www.sula.co.uk

Unmanned & Autonomous Systems

The introduction of unmanned and autonomous systems into the military and commercial domains brings unique challenges. Sula Systems has been engaged with both commercial and military projects across a variety of domains and throughout the System lifecycle. Our people have the highest levels of technical proficiency, engineering expertise and proven judgment.

Introduction

Sula have applied rigorous analysis and Systems Engineering expertise across a broad range of defence and aerospace programmes, including Unmanned Air Vehicle (UAV) research. Capabilities that we can bring to unmanned & autonomous systems include; Technical Assurance, Radar, Integrated Testing and Acceptance, Safety Cases, and Coherence across Defence Lines of Development. Sula are able to provide independent, affordable expertise and support.

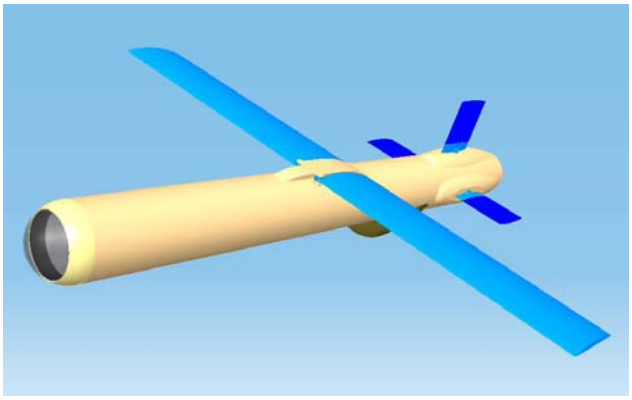
UAV Vulnerability

Sula has undertaken a series of trials to assess the likely extent of fragment damage to typical UAV engines and fuel systems, and the resulting impact on survivability from offensive systems (warheads and guns).

The vulnerability of UAVs to fragments of different sizes and velocities was quantified and related to potential engagement geometries. We developed a number of rules and algorithms for inclusion in detailed vulnerability and OA models.

UAV Sensor Technology

Sula provided sensor expertise in support to the Autonomous Systems Technology Airborne Evaluation & Assessment (ASTRAEA) programme. The work investigated the sensor requirements for the in-flight refuelling of a UAV , identified off-the-shelf sensors and detailed the relative costs and performance.



Affordable Defeat of UAV Threats

Sula developed a novel concept for a cost-effective counter to the increasing threat posed by prolific, low-cost UAVs. Our solution exploited threat characteristics and vulnerabilities to defeat the target well beyond the effective range of its sensors. Novel guidance procedures were developed to attack the target from the rear, allowing the use of very low cost components to achieve robust, hit-to-kill performance.

Technical Assurance

When prime contractors are under commercial pressure to deliver, it is essential that senior staff within both government and industry are able to access independent, realistic views on the health of programmes and their likelihood of delivering against their promises.

Sula provides an expert and independent holistic view of the complex programmes that exist in Defence and Aerospace today. A proven success with MOD, this Sula service is being increasingly taken up by prime contractors. The service is

delivered by small teams led by highly experienced systems engineers and the areas we examine include:

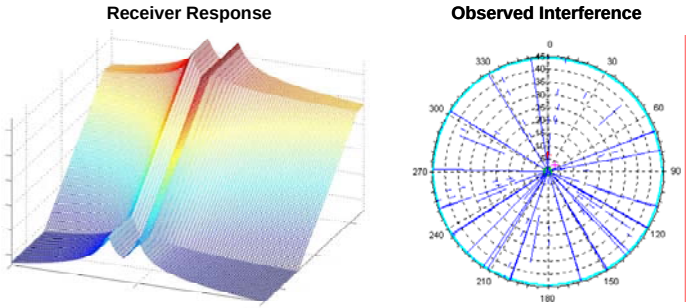
- Technical Maturity
- Requirements analysis
- Processes and Reviews
- Cross DLOD Coherence

Example programmes:

- **Taranis UAV**
- **Tornado Capability Sustainment Programme**
- **Land Environment Air Picture Provision (LEAPP)**
- **Bowman/CIP**
- **Lightweight Mobile Artillery Weapon System (Rocket) (LIMAWS)**
- **Future Integrated Soldier Technology (FIST)**

Radar

Sula's radar team provides expertise in radar systems analysis, signal processing, performance modelling, and test and evaluation. Sula's experience stems from our team's many years in industry and the armed services covering a wide range of radar and complex weapons projects. The radar team are able to apply these skills to the challenges of UAV sensors and the search for a 'sense and avoid' solution for UAV flight in uncontrolled airspace.



Safety Cases

Sula has an established reputation for delivering high-profile studies and support within challenging timescales, and a proven track record in providing objective and technically rigorous safety engineering support to the Defence and Aerospace domains. Our pragmatic and professional Safety and Environmental Team includes a number of dedicated safety, environmental and engineering specialists with experience in the Land, Air, Munitions and Software domains.

Defence Lines of Development

The UK MoD identifies eight Defence Lines of Development (DLODs) that all programmes should consider to ensure the delivery of coherent capability. The eight DLODs are: Training, Equipment, Personnel, Information, Concepts & Doctrine, Organisation and Infrastructure. Overarching all these is the interoperability needed across these lines. These wider system issues are especially critical for networked, unmanned systems which rely on the provision of support, infrastructure, rules and trained personnel to work as intended.

Over the last few years Sula has worked with DE&S IPTs on programmes such as FRES, DII, Bowman/CIP, Artillery Systems and Network Enabled Air Defence and Surveillance to develop a methodology based upon the use of Capability Maturity Models (CMM). This approach means that:

- All stakeholders agree what level of maturity each DLOD must reach by key points in the programme.
- The CMM defines what these levels of maturity mean it terms of measurable achievements.

Integrated Test Evaluation & Acceptance (ITEA)

Sula have extensive expertise in the development and management of ITEA activities across many complex programmes. We ensure that integrated test activities are coordinated and conducted to ensure credible and reliable evidence is obtained for acceptance. Our approach ensures traceability to requirements and consistence with maturity metrics (Technology and System Readiness Levels) are clearly recorded.

Integration and test activities Sula have worked on include:

- Designed and conducted flight trials for Sula's current research into a novel Synthetic Aperture Radar (SAR) signal processing technique called Non-linear SAR (NSAR).
- Providing significant assistance to the MoD's Land Environment Air Picture Provision (LEAPP) trials and subsequent data analysis and performance assessments.
- Development and Management of the ITEAP process for FRES.
- Providing specialist support to Bowman/CIP tactical internet over radio trials.
- Test and Evaluation Services and Targets (TEST) (IPT) support – Sula developed the prototype master schedule and constructed the framework for a 'management cell' against which the IPT can contract for support.

For more information about Sula and how we can help you, please contact us on 01453 844660 or email info@sula.co.uk

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