadership, Governance and Culture	E1.1 Tone from the top E1.2 Continual improvement E1.3 Accountabilities and responsibilities E1.4 Leadership visibility E1.5 Strategic objectives E1.6 Resilient safety management	Element 1
E2 Organisation and Dependencies	E2.1 Safety Management System E2.2 Roles, responsibilities, and accountabilities E2.3 Allocation of resources E2.4 Sharing information E2.5 Standards of Safety Management E2.6 Consultation with the workforce E2.7 Changes to structure and personnel E2.8 Dependencies and interfaces	Element 2
E3 Legislation, Policy, Regulations and Guidance	E3.1 Compliance with legislation E3.2 Compliance with expectations E3.3 Defence organisation's policy and guidance E3.4 Communicating compliance requirements E3.5 Review of policies and guidance E3.6 Exemptions, waivers, and concessions	Element 3
E4 Risk Assessments and Safety Cases	E4.1 Risk Profiles and Hazard Identification E4.2 Managing risks E4.3 Management of risk E4.4 Communicating risks and controls E4.5 Improving risk management E4.6 Changes affecting the Defence organisation E4.7 Safety case	Element 4
E5 Supervision, Contracting and Control Activities	E5.1 Delegation of authority E5.2 Competence of delegated authority E5.3 Risk elevation E5.4 Letter of delegation E5.5 Mitigation of risks to ALARP E5.6 Ceasing activities E5.7 Safe Systems of Work (SSW)	Element 5

**Figure 14 Expressed Elements of the Defence Safety Management System (SMS)
(PART ONE) [6]**

E6 Personnel Competence, Resources and Training	E6.1 Resources E6.2 Responsibilities, accountabilities, and delegation E6.3 People development E6.4 Training programme E6.5 Competency assessment	Element 6
E7 Equipment Design, Manufacture and Maintenance	E7.1 Equipment lifecycle risks E7.2 Risk mitigation E7.3 Compliance with statute and Defence regulation E7.4 Equipment maintenance E7.5 Physical equipment changes E7.6 Supply chain risks and dependencies E7.7 Lessons learned E7.8 Equipment and systems integration risk	Element 7
E8 Infrastructure Design, Build and Maintenance	E8.1 Infrastructure lifecycle risks E8.2 Risk mitigation E8.3 Compliance with statute and Defence regulation E8.4 Infrastructure maintenance E8.5 Physical infrastructure changes E8.6 Supply chain risks and dependencies E8.7 Lessons learned	Element 8
E9 Performance, Management Information and Reporting	E9.1 Monitoring performance E9.2 Reviewing performance E9.3 Management information review E9.4 Leadership performance decisions	Element 9
E10 Accident / Incident Management and Emergency Response	E10.1 Accident / Incident reporting E10.2 Accident / Incident recording E10.3 Accident / incident investigation E10.4 Implementation of actions and learning E10.5 Emergency and business continuity plans tested	Element 10
E11 Communications and Stakeholder Engagement	E11.1 Stakeholder identification E11.2 Stakeholder engagement E11.3 Stakeholder collaboration E11.4 Accessing information E11.5 Raising concerns anonymously	Element 11
E12 Assurance	E12.1 1 st Line of Defence (LOD) assurance E12.2 2LOD and 3LOD assurance E12.3 Annual self-assessment E12.4 Leadership review of SMS E12.5 Corrective action	Element 12

**Figure 15 Expressed Elements of the Defence Safety Management System (SMS)
(PART TWO) [2]**

Safe by design ensured the team remained aware of relevant safety legislation, such as HSE guidelines, MOD DEF STAN 00-56, and CADMID lifecycle safety expectations. The system design was developed with safety principles in mind, embedding deliverables such as Safe Operating Procedures (SOPs), hazard logs, and risk mitigation strategies.

3.4 Basis of Safety and Mitigation

The basis of safety was established through a hierarchy of controls, prioritising elimination and engineering controls over administrative or PPE-based mitigations, Examples included:

- Use of Engineered Non-Detonable Systems (ENDs)
- Isolation barriers in the Safety and Arming Unit (SAU)
- Redundant safety mechanisms in the Exploding Bridgewire (EBW) ignition system

These measures were designed to reduce the likelihood of unintentional detonation and ensure the system was fail-safe in the event of misfire.

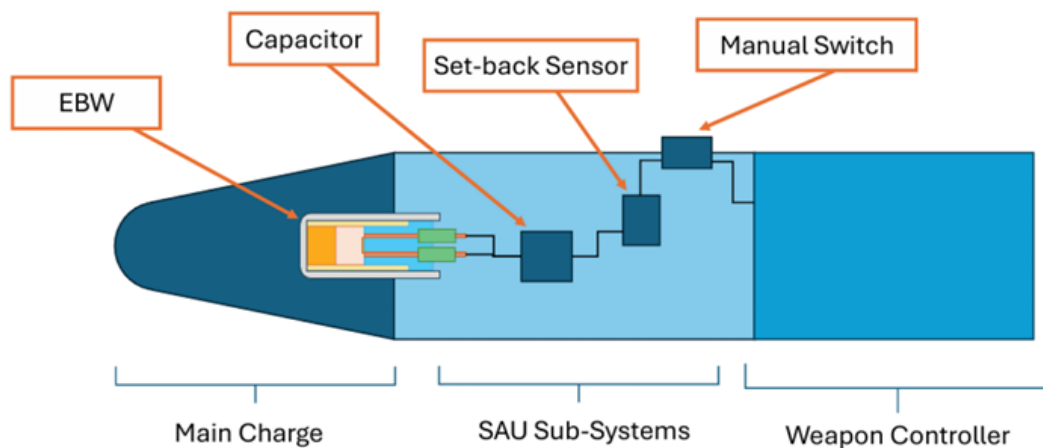


Figure 16 SAU Sub-System Break Down of Safety Systems

4 Cross-Functional Collaboration and Role Interactions

The Safety role required regular coordination with other domain leads to ensure safety was embedded throughout the design. For instance:

With the R&D lead, Collaboration verified that system mounting selection and launch design did not introduce excessive risk.

With the Manufacturing lead, process hazards were assessed along side safety of the process advice on control measures for safe production were given.

With the Performance Trials team, reviewed and tested design changes to ensure compliance with safety protocols and safety requirements.

These interactions enabled a feedback loop, allowing safety insights to inform design changes early and continuously. Trade-offs were often necessary, particularly where performance gains could introduce higher risks. These were addressed through structured discussions, often referencing stakeholder requirements.

5 Midpoint Design Review and Feedback Integration

In preparation for the design review, each team member contributed content to a shared presentation slide pack, ensuring all voices were represented. However, during the actual review, the presentation was unexpectedly led solely by the Test and Evaluation (TE) representative, with limited input from the rest of the team. This shift took the group by surprise, and when technical questions arose, they were directed exclusively to the Safety of Design (SoD) lead, while other team members remained silent.

The midpoint design review provided an opportunity to validate direction of the designs development. The feedback panel highlighted the importance of defining a clear structure with the systems engineering tool set which can be seen in the accompanying ADCA5021 report, defining a clear basis of safety ensuring system performance and integration with all other roles. Following the midpoint review, the panel clearly identified a dominance of two conflicting perspectives, those of Test and Evaluation (TE) and Safety of Design (SoD). The group was advised that broader stakeholder engagement was necessary to ensure a more balanced and inclusive decision-making process.

Overall the midpoint review was a strengthened argument for the use of shoulder-launched delivery, backed by the teams analysis of the tool set of an Functional Means Analysis (FMA) and Pugh diagram. This integration of feedback demonstrated the team's agility and commitment to continuous improvement.

Following the panel's endorsement of the shoulder-launched missile concept, the team integrated this decision into subsequent stages of their design and development work.

6 Presentation Delivery

In the days leading up to the final presentation, the Safety of Design (SoD) representative was approached by multiple stakeholders requesting assistance, as several team members were unclear on their roles or lacked confidence in their content. SoD collaborated with them to help complete their sections, which resulted in significant delays to their own work output. For example, the R&D lead expressed uncertainty about delivering his portion independently and requested support from SoD. After SoD had helped develop and refine this section, the R&D lead decided, just one day before the presentation, to present it alone. This unexpected decision disrupted the flow between their sections, requiring SoD to completely revise their slides and speaking notes at the last minute, placing them at a disadvantage during delivery.

Despite this setback, the presentation successfully included a walkthrough of the SoDs workings such as, hazard identification processes, supported by mitigation strategies aligned with the Hierarchy of Controls. Key design decisions that were justified from a safety perspective, demonstrating a strong understanding of the system's risk profiles. The panel asked specific questions, including which personal protective equipment (PPE) would be required. While further research was agreed upon, SoD effectively responded with an example involving MTBI (Mild Traumatic Brain Injury) and proposed mitigation through the use of appropriate PPE such as hearing protection.

Overall, the team delivered a cohesive and professional final presentation, demonstrating collaboration, technical insight, and a shared commitment to safety and system performance as well as each individual's stakeholder environments .

7 Reflections (Lessons Identified)

What Went Well

- Early definition of roles and responsibilities.
- Effective use of systems engineering tools to integrate safety into the design.
- Constructive communication among some team members.

What Could Be Improved

While much of the project was productive, interpersonal conflict proved a substantial obstacle. A member of the Testing and Evaluation team consistently demonstrated dominant and belittling behaviour, often rejecting the wider teams input as well as making unilateral changes to shared tools and data. This led to incorrect outputs and created significant tension when correction of these issues. was attempted. Due to limited knowledge across some of the team, disagreements escalated into disputes over the correct use of systems tools.

The individual in question also engaged in unprofessional conduct that breached personal and professional boundaries. This included going through a personal bag and altering laptop settings without consent during a presentation. In addition, the individual made inappropriate remarks about teammates' appearances, asked intrusive financial and personal questions, and pushed for responses to security-sensitive topics. These behaviours undermined team cohesion and created a hostile environment.

Such experiences highlighted the need for stronger conflict resolution mechanisms and clearer professional conduct expectations in team-based projects.

Skills Gained

- Enhanced ability to balance project management with technical safety oversight.
- Improved communication, especially under challenging interpersonal dynamics.
- Increased awareness of ethical considerations and boundaries in collaborative work.
- Better understanding of legal and procedural safety frameworks.

8 Potential Design Changes from Presentation Feedback

The feedback provided in Annex B highlighted both strengths and areas for potential refinement in the design and delivery of the final presentation. In terms of content, the recurring suggestion regarding the overlap in safety sections suggests a need for clearer picture of responsibilities and improved cross-role communication. While collaboration between stakeholders is essential, future iterations could benefit from more structured content mapping to avoid redundancy and ensure a coherent narrative across safety and systems roles.

One area noted was the lack of a distinct concluding slide summarising the key points. This is a simple but impactful addition that would enhance clarity and help reinforce the audience's takeaway. In future presentations, including a final "Key Messages" or "Takeaway Summary" slide would improve the structural flow and provide closure.

The feedback also pointed out that references were stated to be available upon request rather than embedded in the presentation. This may reduce perceived transparency and completeness. In future presentations, a dedicated references slide would be added for viewers benefit.

Despite these areas for growth, the feedback clearly reflects a sound understanding of the technical material, strong legal and regulatory integration, and effective communication with the panel. Therefore, while no fundamental changes to the core design content are proposed, the presentation strategy and collaboration process could be enhanced to further improve future outcomes.

9 Conclusion

This report has documented the approach of a group collaboration on systems engineering that was applied throughout the development of an OME-based solution, with a particular emphasis on project management and safety oversight. From initial team formation and role delegation to structured hazard analysis and regulatory compliance. From a safety perspective the project demonstrated the value of integrating safety from the earliest stages of design.

The role of the Safety of Design (SoD) lead, proved critical in ensuring risk mitigation strategies were not only technically robust but also compliant with complex legal and regulatory requirements. Effective use of tools such as FFMEA, THERP, and the Hierarchy of Controls facilitated informed decision-making and traceable risk management.

While the project encountered challenges, including interpersonal conflicts, uneven contribution across stakeholders, and late-stage setbacks, these provided valuable learning experiences in managing technical and relational complexities. The successful delivery of the final presentation, despite such obstacles, reflected strong resilience, professionalism, and teamwork.

Ultimately, this project reinforced the importance of embedding safety as a core design principle, maintaining open lines of cross-functional communication, and applying structured systems engineering methodologies to achieve both technical and stakeholder objectives. The insights and skills developed through this experience will directly inform future work in high-stakes engineering environments where performance, compliance, and safety must coexist.

10 References

- [1] Alexander Kossiakoff, "SYSTEM LIFE CYCLE,," John Wiley & , Hopkins, 2020.
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- [3] ASANA, "A 6-step guide to requirements gathering for project success," ASANA, 31st January 2025. [Online]. Available: <https://asana.com/resources/requirements-gathering>. [Accessed 27 04 2025].
- [4] Ministry of Defence , "Part1: Risk Management Principles | The Orange Book," Gov.UK, London, 2021.
- [5] T. N. Ahmad Ramezani, "Human error probability quantification for NPP post-accident analysis," ELSEVIER, Shiraz, 2020.
- [6] Ministry of Defence , "Defence Safety Management System (JSP 815)," Gov.uk, London, 2022.
- [7] Gov.UK, "Health and Safety at Work etc Act 1974," Gov.UK, 1974. [Online]. Available: <https://www.hse.gov.uk/legislation/hswa.htm>. [Accessed 27 04 2025].

Appendices

Appendix A Presentation for Work Based Group Project



Defence Nuclear
Organisation



Ministry
of Defence







Team 1
Final
Presentation

Presented By;

Gareth James (2217522)
Rachel McColm (2223157)
Libby Jones (2222538)
Charles Hadley (2207149)
Dan Garton (2219350)
Lewis Gray (2224230)

For Group Based Project
ACDA5022

Charles Hadley

Meet The Team

Gareth James

Research &
Development Engineer

Charles Hadley

Test & Trials Engineer

Daniel Garton

Manufacturing Engineer

Libby Jones

Design Safety Engineer
& Project Manager

Rachel McColm

Process Safety Engineer

Lewis Gray

Disposal Engineer



Housekeeping & Amenities

Introduction

Emergency Exit

Fire Alarms

Eating and Drinking

Questions?

Agenda

Research & Development

Design Safety

Test & Evaluation

Manufacture

Process Safety

Disposal

Mission Objective:

1. Neutralise the communications centre.
2. Minimise collateral damage to the rest of the building structure or potential occupants
3. Immobilise / disorientate occupants rather than eliminating them.

Requirements:

Contributing Factors:

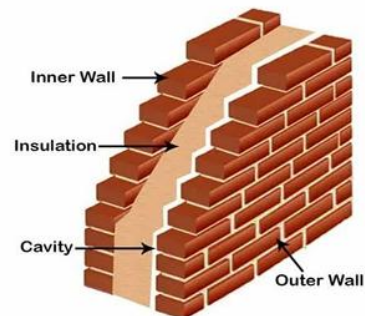
Target specifications:

- External rendered filled cavity block construction – Approx 300-350mm thick.
- Room Dimensions 10m x 8m x 4m Room.

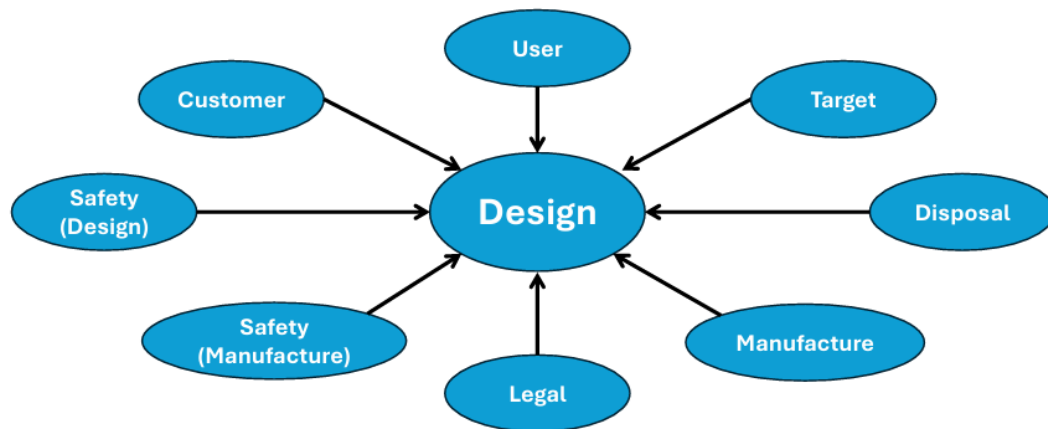
Limiting Factors:

Factors which directly impact design:

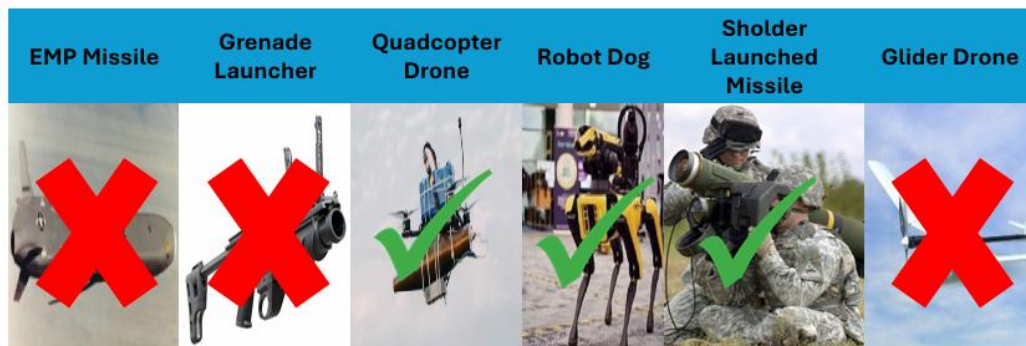
- Reduction of collateral damage
- Blast must also not impact the structure



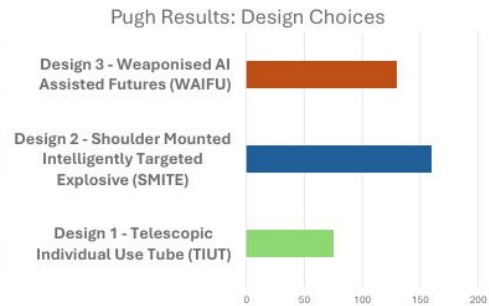
Requirements



Design Phase Summary



Solution:



System Design Overview

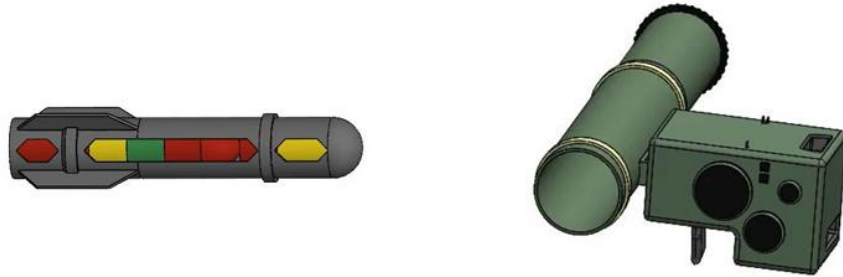
Telescopic Tube



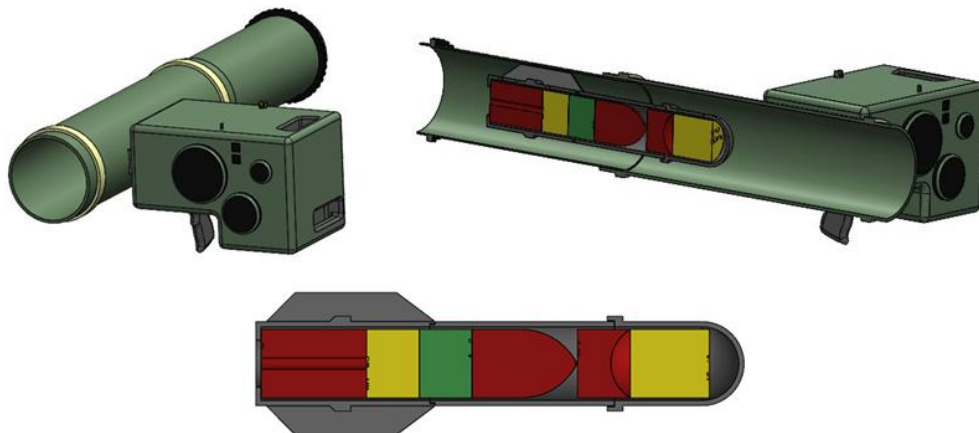
Command and Launch Unit
(C.L.U.)



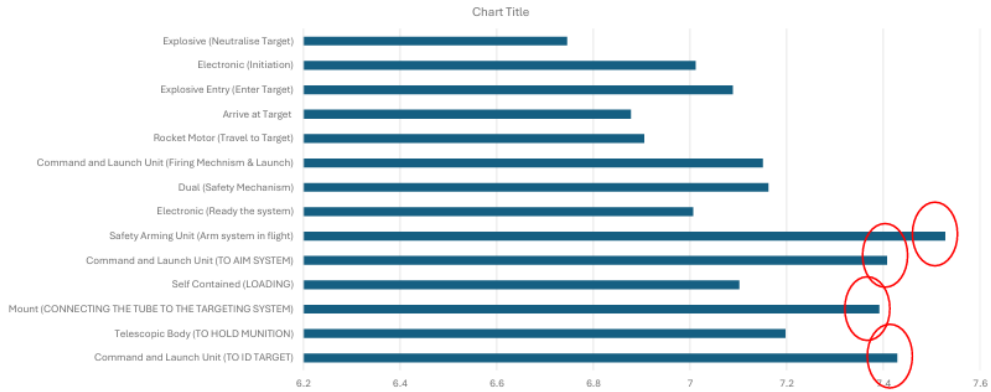
System Design Overview



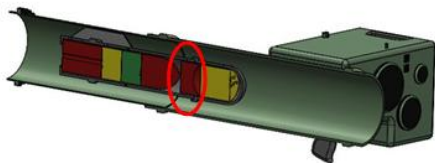
Shoulder Launched Missile



System Design Overview



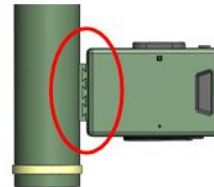
Key Design Features:



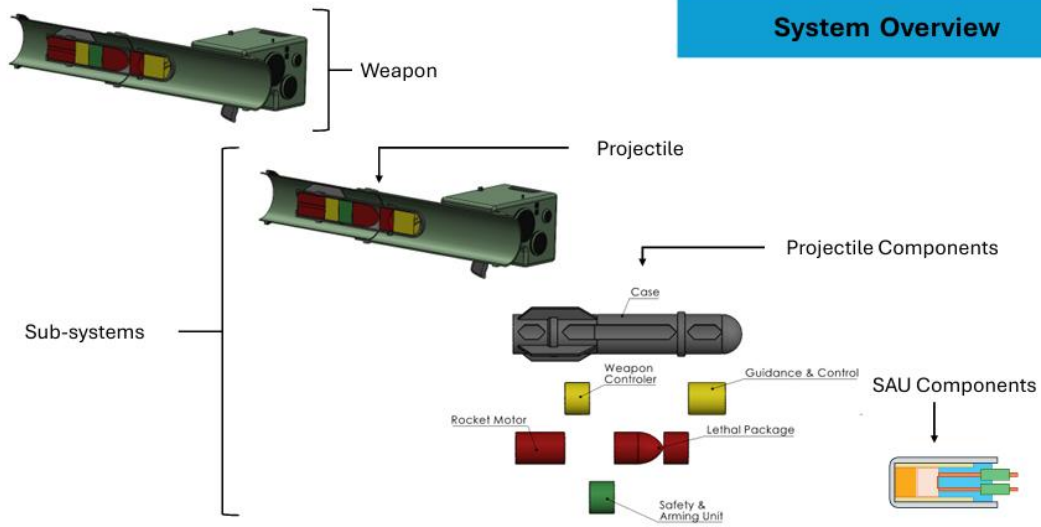
The Safety and Arming Unit



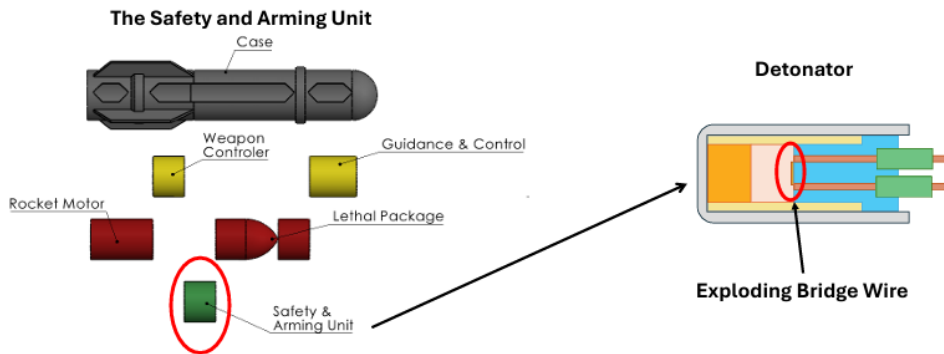
The Command and Launch Unit

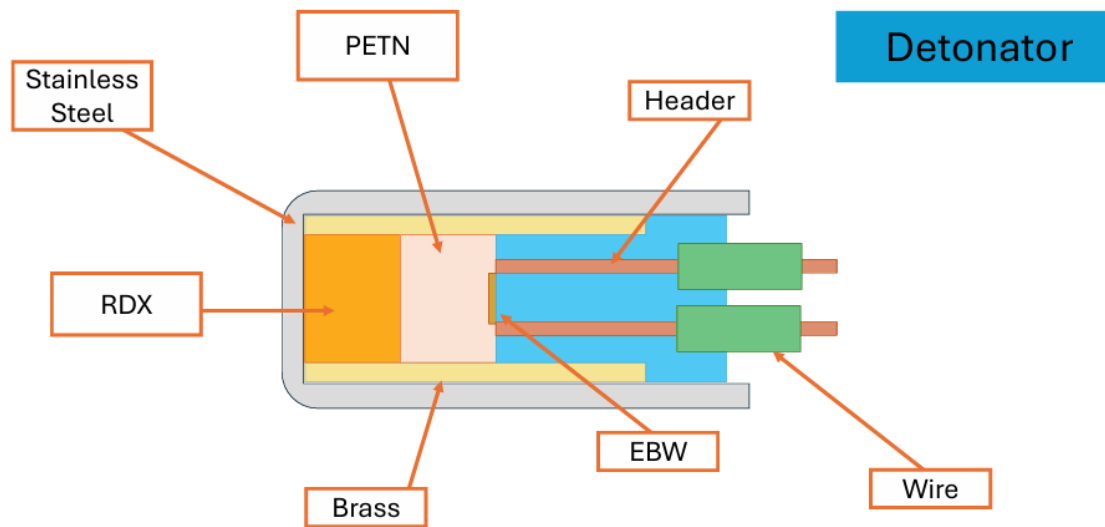


The Mount



Critical Sub-Systems





R&D Questions?



Safety Compliance



The Health &
Safety Work Act
1974



The Explosives
Regulations 2014



DSA 02.OME: Defence
Ordnance, Munitions
Explosives Regulations



Safety Compliance



The Explosives
Regulations 2014

- Prevent an unplanned fire or explosion
- Limit the extent of an unplanned fire or explosion
- Protect people from the effects of a fire or explosion



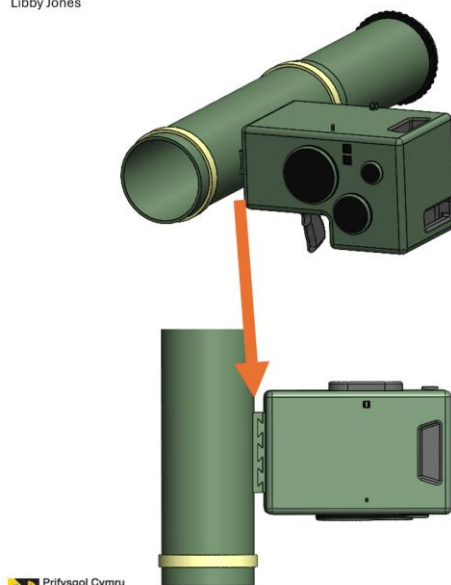
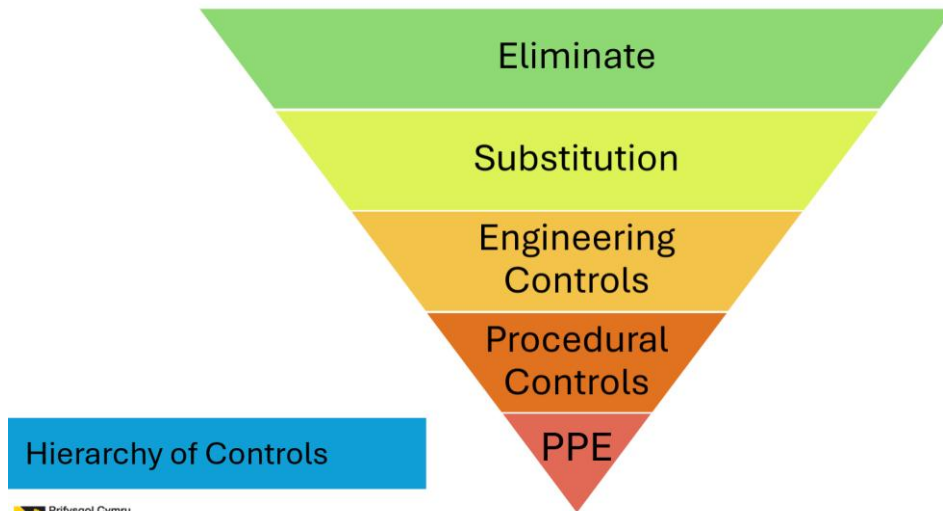
Stakeholder Requirements

- The system must be designed as such it is safe to operate
- The system must be designed as such it is safe to handle
- The system must be designed as such it is safe to function

Push to Fit Mount

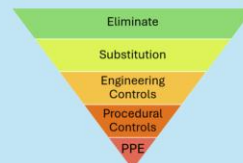


- Design Failure Mode Effects Analysis was utilised to identify the ways the system could fail.
 - Over
 - Under
 - No
 - Intermittent
 - Un-intended
- What was the risk ?
- Can we mitigate that?



Dove Tail Mount

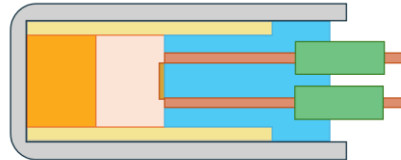
- Lower RPN Value when compare with a Press fit on a DFMEA
- Mechanical Interlock, provides consistent, secure attachment, reducing the "Human Element".
- Ergonomically shaped to withstand vibration during launch.



HAZARD: Unintended Functioning of the EBW System

How this can occur:

- Functioning of the explosive elements in the EBW.
- A presence of a current in the system due to the fusing / arming functioning when unintended.



HAZARD: Unintended Functioning of the EBW System

Sensitive materials in the EBW i.e. Explosives

Eliminate

- No, the Booster Composition is required to detonate Main charge



Substitute

- Could look into Substitution of PETN & RDX



Engineering Controls

- Not really, we can control the critical diameter and density of the composition



Procedural

- Depending on sensitivity of composition, safe handling procedures



PPE

- Not at this stage



HAZARD: Unintended Functioning of the EBW System

EBW as a whole

Eliminate

- Yes, but you can't function your main charge

Safety



Deliver Effect



Substitute

- Yes, could initiate with percussion as an example

Deliver Effect



Safety



Engineering Controls

- Yes, could incorporate SAU, to ensure current to EBW is intended



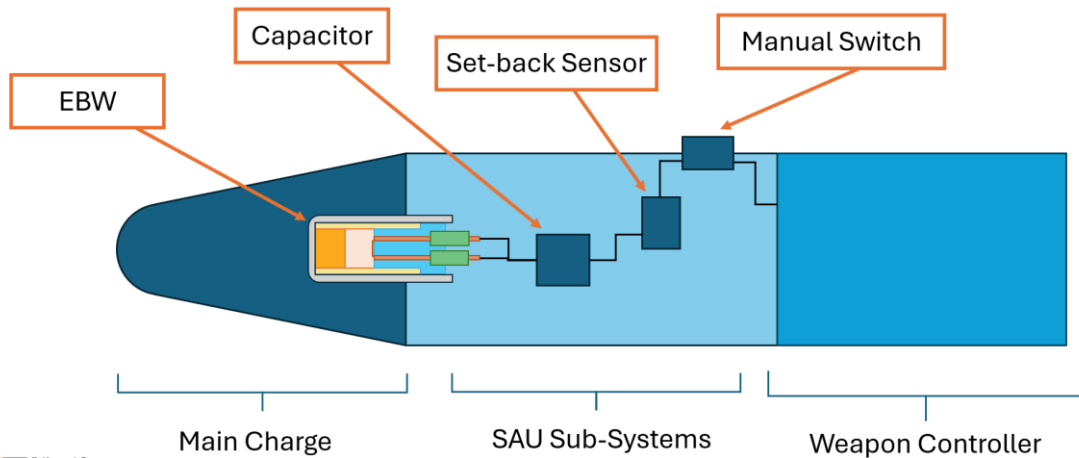
Procedural

- Safe handling procedures



PPE

- Not at this stage



SAU Safety Mechanisms

Design Safety Questions?

Test and Evaluation (T&E)

Charles Hadley



Requirements



Approach



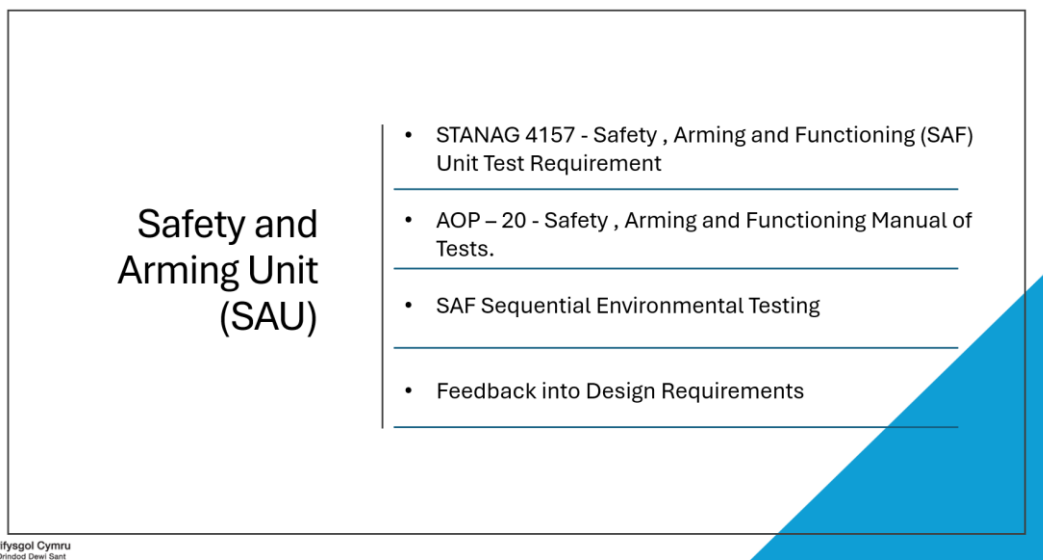
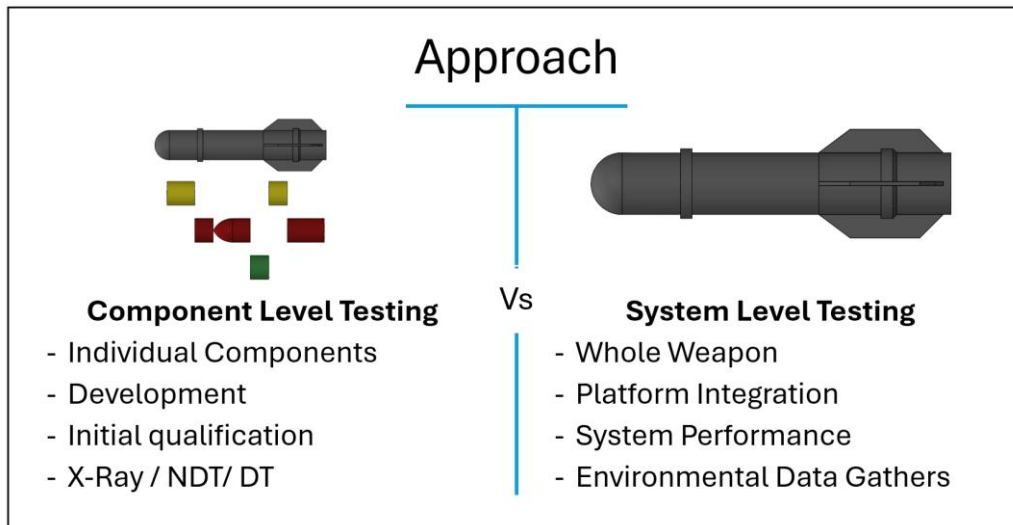
Design Feedback

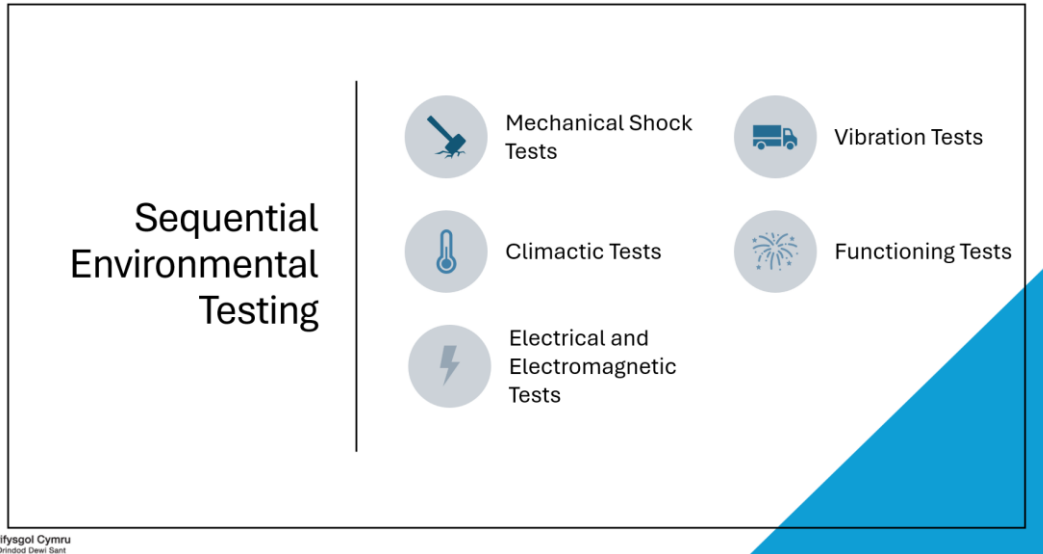


Analysis and Performance



Results





Testing Plan

Group	Test	Criteria for Passing Test	Munition	Packaged	Minimum Asset	Tailored	Tailoring Reason
Mechanical Shock	A1 Jolt	Safe for use 1	None	No	1	n	
Mechanical Shock	A2 1 Jumble	Safe for use 1	None	No	1	n	
Mechanical Shock	A3 15-m Drop	Safe for disposal	None	Both	4	n	
Mechanical Shock	A4 11.5-m Drop	Safe for use 4	None	L	No	2	n
Mechanical Shock	A5 Transportation Handling	Operable	None	L	Yes	2	n
Vibration	B1.1 Transportation Vibration	Operable	None	Both	2	n	
Vibration	B3 Tactical Vibration	Operable	None	No	1	n	
Climatic	C1 Temperature & Humidity	Operable	None	No	1	n	
Climatic	C2 Vacuum-Stream-Pressure	Operable	None	No	1	n	
Climatic	C3 Salt Fog	Operable 5	None	No	1	n	
Climatic	C4 Waterproofness	Operable 6	None	No	1	n	
Climatic	C5 Fungus	Operable	None	No	1	n	
Climatic	C6 Extreme Temperature	Operable	None	No	1	n	
Climatic	C7 Thermal Shock	Operable	None	No	1	n	
Climatic	C8 Leak Detection	7	None	No	1	n	
Climatic	C9 Dust	Operable 8	None	No	1	n	
Climatic	C10 Solar Radiation	Operable	None	L	Both	2	n
Safety, Arming & Functioning	D1 Primary Explosive Component Safety	9	None	No	1	n	
Safety, Arming & Functioning	D2 Projectile Fuse Arming Distance	7	L	No	1	Out	Out for component testing - in for System
Safety, Arming & Functioning	D3 Time to Air Burst	7	L	No	1	Out	Out for component testing - in for System
Safety, Arming & Functioning	D4 Explosive Component Output	7	None	No	1	n	
Safety, Arming & Functioning	D5 Rain Impact	10	I	No	1	n	
Safety, Arming & Functioning	D6 Brash Impact No-Fire Test	Safe, Operable	I	No	1	n	
Safety, Arming & Functioning	D7 Mortar Ammunition Fuse Double Loading Test	Safe	I	No	1	Out	Not a Mortar
Safety, Arming & Functioning	D8 Progressive Arming Test	1	None	No	1	n	
Safety, Arming & Functioning	D9 Explosive Train Transfer Reliability Testing	7	None	No	1	n	
Aircraft Munition	E1 Jetson	Safe for disposal 11	L	No	1	Out	Non Aircraft Munition
Aircraft Munition	E2 Low Altitude Accidental Release	Safe for disposal 11	L	No	1	Out	Non Aircraft Munition
Aircraft Munition	E3 Arrested Landing Munition Pull-off	Safe for disposal 11	L	No	1	Out	Non Aircraft Munition
Aircraft Munition	E4 Catapult And Arrested Landing Forces	Operable	I	No	1	Out	Non Aircraft Munition
Aircraft Munition	E5 Simulated Parachute Air Delivery	Operable 12	None	L	Yes	1	Out
Electric & Magnetic Influence	F1.1 Electrostatic Discharge	Safe for use 13	None	Both	2	n	
Electric & Magnetic Influence	F2.1 High Voltage Electromagnetic Pulse	Operable 7	I	No	1	n	
Electric & Magnetic Influence	F3.1 EMR Hazards (EMRH)	Operable	None	Both	2	n	
Electric & Magnetic Influence	F4.1 EMR Operational (EMRO)	Operable	None	No	1	n	
Electric & Magnetic Influence	F5 Lightning	Operable	I	No	1	n	
Electric & Magnetic Influence	F6 Electrical Stress Test (EST)	Operable	None	No	1	n	

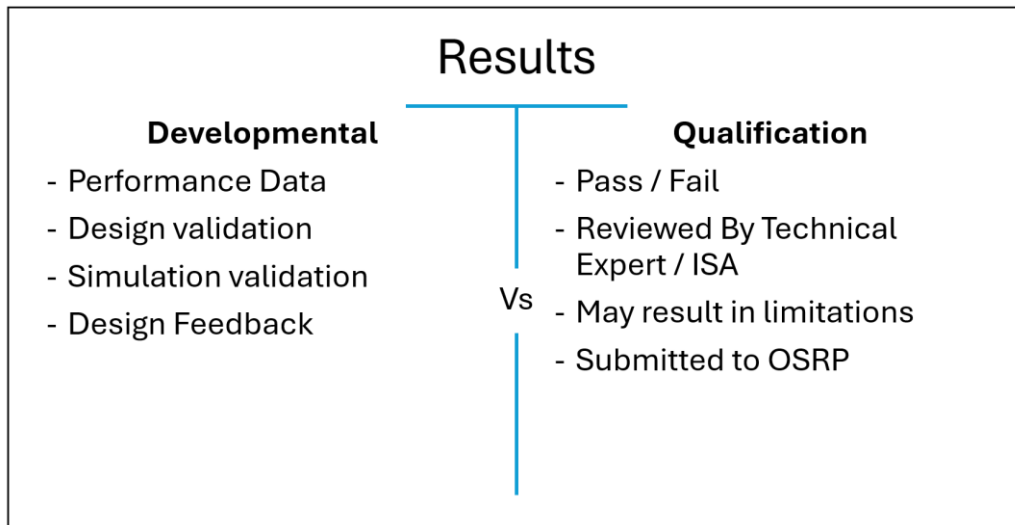
6 Categories

37 Tests

8 Tailored Out

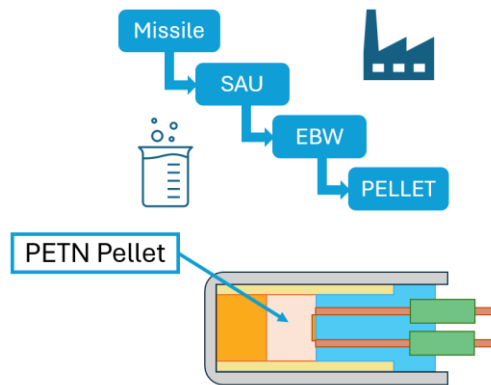
29 Tailored In

38 Assets Required

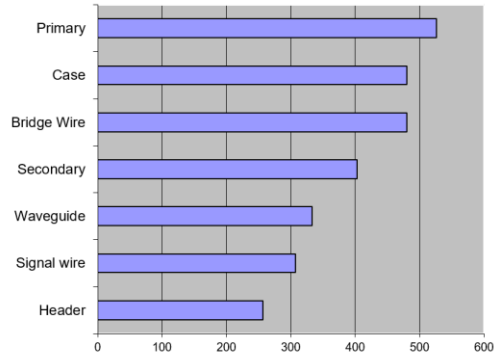


T&E Questions?

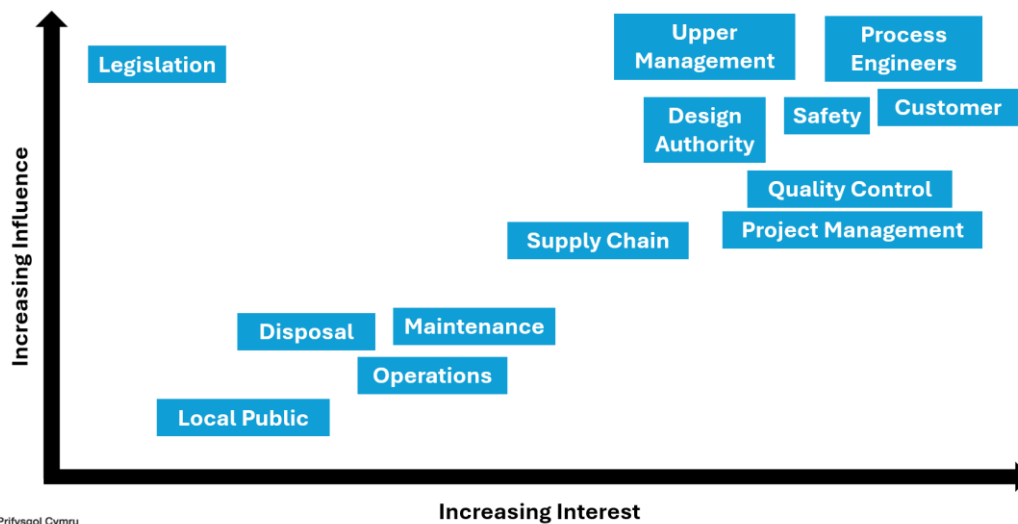
Manufacturing



Process Importances Chart



Manufacturing Stakeholder Map



Available Processes

Mix and Cast



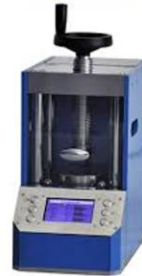
- Increased Process steps
- Needs casing/moulds
- Voids risk
- Shrinkage casting
- + Proven

RAM



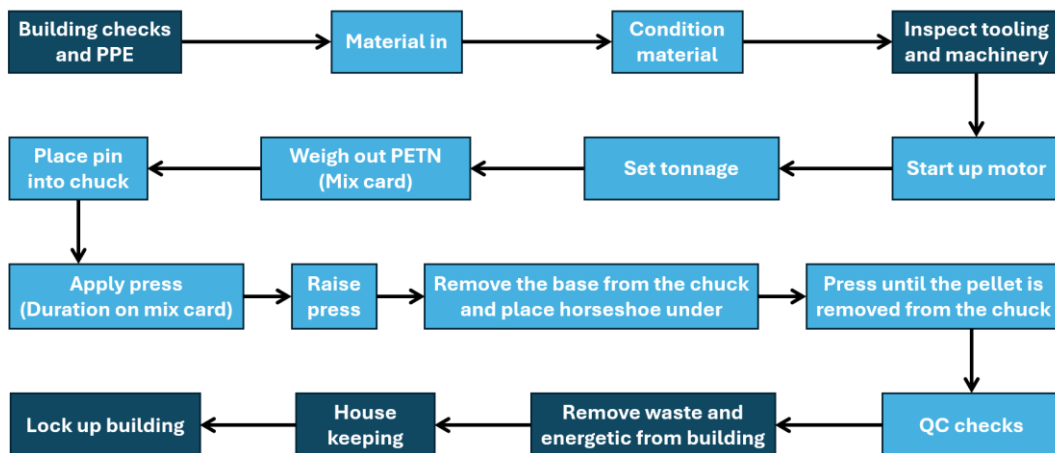
- Expensive
- Not proven
- Needs casing/moulds
- + Increased solid loading

Press

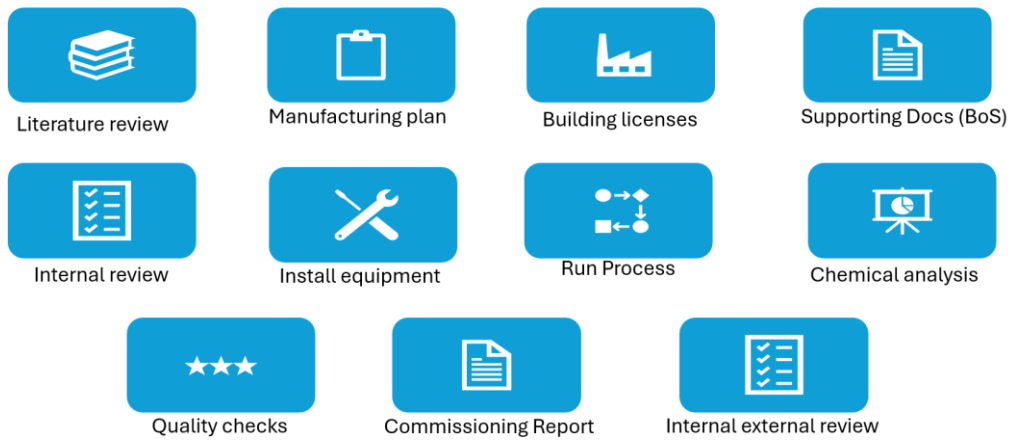


- Specific materials
- + Inexpensive
- + Proven
- + No casing
- + Less heat created
- + Precise shape

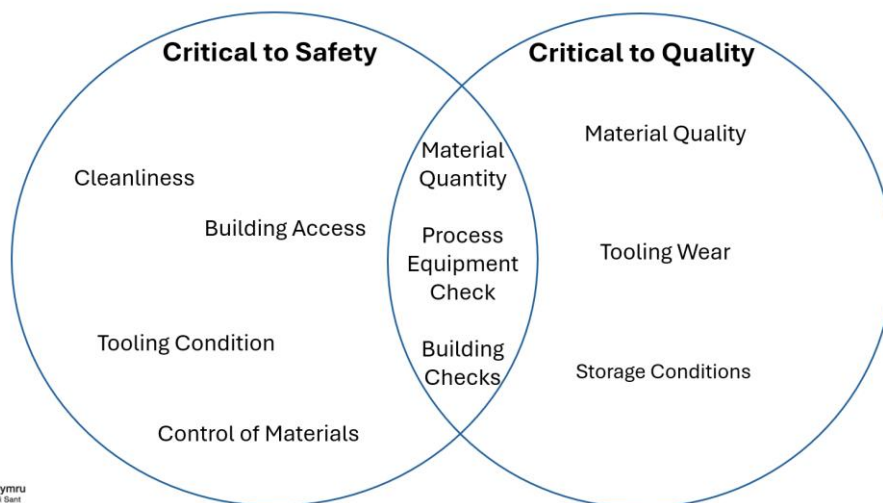
Top level flow



Work Package Deliverables



Critical Process steps



Process Control Plan (PCP)/QFD4



Validation plan

Blast modelling

Human factors analysis

Shift condition running

Various QC checks through the process

Commissioning report

Manufacturing Questions?

Rachel McColm



Legislation and Regulation



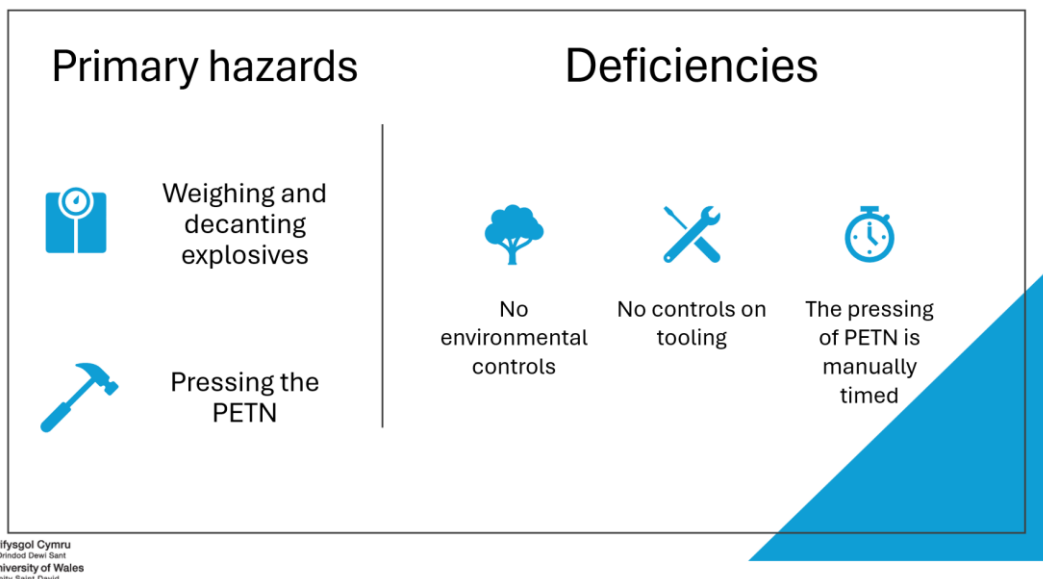
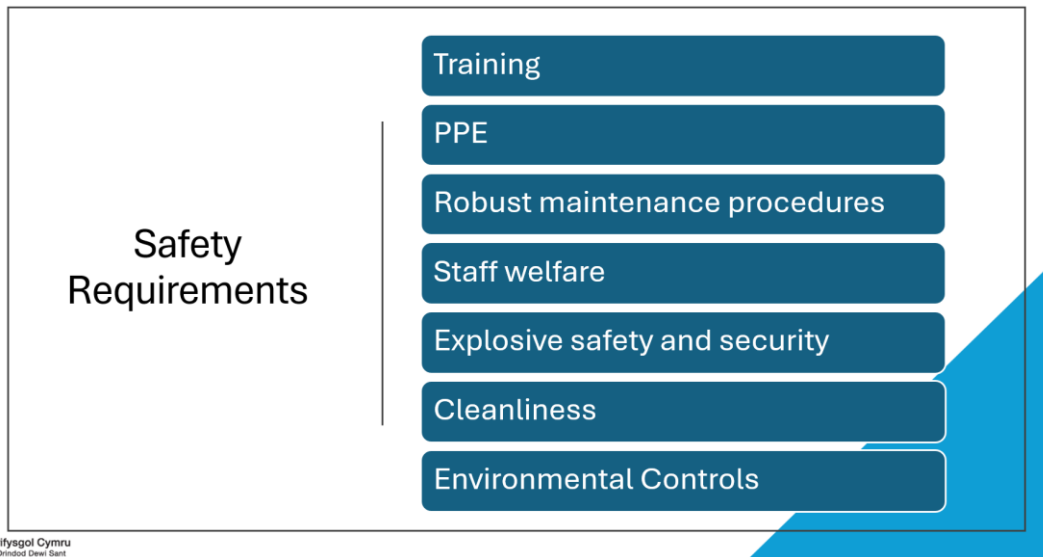
The Explosives
Regulations 2014



The Health &
Safety Work Act
1974



DSA 02.OME: Defence
Ordnance, Munitions
and Explosives (OME)
regulations





Risk Classification

	Negligible	Minor	Moderate	Significant	Severe
Very Likely	Low Med	Medium	Med High	High	High
Likely	Low Med	Low Med	Medium	Med High	High
Probable	Low	Low Med	Medium	Med High	Med High
Unlikely	Low	Low Med	Low Med	Medium	Med High
Very Unlikely	Low	Low	Low Med	Medium	Medium

Risk Class	A	B	C	D	E
------------	---	---	---	---	---



Mitigations



Tooling Controls



Environmental
Controls



Automation

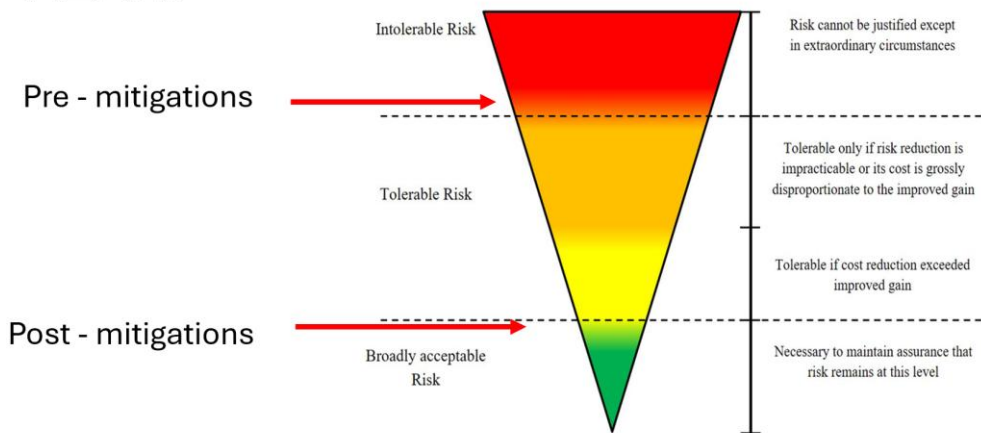


Post Controls Risk Classification

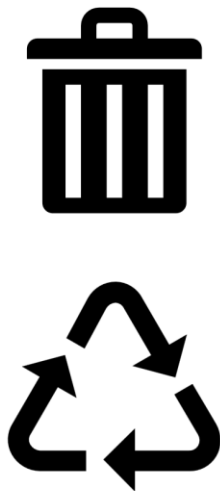
	Negligible	Minor	Moderate	Significant	Severe
Very Likely	Low Med	Medium	Med High	High	High
Likely	Low Med	Low Med	Medium	Med High	High
Probable	Low	Low Med	Medium	Med High	Med High
Unlikely	Low	Low Med	Low Med	Medium	Med High
Very Unlikely	Low	Low	Low Med	Medium	Medium

Risk Class	A	B	C	D	E
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ALARP



Process Safety Questions?



Disposal

Lewis Gray

Requirements



Safe



Effective



Reliable



Minimal Environmental Impact

Input from Design

- Munition must be recoverable from Launch Tube Assembly
- Subcomponents must be recoverable from missile
- Toxic materials kept to a minimum.

Inert Components	Energetic Components
Telescopic Launch Tube	Safety and Arming Unit
Command Launch Unit (CLU)	Rocket Motor
Guidance & Control Unit	Follow Through Bomb
Weapon Controller	Precursor Charge
Storage Case	Blip Motor
Missile Frame	

Components
to be
Disposed of

Methods Evaluated





Disposal / Final Questions?

References available on request



Appendix B Appendices Feed Back from Presentation

Libby Jones	Team 1
Team feedback / Questions	
Q to team.....Alternatives to EBW? Were these considered? simple slides with clear layout. Images are a good size, easy to view. Good contrast between text and background. Theme consistent throughout different sections to give a nice cohesive team feeling. Referring to other people's sections showed good collaboration. Some overlap in safety content, could give the impression of lacking communication between the two. Clear introduction to set out order of events. Would have benefitted from having a distinct conclusion, even one slide summarising the key points. References stated as available on request; it would have been better to include the references slide in the presentation for the sake of transparency. Some misinterpretation of stretch goal between group members?	
Feedback / Comments Dave	
Good evaluation of requirements wide stake holder mapLegal side of safety regulations understood. HSAW 1974 introduced How does that transfer into the hazard prediction Links to your FFMEA Good description of FFMEA Human factors brought in Good drawing of SAU and relationship to safety.	
Feedback / Comments Jenni	
good pace and volume. Interacted fairly well with audience, good eye contact and open body language. Quite a bit of reading from slides/notes on slides, this could come across as being unprepared or lacking confidence. Had something shiny to fidget with, although it was quiet this could be distracting for the audience and perhaps something more matte may be better in future. Some "umm" and "err"ing but overall a reasonably confident delivery, confidence increased over time during delivery.	