# 12TH ICCRTS
# “Adapting C2 to the 21st Century”

## "Integrating Military and Civilian C2“

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# OVERVIEW

NuParadigm recently received a Navy SPAWAR contract for "Secure Legacy Application Integration with NCES" (SLAIN). As a result, we are developing prototype system models to integrate civilian and military Command & Control (C2) across a Service Oriented Architecture (SOA) network using the internet protocol (IP).

- Integration of Command across Civilian and Military structures is as much about creating interoperability among cultures.
- Atkinson & Moffat (2005, pg 161) describe the nature of Command as “a function of trusts, fidelity and agility”, whereas, Control is a function of rules, time and bandwidth”.
- Civilian Commands all work under and among state & local governments who have worked out complex trust relationships to get things done such as new roads, disaster relief, criminal pursuit across jurisdictions, etc.
- The emerging SOA approach is surprisingly adaptive and capable of supporting both communication bandwidth as well as adapting the message between sender and receiver to be understood in the local context (culture) of each other.

# Introduction

• It is important to observe the role of communication networks and particularly the internet in supporting the creation, self-organization and maintenance of Command & Control structures.

• Atkinson & Moffat (2005, pg 161) also stated, "Organizations have a choice: if they wish to exert control over the battlespace, as opposed to command, they need to provide the rules and quantitative technological bandwidth necessary. If they wish to command, as opposed to control the battlespace, they need to provide the more qualitative trusts of fidelity and agility in their people.

• Taken one step further, command is more associated with culture, and control with technology; and it is the effect of one upon the other that is key." The task of integrating Civilian and Military Commands is as much about respecting and communicating within the context of each participant's culture as it is about having the bandwidth and network access to assign and manage the rules of a battle.

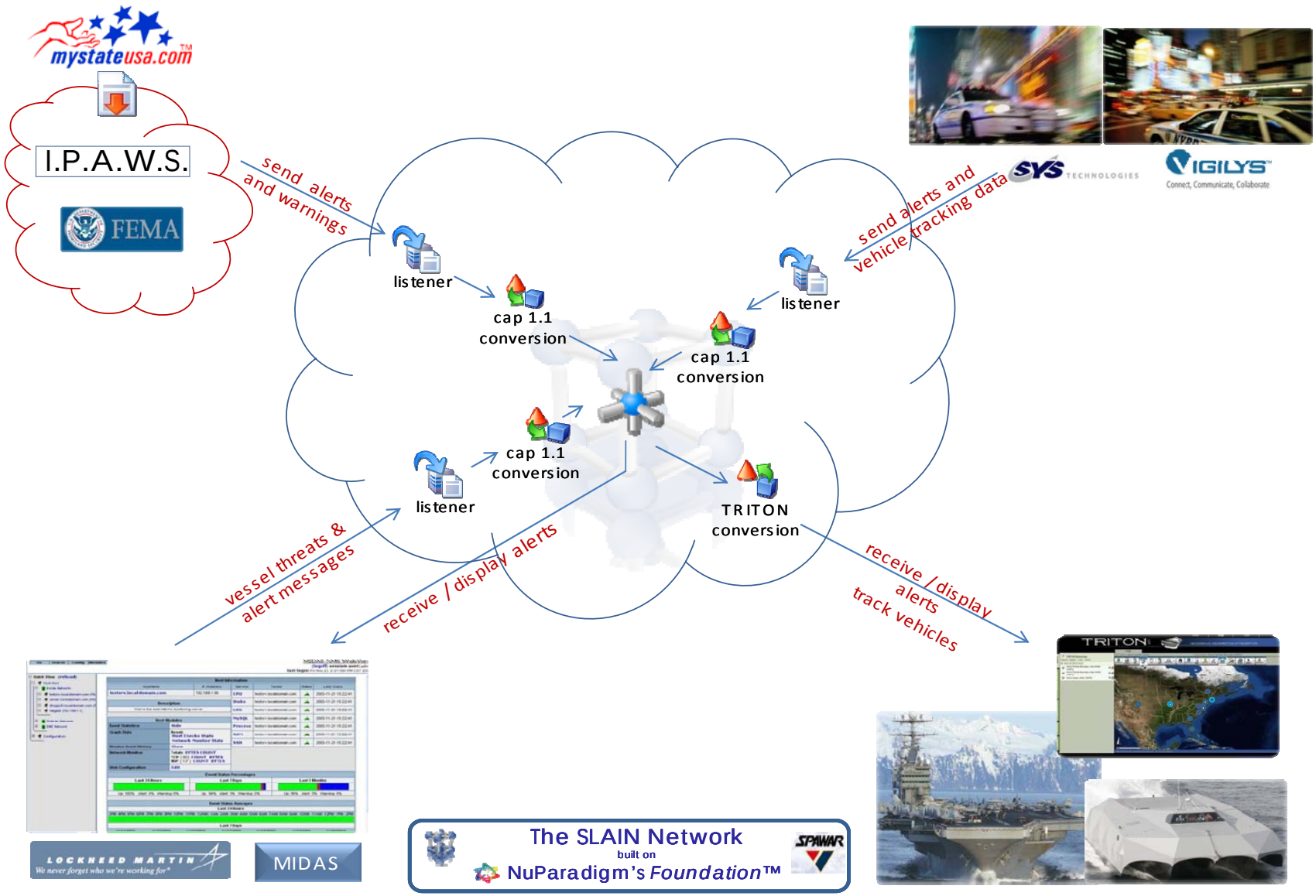
# Network Evolution to Support C2 Environments

• The evolution of “Random Networks” to become “Small World Networks” and then “Self-Organized Scale-Free Networks” are critical to C2 across military and civilian organizations.

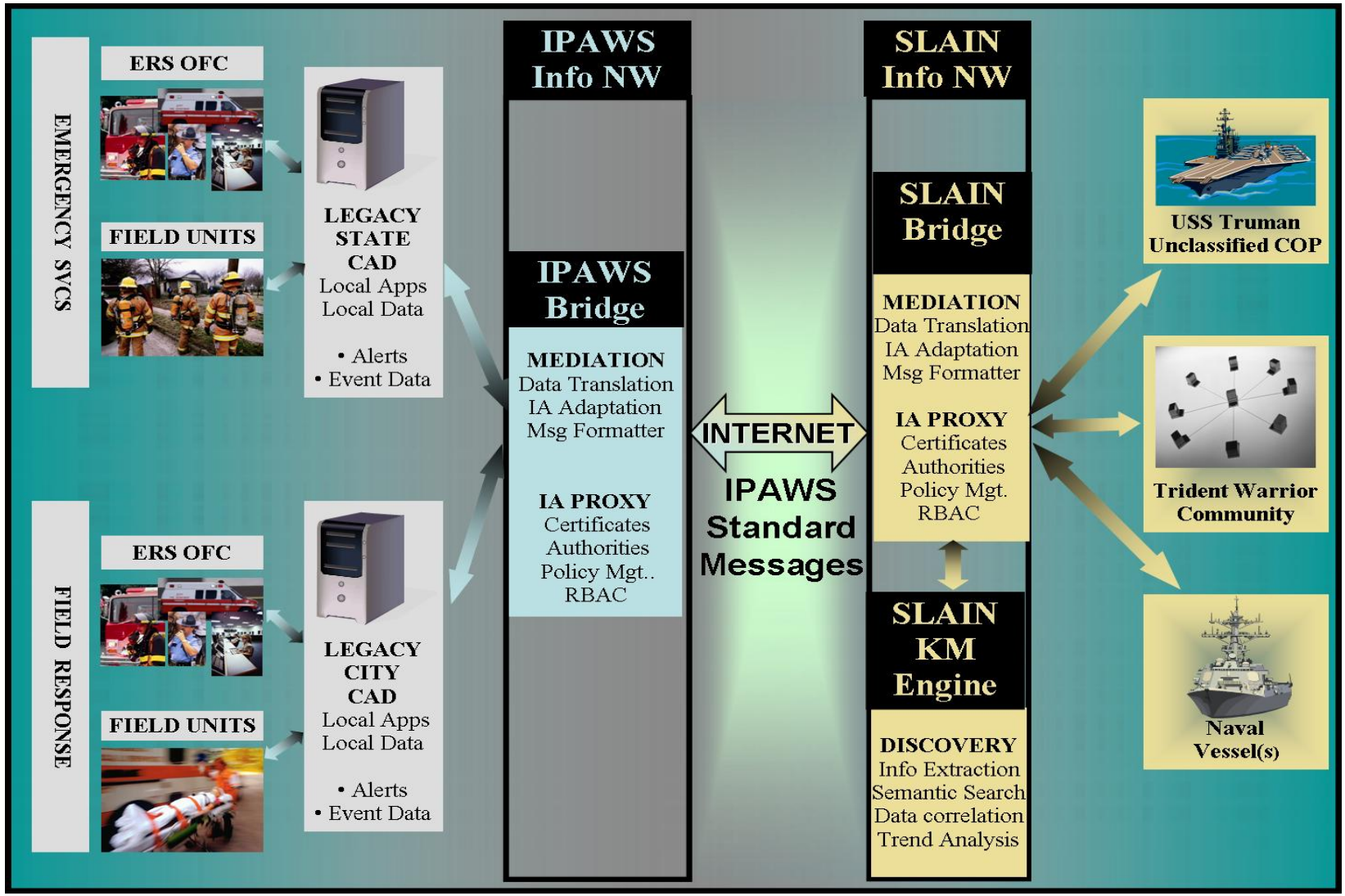
• Random Networks usually form thru chance meetings among people that discover common interests, such as local residents that live near a harbor in the US. Providing a small amount of communications support to random networks (possibly through email access/links) can cause them to have high situational awareness of their particular area.

• Stephen Flynn, former Navy Commander and author of America: The Vulnerable (2006) points out that small groups of individuals in neighborhoods near valuable resources such as shipping ports can have a valuable contribution to Port Security through situational awareness. Terrorists must plan and conduct surveillance on a target for a considerable period of time before attacking the target and they are susceptible to discovery during this time by an informed group of observers.

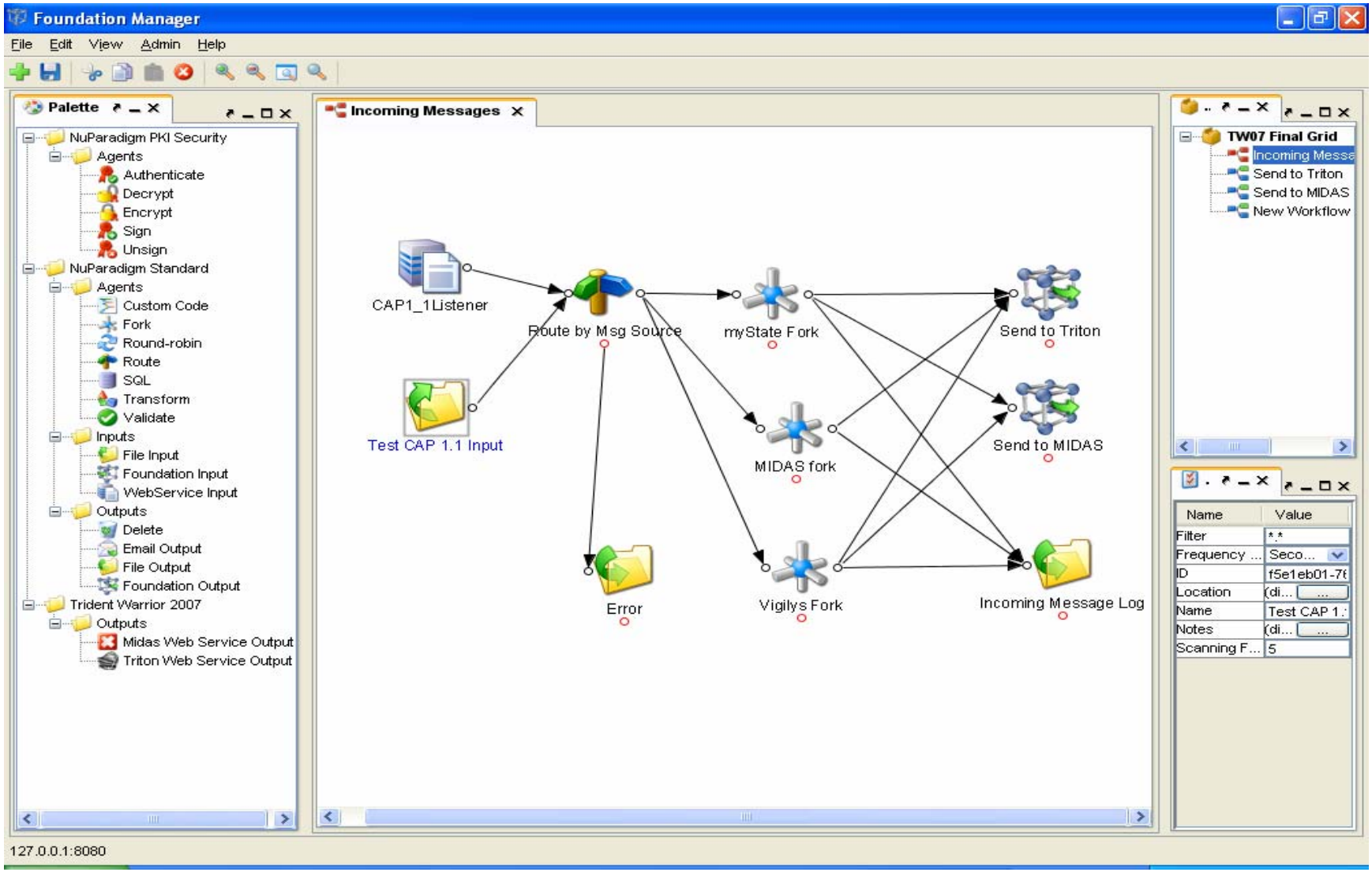
# TRIDENT WARRIOR'07 High Level view of the Maritime Domain Awareness (MDA) COI in the Trident Warrior'07 Experiment.



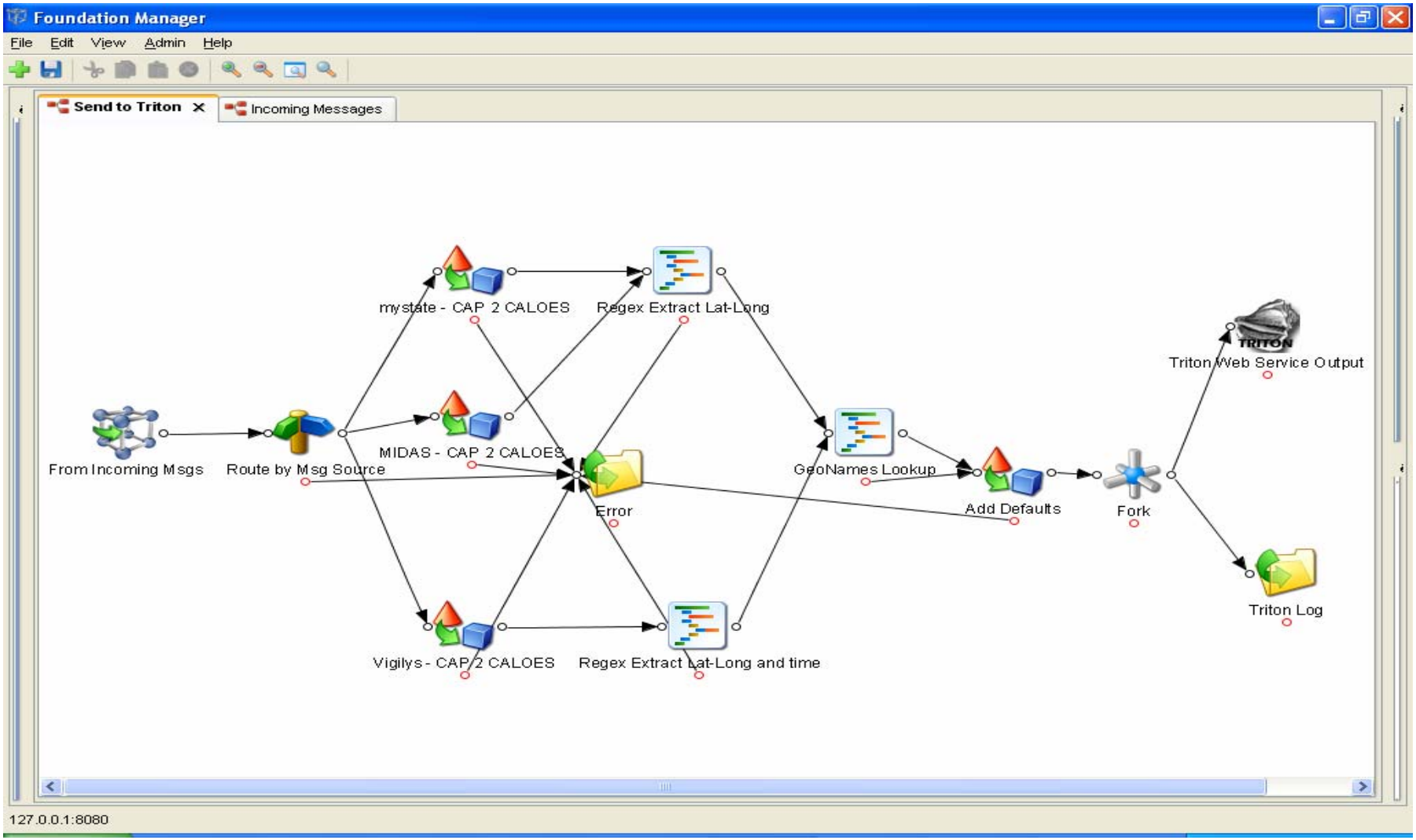
Maritime Domain Awareness (MDA) COI experiment in the Trident Warrior'07 Exercise using the IPAWS (Integrated Public Alert & Warning System) functionality for the hurricane risk area of the US.



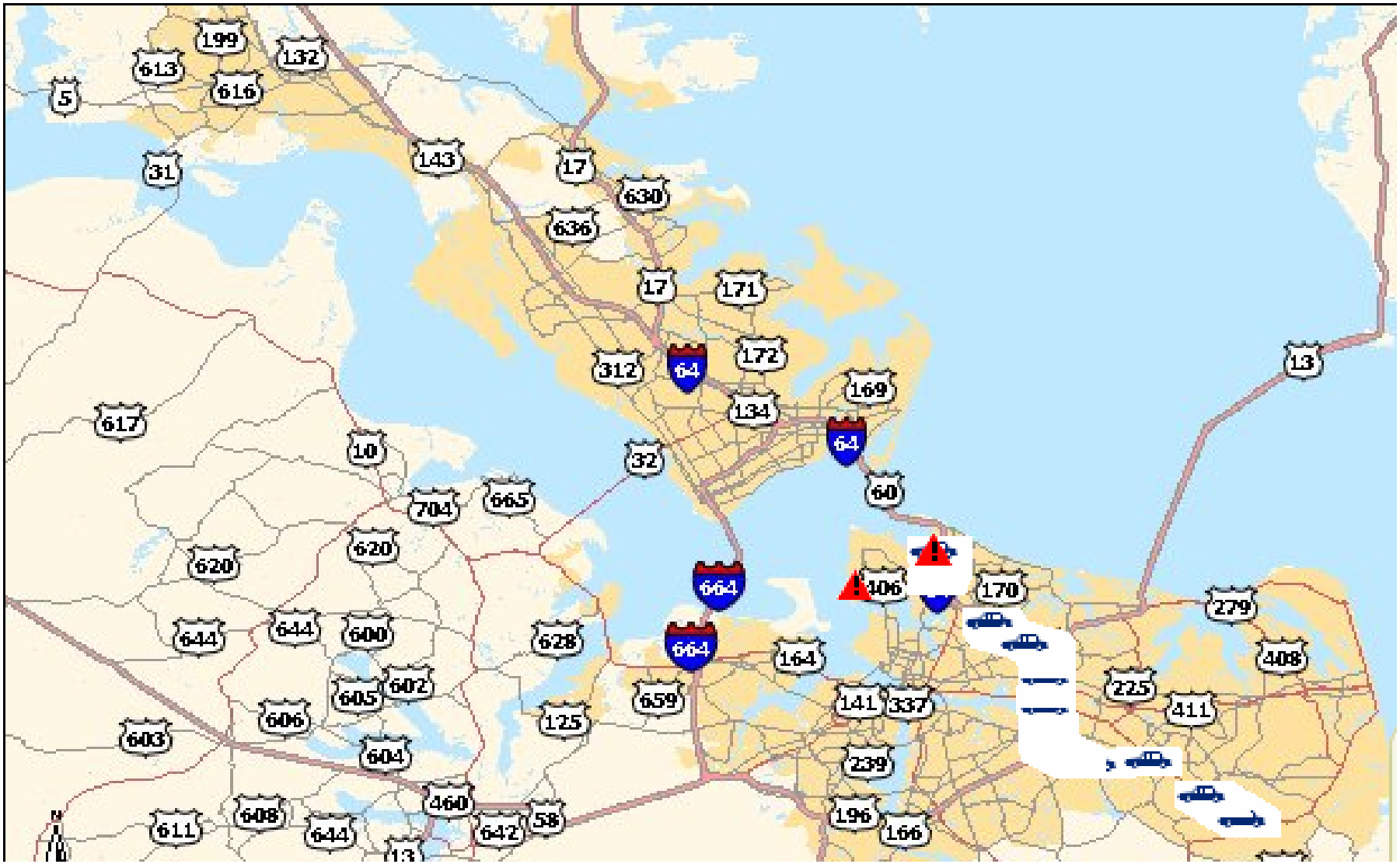
# View of the IPAWS & SLAIN object routing environment for linking multiple data sources into the MDA COI for TW07



# IPAWS & SLAIN object routing for extraction, conversion & transmission of geospatial coordinates across Military & Civ. C2



# High Level view of TW07 MDA COI Common Operational Display for tracking alerts and state/local emergency responders.



# Data Sample showing messaging incident alerts and vehicle movements (“tracks”) for the TW07 MDA COI Common Operational Display.

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | 36.94503007929109,-76.27229332923889 10 | 36.94503007 | -76.27229332 | Norfolk | 23503 | inbound@vigilys.com | Incident | Mar 16 2007 10:05AM | 2007-03-16T09:05:00-05:00 | GROUP GATHERING IN PKG LOT; 45 PEOPLE TW070031 | California at [36.94503007929109,-76.2722933292388 | CD | Immediate | Likely |
| 5 | 36.9083989,-76.180508110 | 36.9083989 | -76.1805081 | Virginia Beach | 23455 | inbound@vigilys.com | Incident | Mar 16 2007 10:05AM | 2007-03-16T09:05:01-05:00 | SUSP ACTIVITY; LITTLE CREEK INLET RAIL DEPOT; DIVE | California at [36.9083989,-76.1805081] | MT | Immediate | Likely |
| 6 | 36.9083989,-76.180508110 | 36.9083989 | -76.1805081 | Virginia Beach | 23455 | inbound@vigilys.com | Incident | Mar 16 2007 10:05AM | 2007-03-16T09:05:03-05:00 | SUSP ACTIVITY; LITTLE CREEK INLET RAIL DEPOT; DIVE | California at [36.9083989,-76.1805081] | MT | Immediate | Likely |
| 7 | 36.94450166666667,-76.27049 10 | 36.94450166 | -76.27049 | Norfolk | 23503 | inbound@vigilys.com | Vehicle | Mar 16 2007 10:05AM | 2007-03-16T09:05:06-05:00 | C11 | California at [36.94450166666667,-76.27049] | police.vbgov.com | Immediate | Likely |
| 8 | 36.909976666666665,-76.179595 10 | 36.90997666 | -76.179595 | Virginia Beach | 23455 | inbound@vigilys.com | Vehicle | Mar 16 2007 10:05AM | 2007-03-16T09:05:08-05:00 | C1 | California at [36.9099766666666665,-76.179595] | police.norfolk.gov | Immediate | Likely |
| 9 | 36.90925166666667,-76.17995833333333 10 | 36.90925166 | -76.17995833 | Virginia Beach | 23455 | inbound@vigilys.com | Vehicle | Mar 16 2007 10:05AM | 2007-03-16T09:05:09-05:00 | E11 | California at [36.90925166666667,-76.1799583333333 | fire.vbgov.com | Immediate | Likely |

# Summary

• The SOA network environment can act as a strong catalyst for development of effective and agile C2 structures. The vision of an effective C2 system becomes a network of formally defined, locally clustered cells with longer range links (shortcuts over the internet) between them: a Small World network.

• In summary, “both Informal Networks and the Formal Organizational Structure are required to work well together in order to deliver the Agile Organization” for effective C2. The secure object routing framework described earlier promises to provide the “shortcuts” essential to C2 network evolution.

• However, significant challenges remain to develop the SOA networks required. The overhead associated with maintaining the message stream and the higher levels of abstraction required in web service communication make this promise difficult in systems of even moderate complexity.

• As a result of our Navy work, we will be addressing several fundamental issues that need to be solved for full deployment of C2 Systems over the GIG with complete situational (and cultural) awareness to support integrated Military and Civilian operations.