Project Results

FedSS

The Federated Security Shield for maritime security

EXECUTIVE SUMMARY

A scalable, state-of-art RIA (Rich Internet Applications) technology that provides a new information handling capability able to disclose data sources on a secure, need-to-share basis: the FedSS software-intensive system enables interoperability among new and existing geographically dispersed, heterogeneous security solutions for maritime security and safety on an international, distributed execution platform.

PROJECT ORIGINS

Serious problems are faced by countries bordering the Baltic, North and Mediterranean seas in relation to maritime activities, whether legal or illegal. The need and demand for safety and security along with rapid response to possible incidents require international cooperation among the respective coastguard, customs, maritime and border police, fishery inspectorates and government ministries. With information and even invaluable intelligence from various third party sources potentially available, the ITEA 2 project FedSS set out to fuse this data with multimedia information originating from open, or at least accessible, sources.

TECHNOLOGY APPLIED

The new information handling services introduced by FedSS encompass various forms of anomaly detection based on non-kinematic data, information to geo mapping, long-term trend detection, cross-border analysis services and smart concept retrieval services. The OGC (Open Geospatial Consortium) Web Feature Service (WFS) and Web Map Service (WMS) standards were used to realise the mapping of fused information with 2D and 3D maps in the security and safety domain. Context-awareness between the map and information of the operator's task is assured via the OGC web coverage service.

A drug smuggler scenario demo was prepared for the Turkish Coastguard to show how the integrated system allows the exchange of data between different agencies. The scenario incorporated a simulation environment, based on the needs of the Turkish Coastguard. At the heart of the FedSS processing framework is the Dynamic Process Integration Framework (DPIF/MARTELLO) that integrates the various applications as part of the FedSS framework and the visualisation (UDOP) of the agencies connected to the system. MARTELLO is geared to data security as opposed to network security, encrypting all data separately thus enabling full-access control of every piece of information and the ability to actually share information on an ad-hoc and real-time basis. A FedSS (graph-based) database component contained an initial collection of knowledge data for more than 330,000 vessels while the semantic

The difficult environment of maritime safety and security

search components included a FedSS ontology along with a semantic indexer and search. User-defined operational pictures were established for the Turkish Coastguard and relevant authorities, and specific vessels tracked using kinematic anomaly detection to identify suspicious movements. In addition, the use of OGC protocols to deliver geo-data makes for significantly improved interoperability in the nautical domain. Other benefits gained from this scenario demonstrator include machine-learning for ship tracking, on-the-fly combination of geo-data from multiple sources. A virtual collaboration tool was used to support the overall development and reduce cost and risk.

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MAKING THE DIFFERENCE

The results of the FedSS project lay the basis for a number of prospective product and service developments. For example, Proline Secure Multiparty Computation is a technique for evaluating a function with multiple peers so that each learns the output value but not each other's inputs. FedSS focused on systems based on secret sharing to implement secure multiparty computation. C2Tech aims to incorporate the newly developed decision-making capability acquired in FedSS into its existing product portfolio and to improve its current expertise in video-streaming and rule-based engines. Thales Nederland will industrialise the FedSS prototype results within two years as software plug-ins that can be added to existing maritime security systems. In addition, Thales Nederland envisages the possibility of integrating the content-based indexing, text mining and threat detection components into a maritime command-and-control system.

Luciad's exploitation of the results will come in the shape of an all-round security and safety monitoring capability that runs within any browser or specific plug-ins and is accessible by static and mobile users. Singular will apply FedSS results to define new products to be included in K-Site product line, with the envisaged business model based on a per-use licence. The availability of the new software component is estimated at around two years. Finally, Skytek expects to deploy the results of the project large manufacturing and complex maintenance activities such as in aerospace and processing plants or power stations. Once a demonstrator is available, Skytek intends to approach key players in the aircraft maintenance domain with whom it has a strong research relationship.

The impact will be felt in terms of boosting not only the attractiveness of existing software products in the single supplier-customer case through improved information processing and analysis but also better information interoperability in cases involving one or more suppliers to multiple customers.

MAJOR PROJECT OUTCOMES

Dissemination
- 8 publications
- 6 presentations/papers at conferences/fairs

Exploitation (so far)
- **DPIF/Martello**; Application integration platform with secure data exchange.
- LuciadRIA; WebGL based map display (2D and 3D), Tactical symbologies , Earth modelling, OGC protocols and Map Data fusion.
- **Secure Data Storage**; Keyless enctyption method, Storage level encryption for inside threats to cloud computing, In build fail over protection.
- **Virtual Collaboration Environment**; for collaboration and training for people geospatial dispersed, audio, presentation boards, movies , whiteboards, 3D objects
- **Semantic Search**; Easy and powerful semantic search over big documents collections (intelligence reports, news, blog posts and social media)
- **SAFAX**; Evaluation of XACML policies, Policy alignment, Integration of credential-based and reputation-based policies within access control
- **ICSS**; Simulation of an Integrated Coastal Surveillance System
- **DTVVD**; Digital TV Video Distribution, Real-time Video Stream over Ethernet Network, Low latency (< 100 msec) and GPU utilisation
- **MS**; Simulated Mission System
- **Gesture Library**; User Defined Gesture Library for naval application for harsh environment
- **MHS**; light weight Message Handling System with ADat-P3 compliant message creation / delivery and Text Message Support
- **ES**; Environment Simulator generating a realistic operational environment for simulations
- **KAD**; Anomaly Detection Engine for Ship Tracking Applications