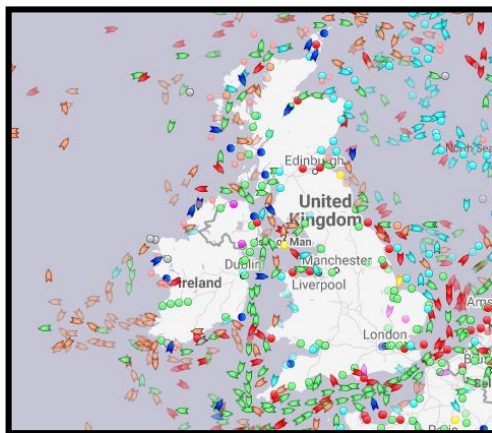


SERVICE LOGISTICS [M6X01294]

Assignment 1:

Critically evaluate based on a case study the application of technology to support innovation for competitive advantage in global logistics

Using AIS chip



I declare that this assignment is all my own work and that I have acknowledged all materials used from the published or unpublished works of other people. All references have been duly cited

Abstract

AIS chip or Automatic Identification System-~~it~~ is a system of exchanges between cargos and permit to know the position, the status and the identification of cargo.

To illustrate AIS chip, I will take the example of Umm Salal built in 2011 in Valetta. It is container ship which can support 145 327 t of goods. This container ship will help me to show the informations that the chip can show.

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Introduction:

Every year we count 9.1 billion tons of goods transported by sea. This number correspond for 289 tons of goods transported by sea every second.

To begin ~~I would like to~~ we will define the principal words write in the assignment. Global logistics can be definite like a mechanism which permit to supply products and services in the right time, right place and good quality. In the process, it affects everything: facilities, organisation, physics process, information and make goods and services available. The global logistics touch all in all, from first-rate material to the end customer. We live in technology generation, without technology and innovation, our products take more time to arrive in the right time and there would be more mistakes.

~~In~~ this assignment ~~deals with the application of I will speak about~~ AIS [Automatic Identification System] ~~in maritime logistics~~. ~~This it's~~ a very little part of global logistics ~~systems~~. Indeed, ~~it's~~ one part of the transport, indeed, maritime transport. But in what ~~sense~~ the AIS chip is an asset for the global logistics?

~~We~~ will respond about this question with ~~in firstly providing time~~ an expl~~anation~~ication and definition of AIS chip ~~and in~~ second~~ly presenting time~~ the advantages and disadvantages of AIS chip ~~based on~~with real ~~life~~ examples and I will finish with possible evolution of this chip.

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What it is AIS ?:

Definition

AIS or Automatic Identification System is a way automatic exchanges in **real time** between cargo thanks **VHF [Very High Frequency] radio**. It ~~is~~ like RFID chip but for cargos. We can also compare the AIS chip like a GPS but with the traffic in real life, with captor and on the sea. It permits for the others cargos and watching systems to know **Identity, status** and **cargo position**. AIS chip it is one of the better innovations realized in the marine electronic and safety in the sea.



Figure 1. Example of VHF radio with AIS system

<http://www.oceanmedix.com/products/stand-ard-horizon-gx2200-matrix-fixed-mount-marine-vhf-w-ais-gps-class-d-dsc-30w-black.html>

In the chapter 5 of the convention of **Safety of life at sea [SOLAS]**, wrote in 1974, several subjects are addressed for all voyages and to travel in **safety** situations:

- Maintenance of meteorological, research and rescues services in case of bad weather.
- The necessity to know the shipment of the cargos.
- The obligation of capitaine to do all possible to save person in danger
- Obligation to have voyage data recorders [VDRs] and Automatic Identification System [AIS]

~~It is obligated~~ since **2004** using AIS required by **OMI** [International maritime organisation].

Indeed, OMI want to save livesfe in the sea, improve the safety in the sea and, improve the maritime navigation and protect the maritime environment. She adopts the rules of the chapter 5 in the **SOLAS** convention. It is mandatory's ~~obligated~~ for one's of **two classes [A and**

B]. Indeed, the class A include cargos with gross **tonnage superior of 300 GT** and cargos passengers which respond of SOLAS norms. The class B it's for little cargos, they are **voluntary**. These both classes can **transmit** and **receives** informations about others boats. We have one last class, it less and less use because you can receive informations about others but you can not transmit.

For example, RayMarine it is a manufacture about VHF radio founded in 1923. She sells three different types of VHF radio: for the class A, it is RayMarine AIS950; for the class B, it is RayMarine AIS 650 and for the others it is RayMarine AIS350. The A class have **transmissions obligations, more frequently** with and thanks **higher** power than class B.

What kinds of informations?

In more we can identify different colours in the web site Marine Traffic

[\[https://www.marinetraffic.com/en/ais/home/centerx:156.4/centery:32.7/zoom:2\]](https://www.marinetraffic.com/en/ais/home/centerx:156.4/centery:32.7/zoom:2) which permit to recognize different types of cargos and have global map:

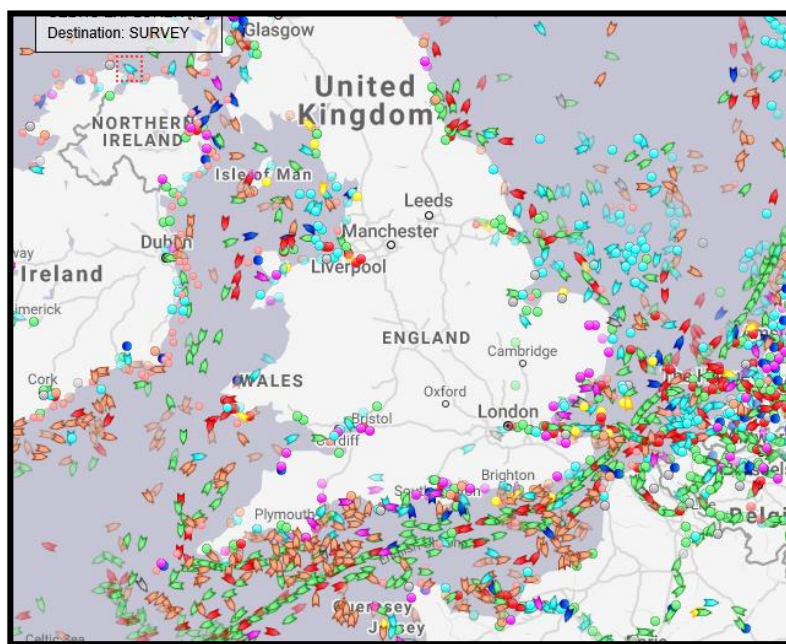


Figure 1 : picture on the web site MarineTraffic – representation of boats around United Kingdom

Figure 2

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Types of cargos	Colours
Merchant Vessel	Green
Tanker	red
Passengers vessel	Dark blue
speedboat	Yellow
Towing vessel	Light blue
Boat fishing	Orange
Pleasure boat	purple
others	grey

Figure 2 : Table : Colours in function of colours

With this website you can know more informations about the boat. AIS chip permit to identify different informations, however these informations are not transmitted in the same time:

Messages every 2 to 10 seconds [dynamic informations]:

- **Maritime Mobile Service Identity number [MMSI]** - a unique identification number for each vessel
- **Navigational Status**
- **Rate of Turn** - right or left (0 to 720 degrees per minute)
- **Speed / cap**
- **Position Coordinates** latitude/longitude
- **UTC**

Messages every 6 minutes [statistics and information about the trip]:

- **International Maritime Organisation number (IMO)**
- **Call Sign** - international radio call sign assigned to the vessel by her country of registry
- **Name** - up to 20 characters
- **Type**
- **Dimensions**

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- **Type of positioning system** (GPS, DGPS, ...)
- **Destination**
- **ETA (estimated time of arrival) - UTC month/date hours:minutes**
- **Nature of goods**
- **Level of danger**

It is important to know that some informations are not include in B class [International Maritime Organisation number, Final destination, Estimated time of arrival, rate of turn and navigational status]. In more, for the B class, the dynamics informations take more time. Indeed, every thirty seconds we receive informations, not ten like A class.

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How the informations are distributed?

To have AIS chip it is simple, we need **power**, **antenna** and principal **system connexion**. There are two principal system connexions today: SeataKNG and NMEA2000. There is an ancient system, [NMEA0183] but he sends only one message at a time. The informations are transmitted via two **channels** reserved by VHF attribution [**87B and 88B**]. Most of informations from boat **him-self** like GPS, speed... but others informations needed **manual entry** like boat status ["in progress", "at anchor" and "next to"], for the calls and the number of passengers. Recently it is possible to receive global informations by satellite. This system it is use by the operators of the fleet. You can use this method with subscription. The problem with this method it's that there are lot of informations. To resolve this problem, they use time slot and use one process which name "deconfliction" to permit to identify and give image the boat.

It is important to know that all the boats are not equipped with the same way. The big cargos [in general class A] have AIS transmitters and the littler ship haven't this transmitter but some little ship there have VHF radio with function AIS which permitting to receive informations about others boats. Thanks to the VHF radio, they can receive [in this order] the name, the cap and the distance.



Figure 3:represents the VHF radio with informations about the others boat in proximity. Indeed, the list permit to see firstly the boat closer and after the forest boats.

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The research can be completed by clicking on the map

If you want to complete your research about this boat, we can click on the map.



To choose the boat, you just need to touch the screen. This map it is like a GPS and permit to situate oneself in the sea.

Figure 4: map screen



We can see a lot of informations [dynamics and statistics informations] in direct witch permit to know the position, the speed, the cap, the type of boat to avoid parcels.

Figure 5: informations in the screen map

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Between boat and company

Companies use the website Marine Traffic to know where is the cargo. But at the difference than us, there are more settings which permit to know all informations about others cargos. In the biggest cargos, there are platform for this chip, it is the same system that the VHF radio.



Figure 6: example of AIS in container ship

Since September 2015 Light House II exploitation system by RayMarine integrated two news functionalities for AIS. Firstly, they created news icons to differentiate kinds of boats.

AIS TARGET TYPES:

	Unknown Vessel type		Blue force
	Commercial Vessel		Search and rescue aircraft
	Land Based Station		Virtuel Aton
	Yatch		Aton [Aid to navigation]

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	Hight Speed		Search and rescue transponders
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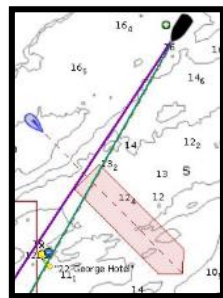
AIS TARGET STATUS:

	Lost target		Dangerous target
	Buddy target		Uncertain target
	Dangerous and uncertain target		Aton target off position

In more they invented the icons to know if the boat is in the good way/cap.

	Relative motion		True motion
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The second functionality permit to know the danger zones. You can see in the next image two vectors, one green and another purple vector. The green vector represents the actual way and the purple the safety way. If you enter in the red zone, the risk of collision increases, in the picture situation the boat will pass behind the yacht. However, if the boat wants to pass in front of the yacht, the purple vector needs to be in the other side of the red zone.

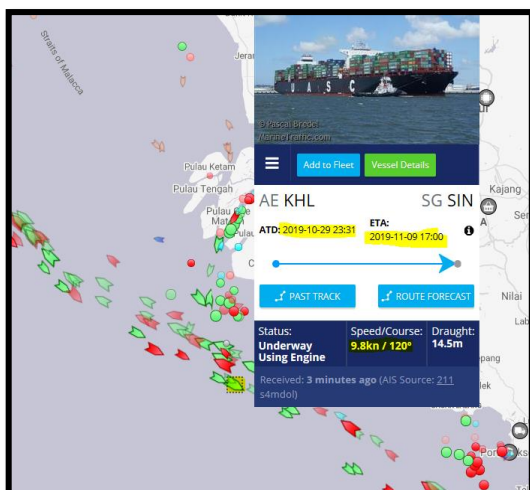


Real life example:

To explain the advantages of this chip, it is important to use antake example as-I take the Umm Salal cargo of the United Arab shipping company built in 2011. It is merchant ship with capacity of 13 470 TEU [Twenty-foot equivalent unit] and the maximum speeds it is 13.8 km:



Based on the information Thanks from to the website MarineTraffic.com, lwe knew where is the boat the 8th November 2019 at 15:35.



It leaves the 29th October 2019 the port KHALIFA at 11:31pm and arrive the 9th November 2019 in the port of Singapore at 5:00pm.

At 3:35 in Wales, the Umm Salal

<u>Types of informations</u>	<u>Informations</u>
<u>MMSI [Maritime Service Identity Number]</u>	<u>215237000</u>
<u>Navigational Status</u>	<u>Underway Using Empire</u>
<u>Rate of turn</u>	<u>14.5m</u>
<u>Speed / cap</u>	<u>9.8kn / 120 degrees</u>
<u>Latitude / longitude</u>	<u>2.64243 degrees / 101.2926 degrees</u>
<u>UTC</u>	<u>Local hour: 22:35 [UTC+7]</u>

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MarineTraffic.com

Thanks this website we can know a lot of informations: dynamics and statistics informations.

We can see all informations about the Umm Salal cargo in the next table:

Dynamics informations:

<u>Types of informations</u>	<u>Informations</u>
<u>MMSI [Maritime Service Identity Number]</u>	<u>215237000</u>
<u>Navigational Status</u>	<u>Underway Using Empire</u>
<u>Rate of turn</u>	<u>14.5m</u>
<u>Speed / cap</u>	<u>9.8kn / 120 degrees</u>
<u>Latitude / longitude</u>	<u>2.64243 degrees / 101.2926 degrees</u>
<u>UTC</u>	<u>Local hour: 22:35 [UTC+7]</u>

Statistics:

Types of informations	Informations
IMO [International Maritime Organisation Number]	9523857
Call Sign	9HA2682
Name	Umm Salal
Type	Container Ship [Cargo Hazard A Major]
Dimensions	365.93m x 51.2m
Destination	Singapore
ETA [estimated time of arrival]	5:00pm the 9 th of November 2019
Nature of goods and weight	Container / 141077 tons [maximum authorised: 145327 tons]
Status	Active

To conclude about the example, the shipowner in charge of this cargo will know when Umm Salal will arrive (or if there is late) and know the quantity inside the cargo. In more, whoever sends the cargo will know in the same time the arrival.

Pitfalls and limits:

Technology and innovation permit lot of big things today. To know in real time the position, the name, the speed, the cap and lot of others things is a fabulous chance for the boats and the companies. But in this chance, there are always limits. Indeed, it is a pleasure to see the traffic in direct time and create a way between others boats thanks the map screens. However, it is tempting to follow only the screen. It is easy in this situation to forget that there are boats without the AIS chip [little boat, not included in A and B classes]. The risk of collision is more important. And in this case, is sadly the littler boat which be in danger.

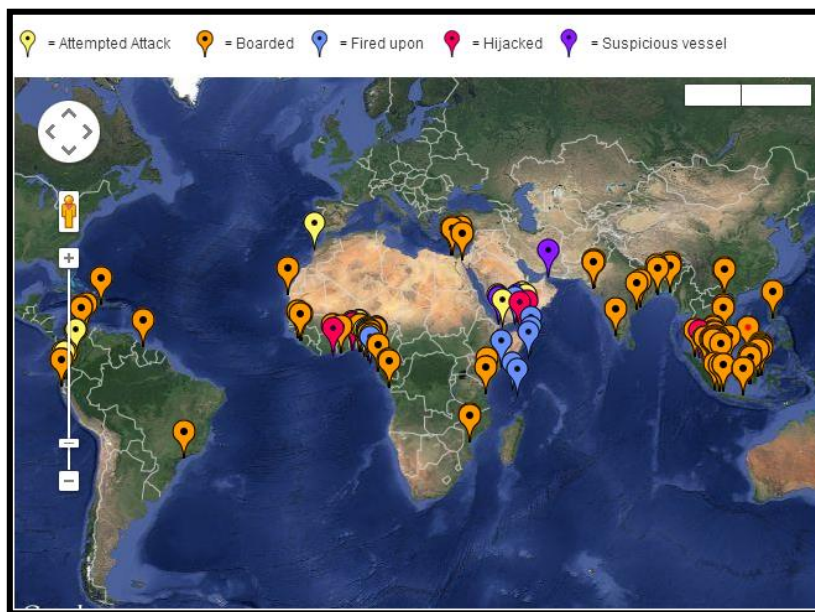
My opinion:

In this case, I question myself about one think. Why all the boats are not obligated to have AIS chip? Little or big, the safety about the passengers is not a game. Or maybe if this is impossible, we can make a limit in the sea. The boats without AIS chip don't have the right to go in roads with circulation.

AIS permit to calculate the closer point of attachment but don't give indications if you pass behind or in front of others boats. With informations given [cap, speed, position...] you resolve situations and take the good decisions and use all available means [COLREGS convention]. For example, the rule number 10 talk about the boat which want to cut the circulation must do "following a course that is as much as possible perpendicular to the general direction of traffic" and as quickly as possible while keeping a speed of safety.

Another kind of limit exist; indeed, piracy exceed the limit, it is a threat. The pirates can localize boats but on the other hand boats cannot localize pirates. The localization functionality is very good for companies, others boats but maybe it is the problem, all can know where are the vessels merchant. On the contrary military boats are not localizable. The use another system, they use electromagnetic waves [VLF – Very Low frequency and ELF – Extremely low frequency] to communicate and use powerful radars to know where the others boats.

The next map represents the places with pirates. In the first quarter of 2019, we count 38 piracy incidents in the world.



[Figure 7: piracy in the world - map](#)

~~We can~~^{would like} to add another thing, it is important to know that AIS chip localize the boat not the goods. We don't know where the goods are in the boat, there are no precisions, it is general informations.

All of these limits can curb the paths of cargos and harm a good travel.

Advantages of the tag on global logistics

After talk about the AIS limits, we can talk about the advantages. Indeed, despite limits we know if boats have problems or not. We know dangerous places [pirates, channels, weather...] so if the approximative final hour destination change it is maybe there are problem. AIS chip permit to improve the **safety** in sea and **fleet management**. Thanks these point, the goods have more chance to arrive in the **right quality, right place and right time**. In more, during the travel companies can receive all informations: **Identity, status and position** about our boat and others boats. Companies can answer customer about the **arrival time** or maybe the **delay** and the **position** of the boat.

AIS help companies to know informations but help also in first time the boat him-self. The news icons by RayMarine improve the communication and safety therefore increases the chance that the whole travel goes well.

This innovation is very little in throughout course of the goods, indeed, it is transport part and not all transport, just maritime transport time. But without this maritime innovation, the transport maritime, goods and peoples who work in maritime transport will be not in safety. Without this innovation we cannot follow the boats, we cannot have informations in real time and in consequences make an answer about at customers.

To finish, AIS chip have important informations:

- Multi scales: temporal and spacial
- Multi finalities: navigation aid, monitoring of economic flows, analysis of the behavior of economic actors
- Multifunction: management of shipping lines, traffic, ports of call, reliability, performance, impacts on logistics chains

Conclusion

In conclusion, like it is already saying, AIS chip don't permit to follow goods during all the process of global logistics. However, it is innovation which permit to safe and sure the maritime transport. In what the AIS chip is an asset for global logistics? We are sure about one thing, without the maritime transport, many goods cannot be arriving at destination. This innovation helps to ensure the position, the hours and the current situation about the boat [pirates, weather or good situation]. Lot of things can be put in place to improve this innovation; like force others boats to have AIS system and/or put in place one system to visualize all others means of transportation [plane, road, sea]. It is very riches in evolutions because it is the only way to follow for the moment.

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To help me to find definition:

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VHF: https://en.wikipedia.org/wiki/Marine_VHF_radio

SOLAS convention:

[http://www.imo.org/en/About/Conventions/ListOfConventions/Pages/International-Convention-for-the-Safety-of-Life-at-Sea-\(SOLAS\),-1974.aspx](http://www.imo.org/en/About/Conventions/ListOfConventions/Pages/International-Convention-for-the-Safety-of-Life-at-Sea-(SOLAS),-1974.aspx)

Traffic marine in live:

<https://www.marinetraffic.com/en/ais/home/centerx:156.4/centery:32.7/zoom:2>

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Article: Marine Traffic Optimization Using Petri Net and Genetic Algorithm
Anita Gudelj ; Danko Kezić ; Stjepan Vidačić / Promet (Zagreb), 01 November 2012, Vol.24(6), pp.469-478

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