Maritime Safety and Security in the Alpe Adria Region - Concept for LivingLab

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This paper introduces principles for the creation of the Maritime Safety and Security Lab, and its possible impact on the Alpe Adria Region. Maritime trade is discussed as a principal source of globalization, as along with global maritime trade statistics. Maritime accidents causing economic and environmental damage amounting to billions of euros are briefly highlighted. Maritime security issues, increased after 9/11, are briefly discussed, as well as how the lack of research on security impacts the supply chain. As a result, the authors state that only good cooperation between the maritime and logistic sectors in the region is a winning solution for this problem. The integration of safety, security and commercial information and data are the only favourable safeguards against disasters and security threats in the region.security and commercial information and data are only favourable safeguard against disasters and security threats in region.

1 Introduction:

The maritime safety and security LivingLab is focusing on the development of safety and security procedures for maritime transport, as well as procedures for search and rescue at sea. The whole coastal area of the Republic of Croatia, in all its size, the full 6,000 kilometre length coast of Adriatic Sea and its thousands of islands, represents a remarkable natural resource.

The maritime system should be looked on as a complex system divided into segments of activities bearing different technical, economic and legal characteristics. Although there is considerable variety between certain component parts of the maritime system, they are also closely dependent on each other and this should be taken into consideration when defining developing measures and goals. The Adriatic Sea, like every other sea, is a means of integrating not only neighbour countries, but all the countries in the world. The process of protecting the Adriatic Sea is not just local, but primarily a regional concern and then a global one.

2 Description of the Concept

The main concept of the living lab is the prevention of accidents at sea, including maritime terrorism, as well as establishing a system of navigation, a ship reporting system, complete coverage of the radio communication system and a vessel control service in port areas and in the access routes to ports with the largest volume of passenger and cargo traffic, especially regarding dangerous and hazardous cargo, improving mutual cooperation with corresponding offices in the neighbouring countries, such as the Republic of Slovenia and the Republic of Italy, in applying the regulations protecting the marine environment against pollution, and the application of the Coast Zone Management principles.

The maritime system is closely coupled with all other industries and especially with logistics. It would be unjustified to create a safety system without connection to related companies in the supply chain as a whole, especially in the ICT. The integration of information between the safety system and the commercial companies is a primary goal of our Living Lab, thus creating an interface between both.

3 Maritime Trade

The maritime world can also be seen as a primary source of globalization because it is the medium by which 90 percent of the world trade (as measured by weight and volume) is transported (Santoso, 2002). The barriers to global commerce would be insurmountable without maritime trade and the history of the world would have been vastly different. E-commerce and the Internet may be the symbols of the most modern form of globalization, but historically the symbols have been the ever-increasing size and speed of ships and the shrinking cost of commercial transport (Cullinane et al., 1999, Cullinane et al. 1997, Komadina et al. 2000). Transportation and logistics can be seen as real parts of virtual business and ultimately the open ocean is still globalization's prime medium and symbol

In the past few decades many barriers to trade have fallen. Key factors in supply and demand have resulted in a burgeoning of trade relationships between regions and nations across the world At a global level, the growth in the value of international trade since 1989 (up 190%) has substantially outstripped the growth in production (up by 80%) (Cachon and Lariviere 2001, Holland International Distribution Council, 2001).

Complex trading networks have evolved primarily to exploit differentials in labor cost and the availability of raw materials in particular countries (Frankel, 1999a). Their development has also been facilitated by major regulatory and technological trends. Trade liberalization, especially within trading blocks such as the EU and NAFTA, has removed constraints on cross-border movement and reduced related 'barrier costs' (Gilman, 1999). Advances in telecommunications and information technology have given companies the means to manage the physical movement of products over long and often circuitous routes.

Around 90% of merchandise is transported by sea. According to WTO data, world seaborne trade amounted to 5.9 billion tons of loaded goods in 2002, up by 0.8% from the previous year (Santoso, 2002). In 2002, the share of seaborne exports from developing countries was equal to 49.4%, while that of developed countries was 40.4% (the developed countries' share in seaborne imports being 60.3%, while that of developing countries was 31.4% (Frankel, 1999b).

The global economy is expected to expand, but much will depend on the rate of industrial development in Asia, the growth of import and export in the United States and Europe, and the price of oil. In line with these developments, European ports showed a throughput of 60 million TEU in 2003, an average 10.5% increase compared to 2002 (Ferrari et al., 2005).

All this shows that the maritime transport industry is changing clock-speed (Frost 2000). From industry where changes were only expected over decades, maritime transport is suddenly changing into industry that moves fast, where changes are constant and new logistic strategies are introduced daily.

4 Maritime Safety

Accidents such as the 'Herald of Free Enterprise' (1987), 'Derbyshire' (1980) and 'Piper Alpha' (1988) tragedies, along with environmental disasters such as the 'Amoco Cadiz' (1978) , 'Erika' (1999), 'Prestige' (2002) and Solar (2006) pollution incidents, have focused world opinion on maritime safety in both design and operation. Unfortunately it is a fact of life that designing for safety and safe operational practices are only appreciated after serious accidents have occurred.

With serious concern being raised on the safety of ships the world over, the International Maritime Organization (IMO) has dealt continuously with safety problems in the context of operations, management, surveying, ship registration and the role of the administration. The improvement of safety at sea has been strongly emphasized and the international marine regulations on safety have been driven by serious marine accidents. It was serious accidents that taught the first lessons. Regulations and rules were then produced to prevent similar occurrences. There has been a significant change in the regulatory regime for offshore safety worldwide since the 1990s.

One of the main problems of maritime safety is knowledge and training seafarers. As Efthimios Mitropoulos, Secretary-General of the International Maritime Organization, stated in Athens on 6 May 2005 "… Today's ships represent very high value assets and, because of their size and the nature of the cargoes they carry, have the potential of incurring unimaginable destruction, both on human lives and the environment. The burgeoning liquid natural gas (LNG) sector is a good example: the number of these specialized ships in service is expected to increase by over 50% in the next 3 years and there are already insufficient numbers of officers with the requisite skills. How comfortable will we feel when we have doubts about the quality of those in command of such highly sophisticated ships?"

5 Maritime Security

Ten or even five years ago, the concept of 'terrorism' referred to a fairly traditionally defined category, but in recent years our thinking has encompassed new threats and scenarios. The fear that terrorists could launch attacks using chemical, biological or nuclear materials has been added to our concerns about the rise in terrorism in general (Frost, 2000).

Maritime terrorism is evolving and encompasses a wide range of events such as direct attacks on vessels (the USS Cole and the Limburg), hijackings (the Achille Lauro) and the transport of individuals and materiel in support of terrorist groups and activities. Maritime terrorism refers to 'any illegal act directed against ships, their passengers, cargo or crew, or against sea ports with the intent of directly or indirectly influencing a government or group of individuals', US Department of Defense, definition provided in www.militaryworld.com.

Essentially, there are three potential safety problems in the maritime world: container trade, tankers and liquid natural gas carriers.

There are approximately 15million containers in circulation worldwide, making over 230 million journeys each year. Containers now carry tamper-proof security seals (to ensure that nothing has been added to the container after it has been loaded, inspected and closed), but they are not always reliably inspected. In fact only 1% of all containers are inspected per year (Gilman, 1999). It is common knowledge that there are more than twenty ways to introduce material into a container that has been sealed without breaking that seal. Furthermore, containers do not remain at ports and this can cause significant safety problems in the supply chain.

As stated in the previous selection, any tanker accident can have tremendous impact on industry and especially on the environment – but an LNG ship can be seen as a weapon of mass destruction. LNG tankers can hold 3.3 million tons of liquefied gas and can be as long as three football fields. Although reports show that these ships are safe in their working environment, their potential use in terrorist actions is a terrifying.

6 Work to be Done

The analysis of maritime safety and the development of a maritime security regime point towards many directions for further study, because an effective maritime security

regime must involve an impressive degree of national and international cooperation.

A formal safety assessment framework consists of the following five steps

- the identification of hazards;
- the assessment of risks associated with those hazards;
- ways of managing the estimated risks;
- a cost-benefit assessment of the risk control options;
- decisions on which options to select.

All this should be done not only in connection with neighboring countries, but with all the countries in Europe, because ports are focal points of international trade and supply chains.

The literature on supply chain disruptions focuses mainly on information distortions such as the bullwhip effect (US Department of Transportation), disruptions that affect production in subsequent stages (Evangelista and Morvillo, 2000) or forecast sharing (Durvasula et al., 2001). Hendricks and Singhal (2005) show the impact of glitches in their supply chains on the company operating performance and Huggins and Olsen (2003) look at a supply chain where extraordinary methods must be built in to make sure that the supplier can always deliver. Chopra and Sodhi (2004) provide a general framework for supply chain risks and categorize methods for reducing those risks. Authors do not know about comprehensive research into supply chain safety and security, so this is one of the directions of research. As there are initiatives in creating complex supply chain projects, known as the "Silk road" and the "Amber road", safety and security should be one of the distinctive parts of this projects.

7 The IT and Communication Infrastructure

Many different systems exist today across the numerous companies and agencies that work in the field of maritime safety and security – and even more in the supply chain environment.

It is common knowledge that in incidents of crisis and consequence management over the last decade, responders consistently reported that an unwieldy number of different devices were needed to talk to the other participants. It is possible that lives were lost because the first responders were unable to communicate and share their awareness of the situation.

Each communication and IT system was created for (and is currently used for) a variety of purposes and missions. For example in the Alpe-Adria region, numerous security systems are in place. The military, coast guard, police and particularly the VTS (vessel traffic systems) and AIS (automated ship identification system) are being controlled separately by each country and always without connections with the neighboring country. Even systems in the same country are not connected to each other, especially the safety systems and commercial information systems in the ports.

Connections and interactions between the systems should be a habitual way of working in the field of safety and security. No specialized safety system can work properly without commercial data retrieved from the port or customs IT systems, because they are information resourceful. The same thing is necessary for the safety of the supply chain, because national agencies in continental

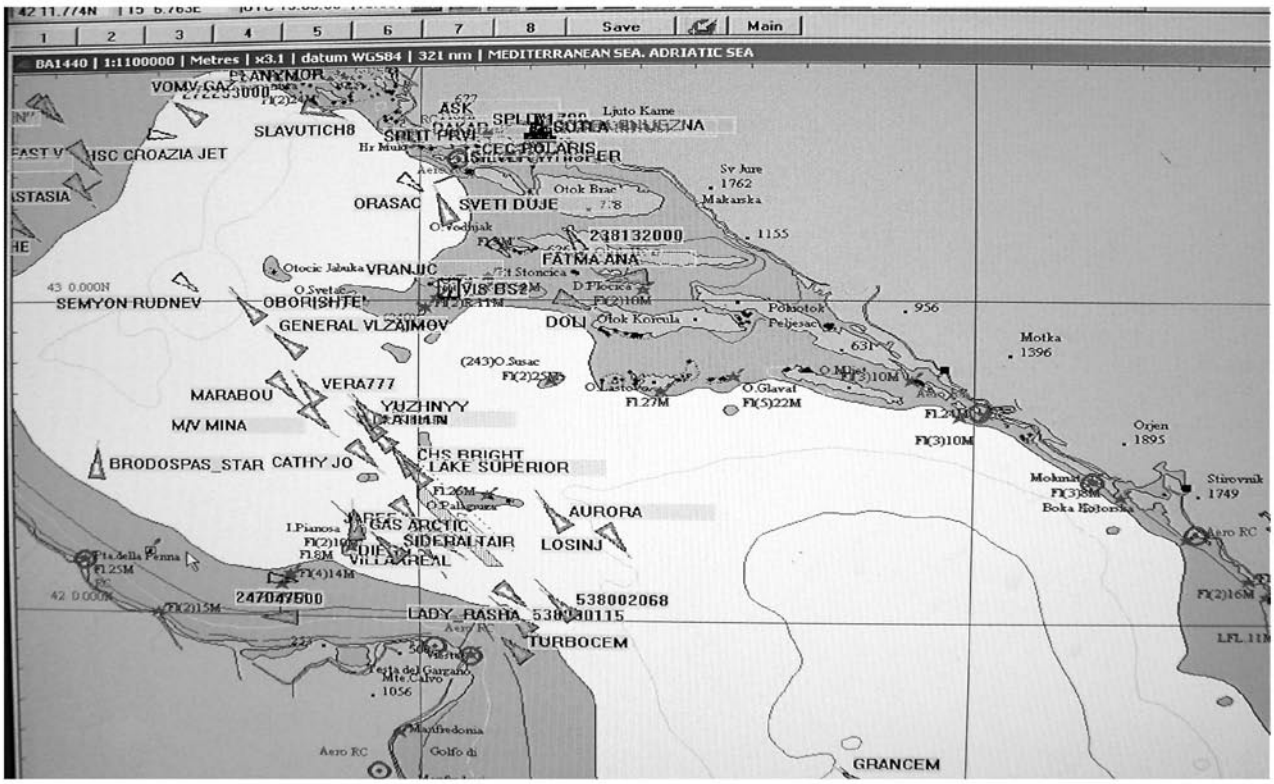

Figure 1: AIS picture of ships in the central Adriatic

countries do not know all the security facts about ships and their cargo. Austrian or Hungarian police and customs can not get information on a particular container, for example, that has been on a ship pirated in Asia. Taking into account the previously stated security risks (the possibility that explosives could be inserted in the container) and this can be very dangerous treatment.

There is a strong need for an integrated system, which would allow the new safety and security structures to conduct operations effectively – to share a common operational picture built on common data; to provide multilevel security information to accommodate local, state and regional needs; and to facilitate real-time communication between these local, state and regional entities. This task should include all the IT research facilities in the region, especially the LivingLabs in the Universities connected with the ALADIN group.

8 Conclusion

Researchers and students of the Faculty of Maritime Studies, University of Rijeka, are developing operational cases in safety and security, as well as logistics projects, in close cooperation with numerous organizations. Current research and development areas of the maritime safety and security LivingLab include: Information Systems, the Interoperability of Organizations Involved in Major Disaster Relief in the eRegion, the creation of a multinational Adriatic Coast Guard system and multiple projects for the maritime industry. These activities form the key potential for future IT services in the maritime industry, logistics and the future applications in several services of the AlpeAdria Region.

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