

BAE Systems

Intelligent Lead Assessment Service (ILAS)

ILAS Software - Service Definition Document

1 Product Overview

ILAS is an advanced analysis platform that detects, prioritises and monitors risk, using proprietary inference technology.

It does this by replicating existing analyst tradecraft, and applying this to complex interconnected data - such as is stored in records management systems - in order to infer leads (fully contextualised narratives of real-world situations) and assess risk. The leads are prioritised by the level of risk each represents and are fully understandable and explainable enabling users to assess them for intervention. ILAS reprocesses and tracks leads, re-assessing their risk level as new information is ingested, maintaining an up-to-date view, highlighting changes and calculating the risk dynamics of each lead.

2 Features

ILAS includes the following key features, which are described in detail below:

- Automated risk detection using human tradecraft
- Continuous complex risk monitoring
- Rapid response to new information
- Automated risk assessment and generation of risk profiles
- Emerging risk detection
- Proactive risk prioritisation
- Confidence analysis
- Risk velocity analysis
- Explainability and traceability
- Workflow stage integration

2.1.1 Automated risk detection using human tradecraft

ILAS replicates the complex and nuanced tradecraft currently used by practitioners to identify risk within data, and applies this to data already available to the user to automatically detect risk. This automates the research, detection and collation work of an analyst, but ensures that decision making remains with the person, presenting and explaining all risks detected for corroboration, investigation, and action.

2.1.2 Continuous complex risk monitoring

ILAS responds to new information as it is ingested, providing an over-watch function. It maintains an up to date, fully contextualised, traceable and detailed picture of risk to users, in the domains that have been configured, based on all information made available to it. Thereby ILAS is enhancing the users' situational awareness, ensuring relevant information, context and connections are not missed.

2.1.3 Rapid response to new information

ILAS responds rapidly to new information as soon as it is made available to the system, reassessing all leads, highlighting to users where a lead is affected, the impact it has had, and how the risk has changed. This aligns to the workflow integration capability of ILAS, presenting changes since the previous assessment.

This also ensures that there is minimal delay between information being received, the impact on management and intervention being understood, and the appropriate action being taken.

2.1.4 Automated risk assessment and generation of risk profiles

ILAS produces risk profiles automatically across all available information. These provide a detailed and structured view of any lead detected in the data and are presented as a fully contextualised narrative, explaining the detected risk. These go beyond traditional subject profiles, taking into account the influence of other entities, the wider patterns of behaviour and activity, and the key relationships and connections that impact the identified risk.

Selecting any lead presents the full intelligence and information picture. This risk profile shows a relationship network chart highlighting the influential and pertinent relationships within the lead, a structured graphical view of the risk factors identified as part of the lead which reflects practitioner tradecraft, a timeline view of the events ILAS has assembled and complete traceability to the source data. This ensures that risk profiles can be effectively and quickly understood, corroborated, and intervention opportunities identified.

2.1.5 Emerging risk detection

ILAS is able to detect partial and developing patterns of behaviour and risk, rather than waiting for them to have reached a significant level of harm.

This feature enables ILAS to detect, monitor and highlight emerging risks to users, giving the opportunity for early intervention. The advanced confidence scoring capability built into ILAS captures the nuance of these emerging risks, re-assessing the confidence that the risk is valid as the information picture develops.

2.1.6 Proactive risk prioritisation

ILAS presents the highest priority risks to users first, to drive focus and maximise impact. This ensures that while it is monitoring risk across all available information, analysts are not overwhelmed.

ILAS uses a specialised probabilistic risk engine, which supports multiple risk frameworks, including MoRiLE (Management of Risk in Law Enforcement), to score and prioritise identified leads, and present multiple dimensions of risk to the user. The contextual importance, threat and vulnerability of all entities involved are assessed and presented based on the risk factors seen in the available information.

2.1.7 Confidence analysis

The confidence in intelligence is often imperfect. This is because its source may be unreliable, collected data is not a complete picture of the real world and inferring risk from multiple distinct indicators and factors is an imperfect process which has uncertainty associated with it.

ILAS is designed to take into account this uncertainty of information and tradecraft which is inherent in intelligence analysis. It does this using an advanced confidence scoring mechanism built on a proprietary dynamic probability network approach which was specially designed for this purpose. This approach enables the answers to a few simple questions asked of practitioners to be used to inform any situation ILAS comes across. This means that ILAS can present a defensible, traceable and explainable confidence score along with each lead.

This confidence score supports assessment by users, and ensures that the inherent uncertainty is accounted for and understood when users make their assessments.

2.1.8 Risk velocity analysis

High risk situations in the real world are not static and are constantly changing and developing. The change in situations over time is therefore often a useful way to direct focus and understand whether early intervention is required, as well as whether current management of that situation is working.

ILAS tracks the level of risk over time, showing users at a glance whether the risk is increasing or decreasing, and the rate of this change. This supports focus towards the most rapidly changing leads, the opportunity for early intervention, and an understanding of whether interventions and management are working.

To account for the fact that indicators of risk become less relevant and impactful as time goes on, ILAS has a built in decay of risk scores, ensuring that well managed situations with minimal activity drop in risk over time. This also ensures that, as more information enters the organisation, leads do not continue to increase in risk if the behaviour associated with that risk is diffusing and lessening.

2.1.9 Explainability and traceability

ILAS plays the role of supporting users in making rapid decisions based on complete situational awareness of risk across the board. The supportive role that ILAS is playing means it is important that the risks ILAS detects can quickly be understood, corroborated, and ultimately acted upon by users. As such, explainability and traceability are key tenets of the system.

The proprietary inference engine which sits at the core of ILAS is built on fully explainable, traceable and predictable technology. It uses logic, reasoning and inference – directly configured with tradecraft provided by practitioners – to detect and assess risk, rather than learned or black box models which wouldn't be suitable for the intelligence analysis environment.

The ILAS interface is designed to rapidly explain the information it has assembled and how this was done to ensure that users can spend the majority of their time on downstream decision making and intervention rather than understanding and corroboration.

Everything ILAS detects and assesses is fully traceable and evidencable back to the underlying source data, integrating with the source system(s) to provide complete traceability. This supports user trust and ensures that corroboration is always possible.

2.1.10 Workflow stage integration

While ILAS is not a workflow or case management system, it tracks key workflow stages, such as a review of risk, or management of that risk. ILAS can show this information as part of a lead to provide an overview of the

management and intervention context to an analyst. ILAS also maintains the management status of a lead, helping to highlight where action and review may be required.

3 Technical Overview

3.1.1 ILAS Components

ILAS is composed of a number of high-level components. These are shown in the diagram below.

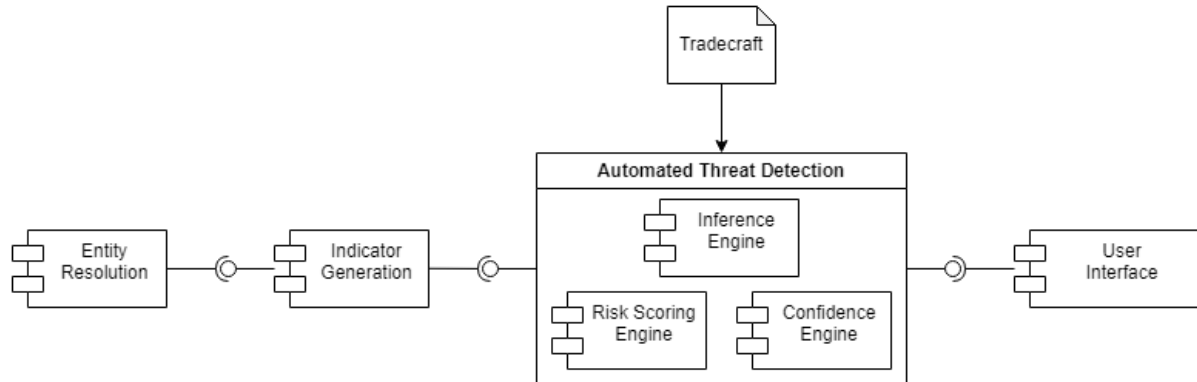


Figure 1: High Level Component Architecture of ILAS

3.1.1.1 Entity Resolution

Where data is combined from multiple systems, or entities exist with multiple identities, entity resolution provides the capability to resolve multiple identifiers into coherent representations of things in the real world, such as people, businesses, vehicles etc. The entity resolution engine is designed to work in near-real-time and is fully aligned to the indicator generation and automated threat detection capabilities.

3.1.1.2 Indicator Generation

ILAS ingests data from source systems. The indicator generation component transforms and connects this data, running configurable rules over the connected data to generate low level indicators of risk. These indicators are the most granular factors which inform risk detection by the ILAS capability.

3.1.1.3 Automated Threat Detection

This is the core technology underpinning the capabilities of ILAS including an inference engine, risk scoring engine, and confidence scoring engine. The inference engine takes in large numbers of indicators of risk (many of which may on their own be low risk) and applies practitioner-defined tradecraft to these to detect leads which may require intervention. The engine replicates the reasoning that analysts follow when analysing information, incorporating the nuances of variable uncertainty and differing levels of harm, threat and vulnerability that contribute to risk.

The risk scoring engine prioritises leads by level of risk, and the confidence engine calculates the confidence in those leads – presented using the established PHIA (Professional Head of Intelligence Assessment) probability yardstick.

3.1.1.4 User Interface

Users consume the output of ILAS via the user interface. It is hosted as a webapp which works on modern browsers.

Leads are presented on prioritised, filterable lists, with each serving a specific area of business. Each lead is annotated with appropriate workflow, priority and confidence information. Selecting a lead shows the detail behind it, providing a fully explainable and traceable view of the assembled information, reasoning, risk scoring and confidence scoring.

A 3rd party user interface or external system could be made to work with ILAS via a supported API, but this would be subject to discussion and agreement of the work involved under the Lot 3 ILAS Support offering.

3.1.1.5 Configuration

ILAS is directly configured using tradecraft captured from practitioners and SMEs. This configuration is entirely transparent and open, ensuring it is challengeable. It can be updated, modified and improved to ensure ILAS' operation continues to align to best practice and current tradecraft. This tradecraft is core to the operation of ILAS. ILAS has built in no-code tooling to build and manage this configuration, using a risk-focused framework to structure the tradecraft and expertise captured from analysts and subject matter experts. In addition, aspects of tradecraft can be configured directly from analysis of historic data, or from quantitative studies of risk and threat.

3.1.2 ILAS Information Flow

The diagram below illustrates an indicative flow of information through the system. The data load process is flexible and other models of data ingest ranging from batch through to event-driven real time are all possible.

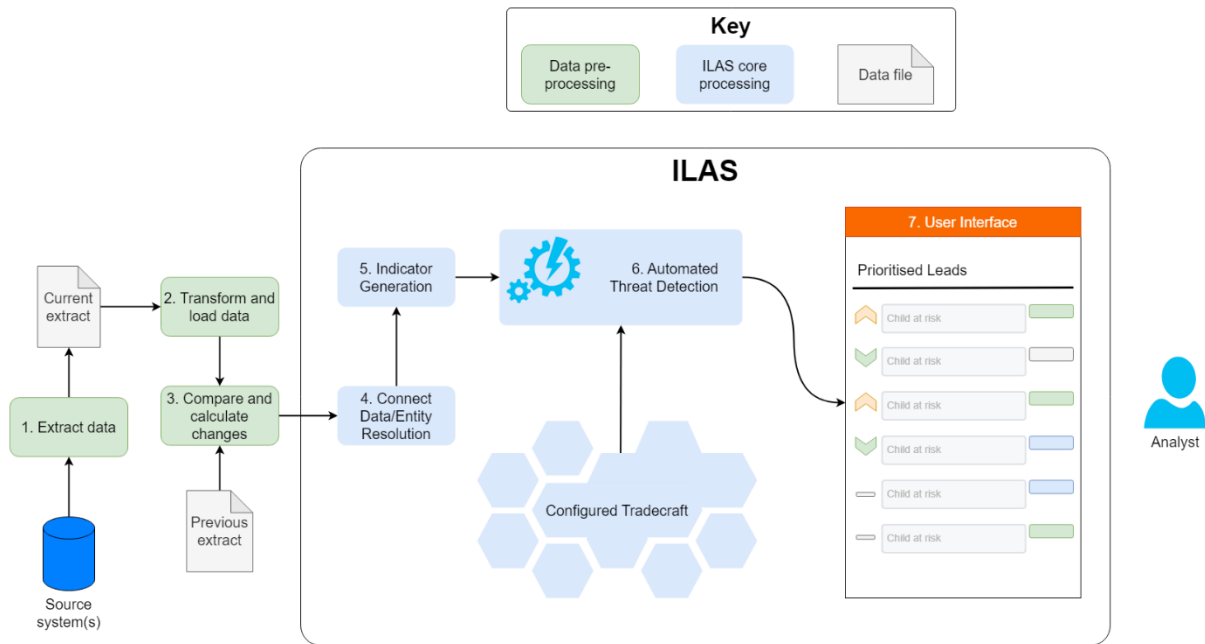


Figure 2: Simplified Information Flow of ILAS

3.1.2.1 Core ILAS Processing Flow

1. Data is processed to connect and resolve the information.
2. A set of defined rules are used to generate indicators of risk representing low-fidelity pieces of information that could contribute towards leads.
3. The indicators along with the configured tradecraft are fed into the inference engine which assembles the indicators into a picture of what is going on. These are scored for priority, emerging risk level and confidence using the risk and confidence engines.
4. Analytical users interact with the ILAS interface to view and explore the detected, prioritised and continuously monitoring risks.

Note that other interfaces, endpoints and data flows are provided with the capability to support peripheral system users. These include:

- System health and status endpoints for administrative monitoring of the system
- Tradecraft configuration user interfaces for ensuring the correct tradecraft is configured and can be iterated
- Audit and metric outputs are provided to integrate with external audit and BI systems for system usage monitoring and management oversight.

3.1.3 Data Management

ILAS stores a subset of the information it ingests from source systems in a highly specialised format optimised for tradecraft-driven analysis. This information is kept current and is accessible through ILAS APIs if required.

ILAS maintains consistency with source systems, ensuring addition, modification and deletion of data is reflected both in the data it has ingested, and any derived information. It does this by identifying changes in the source data system, determining the impact of these changes on the inferred information and leads that it identifies, and then mirroring the changes.

The only data held within ILAS which cannot be recreated from source systems is the status of detected risks, which is an ILAS specific capability. All other data can be re-created from source systems if required.

4 Documentation

4.1.1 Training Materials

On-site training and demonstrations can be provided.

5 ILAS Support Services

ILAS Support services are available under Lot 3, these include:

- Expert tradecraft capture and mapping
- Multiple operating environments, cloud, hybrid and on premise
- Business analysis, feasibility assessment, cloud solution planning and guidance
- Installation, integration and configuration
- Data quality assessment and cleansing
- Training on how to navigate ILAS
- Quality assurance testing
- Helpdesk support

