"The reasonable man adapts himself to the world; the unreasonable man persists in trying to adapt the world to himself. Therefore all progress depends on the unreasonable man."

- George Bernard Shaw, *Man and Superman (1903) "Maxims for Revolutionists"*

Comprehensive Port Security through Waterside/Landside Integration

By Graeme Dunk[1]

Abstract

Port security has traditionally been addressed as two distinctly separate components; the waterside aspects providing surveillance and situational awareness, and the landside addressing the physical security of the port itself, and the monitoring of activities on land. Given that any waterside incident will elicit a landside response the integration of these two components is required.

The presentation discusses developments within L-3 that have the potential to achieve the proposed landside/waterside integration.

Introduction

Maritime Domain Awareness (MDA) is progressively being considered as a layered approach comprising Long Range Identification and Tracking (LRIT), coastal surveillance, offshore critical infrastructure protection, vessel traffic management systems for restricted waterways, etc, with the aim to develop a Common Operating Picture (COP) assessable by cooperating states and agencies. The information is utilised for a variety of purposes[2] including national security, vessel compliance, economic planning and development, and environmental monitoring and protection[3].

Inside the port however this approach breaks down into separate waterside and landside security components, with the latter often focussing on the physical aspects of security – perimeter, access control and other related ingress and egress factors.

This presentation will consider port security as part of the above continuum of surveillance and response options that needs to integrate waterside and landside aspects. After all, any waterside security incident will require a landside

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[2] In Australia 24 Federal agencies have a stated interest and involvement in MDA. Numerous State Government Departments and agencies are also involved.
[3] For a view that MDA information can be misused to restrict the traditional freedoms associated with navigation on the high seas see Kraska, J; "The Dark Side of Maritime Domain Awareness" *US Naval Proceedings*, December 2009; accessed online 05 January 2010 http://www.usni.org/magazines/proceedings/story.asp?print=Y&STORY_ID=2127

response. The presentation will be illuminated through various developments and activities occurring within L-3 Communications, and will advance the implementation of the Customised Vector Nautical Chart (CVNC) as the waterside-landside link.

Landside Security

Since the terrorism events of 11 September 2001 there has been an increased focus on the security of port facilities and shipping. These security measures have been included as amendments to the Safety of Life at Sea Convention, 1974 (SOLAS Convention) and implemented in Australia through the introduction of the *Maritime Transport And Offshore Facilities Security Act (MTOFSA)* and *Offshore Facilities Security Regulation 2003*[4].

Measures taken to be compliant with the increased security measures include establishing forums for information sharing between Government Agencies and regulated port users; new and upgraded fencing and gates; restricted access to sensitive areas; background checking of port workers through the introduction of the Maritime Security Identification Card (MSIC); signage; access control; increased closed circuit television (CCTV) surveillance; perimeter patrols; and increased monitoring of port precincts, particularly the waterside[5].

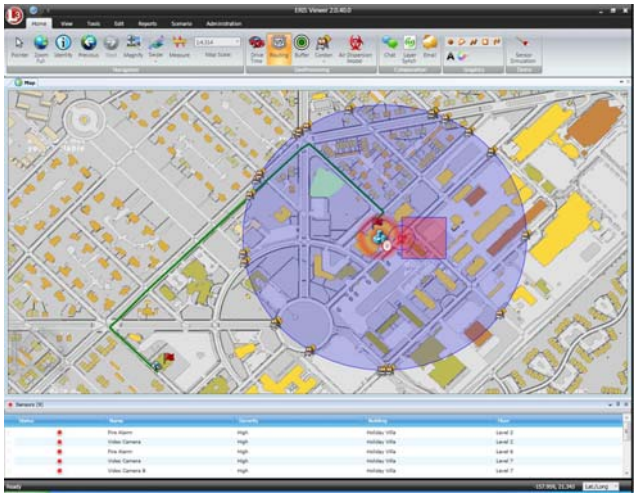
Whilst all these actions will all lower the risk of an incident they do not address the management of that incident once it has occurred. What is required is a decision support aid that provides a temporal and spatial view of the port environment, the unfolding incident and the resources that have been assigned roles for incident response – that is a Geographic Information System (GIS) based solution. An example of such a tool is the L-3 Emergency Response Information System (ERIS)[6].

ERIS is a real-time Building Information System (BIS) developed in response to the growing challenge of protecting public and private infrastructure. ERIS provides emergency response personnel with situational awareness and tactical building information to support decision making before, during and after a building-related emergency. The current ERIS system integrates three proven technologies into a single system – GIS captures, manages, analyses and displays

[4] See http://www.infrastructure.gov.au/transport/security/maritime/isps/index.aspx Site accessed 05 January 2010.
[5] For example see http://www.sydneyports.com.au/port_operations/port_security for increased security actions taken in Sydney Ports. Site accessed 05 January 2010.
[6] L-3 Enterprise IT Solutions ERIS Data Sheet.

geospatial information; Building Information Modelling (BIM) provides detail on the building specifications and designs; and senor devices capture environmental parameters and transmit these to a secure, central system.

Unlike existing crisis command and emergency response applications, ERIS enables the end user to dynamically interact with the three dimensional building models, and overlays critical, real-time situational data. ERIS therefore provides emergency personnel with the tools needed for real-time decision support, resource allocation and crisis management for the landside component of security.

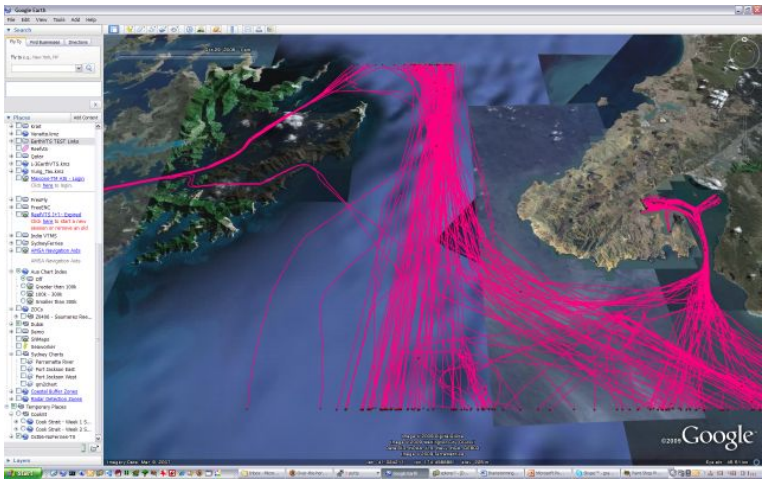


Waterside Security

Waterside security pertaining to a port exists in two related (but only sometimes correlated) forms – maritime domain awareness of events in the approaches to the port and within the port limits, and operational security as it pertains to the movement of shipping within the port.

The waterside aspects of port security are inevitably a combination of radar, Automated Information System (AIS), optical and infra-red cameras, and underwater detection devices with the outputs fused and presented via a command and control system to enable responses as appropriate to be taken. Electronic fences are established to provide alarms should a contact move outside defined shipping lanes, or into restricted areas. “Rhythm of life” analysis can be undertaken on stored traffic data as an aid to warning and cueing. Such analysis

provides an initial view into events that might be considered as being outside of the “normal” pattern, and therefore worth investigation.



The aim of both facets of the port waterside security picture is the detection, classification, identification and tracking of all maritime contacts in the area of interest (however that is defined). The operating picture for these endeavours is typically based on a chart or some chart derivative. In a developing number of cases this is through a Customised Vector Nautical Chart.

A CVNC is a large scale Vector Nautical Chart that has been compiled to more exacting tolerances and may contain additional information – including landside information. Depth contour increments may be as small as 0.1 metres to provide the best view of the bottom within the port. The CVNC terminology is not standard and may be considered as analogous to other terms such as Precision Electronic Nautical Charts (ENC), Nav Usage 6 ENCs (berthing charts), or as used by the Port of Hamburg “Port ENC”. At L-3 Nautronix, we have specifically used the term “Customised” as large scale charts are equally applicable in sensitive, restricted or strategic areas outside of ports, and the final product is customised to the requirements of the user.

The rationale for the development of the CVNC is one of port efficiency. Ports are under increasing pressure to service longer, wider & deeper vessels, to improve efficiency and productivity and importantly for this discussion to enhance security. The rapid advance of the technology associated with live position information, portable pilot and other computing devices, precision manoeuvring systems, and more accurate geographic information and survey systems has supported the introduction of the CVNC.

In Australia the ports of Port Hedland and Fremantle have been delivered of a CVNC. The CVNC is created as a separate data set and implemented as an Additional Military Layer (AML) overlaid over official data giving pilots and other users the ability to return to the official data should that be required.

Integration through the Customised Vector Nautical Chart

The question relevant to this discussion becomes how to integrate the landside and the waterside components of security together, and the answer must be through the GIS and the CVNC. The maritime information needs to be integrated into the landside data, rather than the reverse, as the aim is to aid incident response, and this will primarily always be a landside activity. The maritime integration could be undertaken as additional layers within the incident response system.

For an emergency situation within a port, a ship can be considered as a building – albeit a mobile one. In this sense, the management of any emergency will be affected by the nature of the ships in harbour and how they can be moved as part of the incident response. The additional GIS layers would therefore contain both the CVNC data and the location and nature of all shipping within the port area, including cargo and safety distances. The inclusion of ship layout information, maybe as a required report upon entry to a harbour, would further augment the overall incident response capability by enabling management and response personnel to have immediate access to all relevant data. Such data is readily available for many ships through the implementation of Integrated Ship Management Systems.

The benefits of waterside/landside integration through the CVNC are considered to be (in no particular priority order):

1. Single GIS coverage of the entire port/harbour area. This means that a single spatial database will contain all the relevant data, with no database consolidation or integration issues. This will mean a reduced maintenance overload as compared to having separate instances of the database.
2. Makes use of infrastructure that aids/supports normal port operations (the CVNC). CVNCs are of interest to ports for operational efficiencies, and it makes sense to utilise this as the integration layer, rather than create some other application.
3. Shipping is taken in account when planning incident responses. The location and characteristics (cargo, etc) of underway and berthed shipping is crucial in planning responses to port-related incidents. The incorporation of a maritime display based on the CVNC will ensure the necessary information is available to incident planners and responders.
4. Enables precision movement of maritime platforms and response assets. It some cases it may be necessary to move shipping as part of the incident response. The CVNC will provide the detailed information necessary for the optimum response, to limit the impact on maritime operations from the landside response, and hence reduce port recovery back to normal operations following a security incident. This may be particularly important should damaged shipping be required to be moved as part of the incident response.
5. Integrates those responsible for the landside and waterside operations and responses more closely. Landside response planning is also supported by MDA functionality for warning time and preparation. Waterside "daily rhythm of life" analysis will contribute to decision making by giving early indications of contacts acting outside of normal patterns, and that therefore might require investigation.

Conclusions

In conclusion therefore, optimal port security can only be attained through the integration of the landside and waterside security components. The CVNC, a GIS representation of the harbour area, together with shipping location and characteristics data is considered to be the way to bring this to fruition.