Workshop on electronic technologies for fisheries

Part I: Transmitted positional data systems

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Structure of the Presentation

1. STATE OF PLAY
2. CURRENT APPLICATIONS
3. BENEFITS AND RISKS
4. POLICY RECOMMENDATIONS

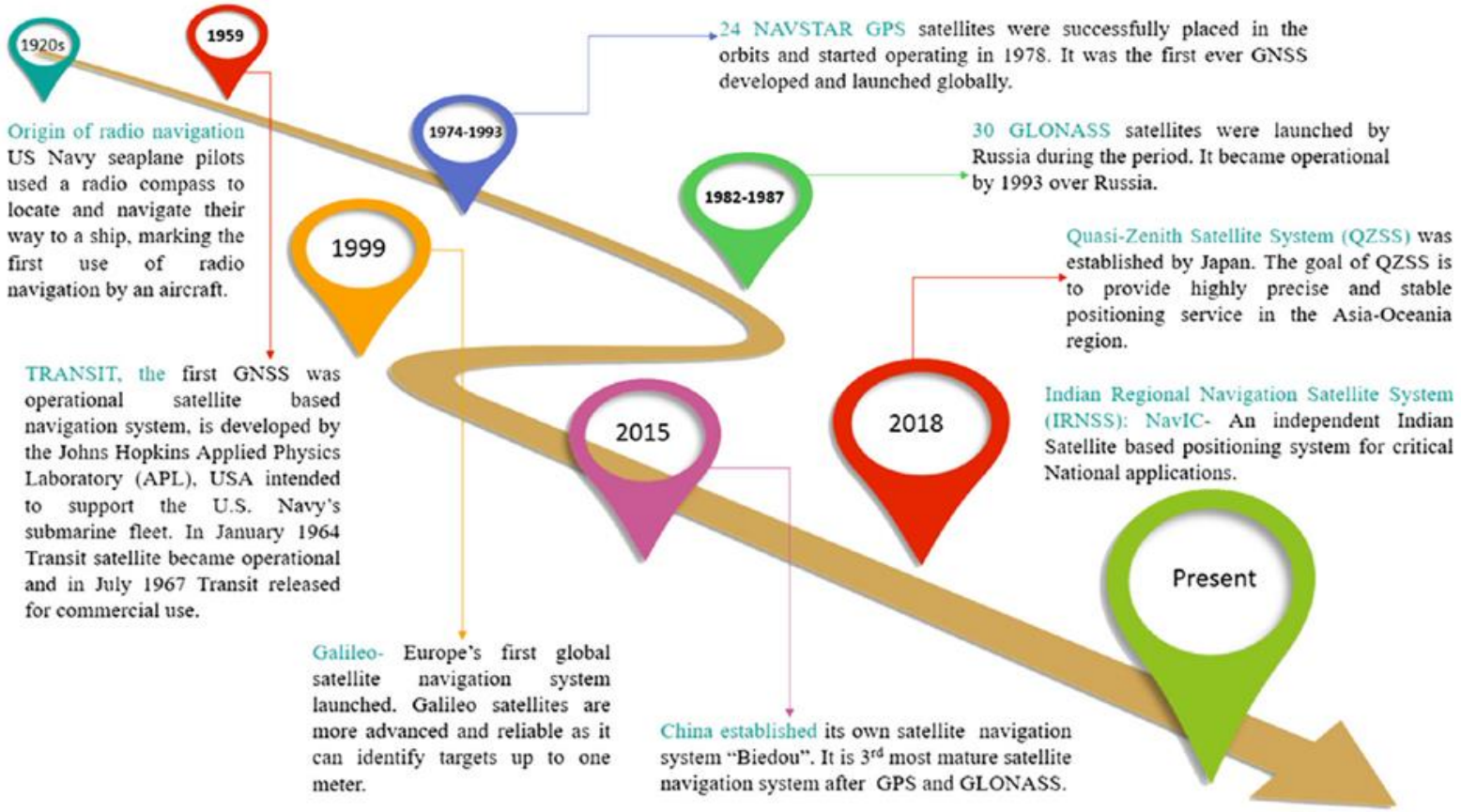
1. State of play of transmitted positional data systems (1)

Global Navigation Satellite Systems

- A global navigation satellite system (GNSS) involves a constellation of satellites orbiting Earth, which are continuously transmitting signals that enable users to determine their three-dimensional (3D) position with global coverage

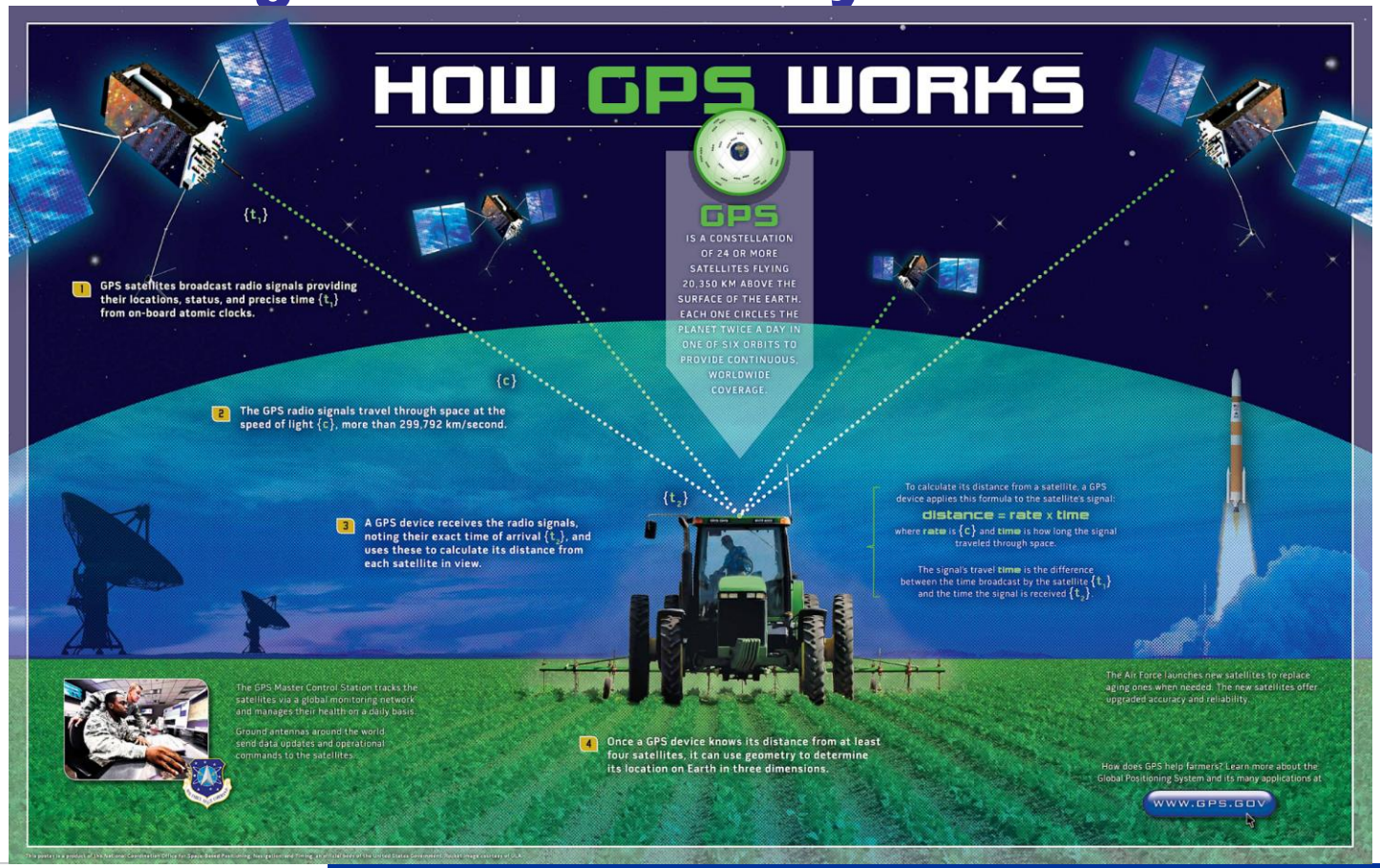
1. State of play of transmitted positional data systems (2)

Global Navigation Satellite Systems



1. State of play of transmitted positional data systems (3)

Global Navigation Satellite Systems



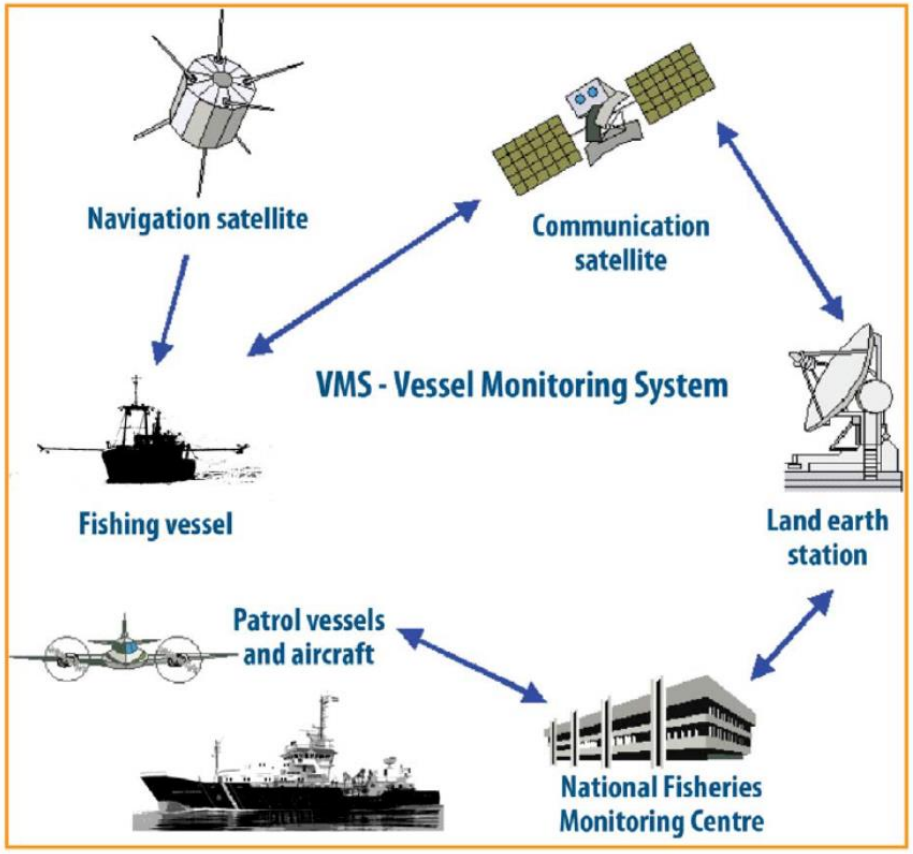
1. State of play of transmitted positional data systems (4)

Marine monitoring solutions based on GNSS data

- **Vessel monitoring system:** VMS is a general term for systems that are used on board commercial fishing vessels to allow control agencies to track and monitor fishing activities.
- **Automatic identification system:** AIS is one of the first open-standard data-broadcast communication systems on board ships. It operates in the VHF maritime band and has been adopted within the global maritime environment as a vessel traffic service. AIS data exchange supplements human use of marine radar, which is still the primary method of preventing vessel collisions

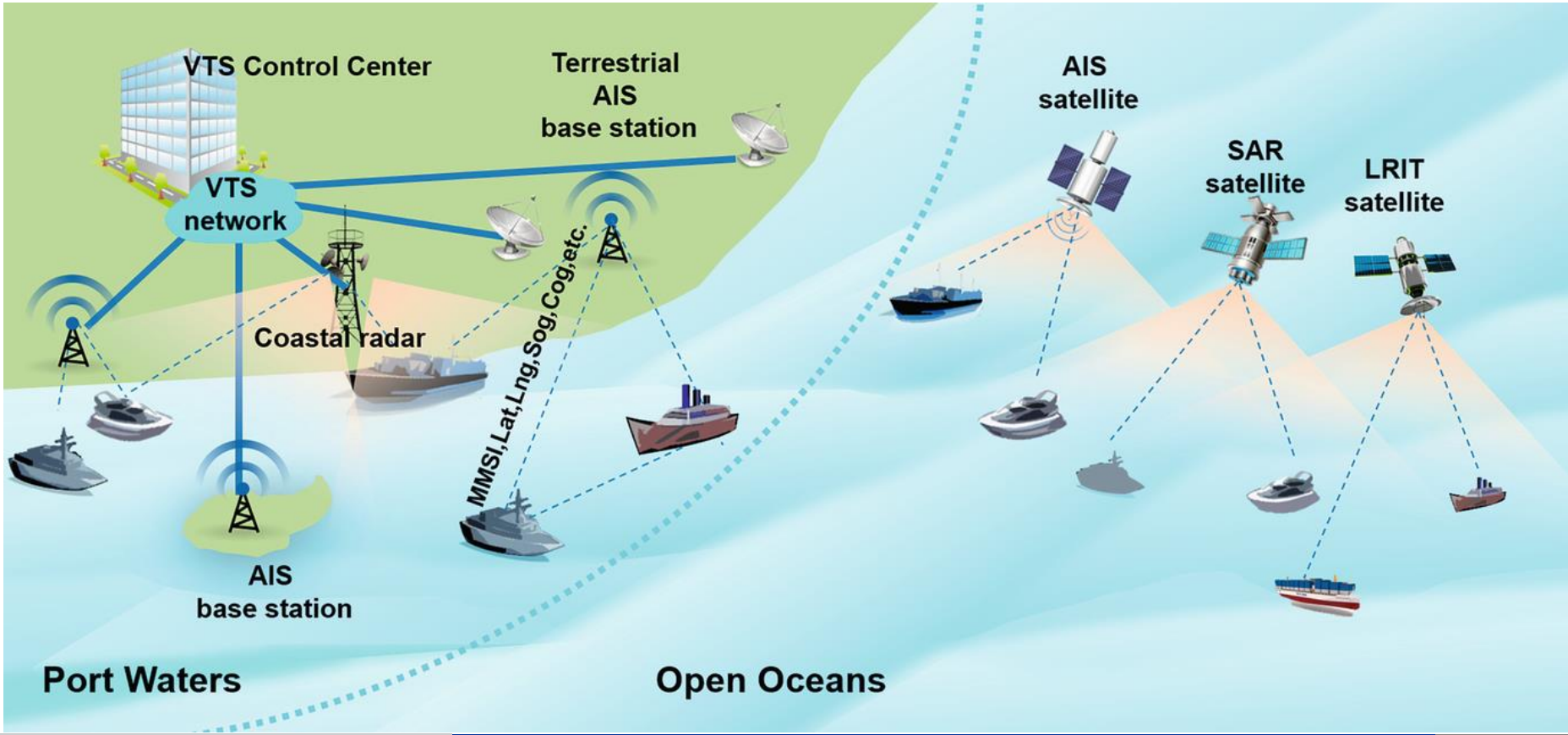
1. State of play of transmitted positional data systems (5)

Marine monitoring solutions based on GNSS data



1. State of play of transmitted positional data systems (6)

Marine monitoring solutions based on GNSS data



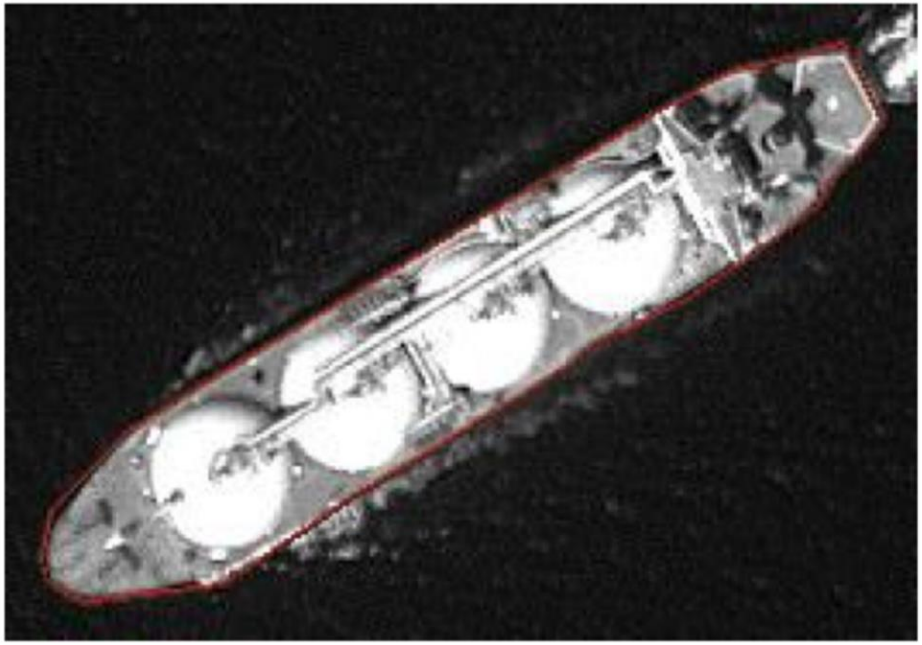
1. State of play of transmitted positional data systems (7)

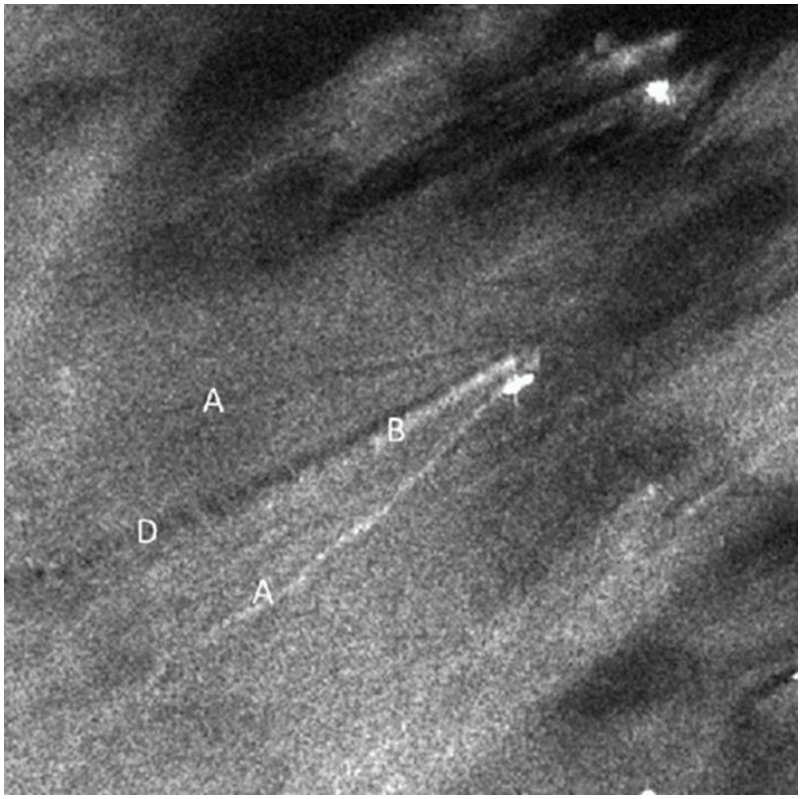
Marine monitoring solutions based on satellite remote sensing (SRS)

- **Very high resolution remote sensing.** A very high resolution (VHR) remote sensing satellite is an orbiting satellite mounting optical sensors that provide multispectral and panchromatic images at resolutions from 50 metres (1 pixel = 60 metres) to less than 1 metre
- **Synthetic aperture radar**. In SAR, the forward motion of the actual antenna is used to ‘synthesise’ a very long antenna enabling the creation of two dimensional images (pictures) or three-dimensional estimations of the shape of real objects.

1. State of play of transmitted positional data systems (8)

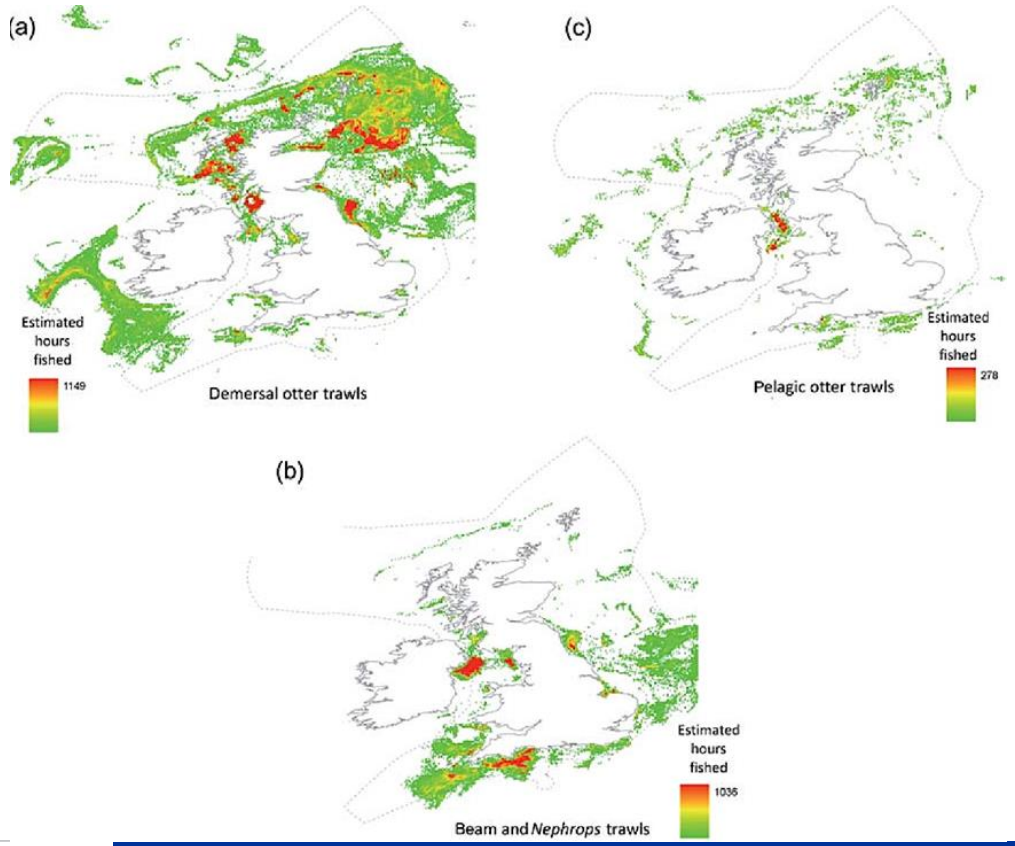
Marine monitoring solutions based on satellite remote sensing (SRS)





2. Current applications using transmitted positional data systems (1)

Applications using a vessel monitoring system



2. Current applications using transmitted positional data systems (2)

Applications using AIS data: https://globalfishingwatch.org/map/

2. Current applications using transmitted positional data systems (3)

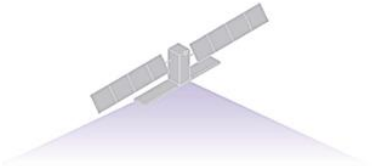
Applications using satellite remote sensing:

The Copernicus Maritime Surveillance (CMS) Service

CMS Service for Fisheries Control

The EU's fishing industry is a big business, and effective controls are necessary to ensure that fishing is carried out safely and sustainably. Earth Observation can provide valuable additional data. CMS is used by EFCA (The European Fisheries control Agency) and more than 300 other national fisheries control authorities.

It supports the monitoring of:



Fishing grounds

Over 60% of the world's fisheries are fully exploited, and almost 30% are overexploited

Fishing ports

Actions against illegal, unreported and unregulated fishing must be supported by monitoring both at sea and in ports

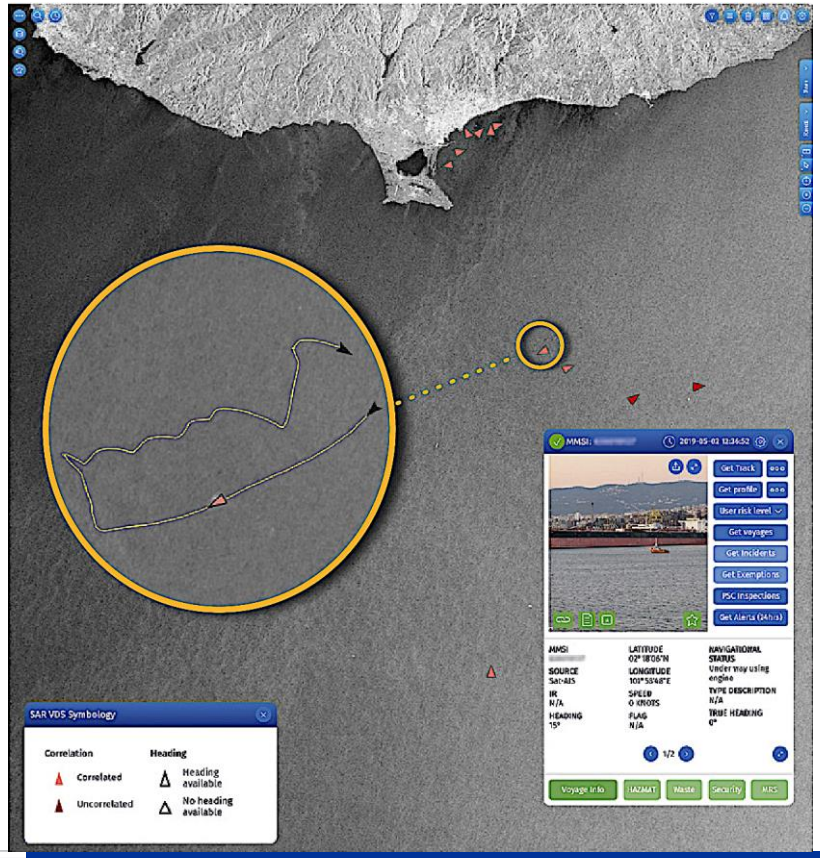
Fish farms

In Europe, aquaculture accounts for about 20% of fish production

Copernicus EMSA

2. Current applications using transmitted positional data systems (4)

Applications using satellite remote sensing:



3. Benefits and risks of transmitted positional data systems (1)

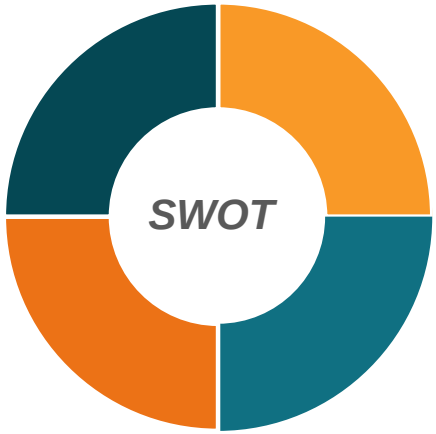
Vessel Monitoring System

STRENGTHS

- Reliable and well tested.
- Rules of use well known by fishermen.
- Infrastructure already in place in all Member States.
- Real time reception and use of data.

WEAKNESSES

- Legal rules not adapted to current technological development.
- Long time lag between transmissions.
- Low legal spatial accuracy.
- Confidentiality impedes use for uses not controlled.
- The GPS can be jammed.



OPPORTUNITIES

- Upgradeable to current technological developments.
- Can be adapted to new and cheaper communication technologies.
- Potential to be routinely used in fisheries science.
- Machine learning and fishing events identification methods developed with AIS could be easily adapted if faster emission frequencies are implemented.

THREATS

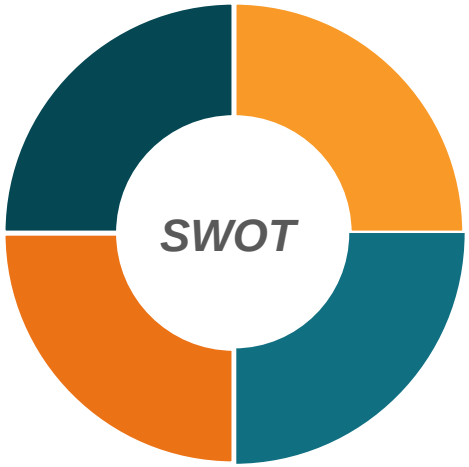
- If updated, fishermen would be reluctant to abide by stricter control measures.
- Confidentiality issues from data protection laws could impair its use for fisheries science if this is not addressed in the new fisheries control framework.

3. Benefits and risks of transmitted positional data systems (2)

Automatic Identification System

STRENGTHS

- Reliable and well tested.
- Rules of use well known by fishermen.
- Infrastructure already in place all around the world.
- Short time lag between transmissions.
- Algorithms for analysis developed.



WEAKNESSES

- Legal rules enforcing its use not intended for fisheries.
- Confidentiality obstructs use for non-security purposes.
- Best reception infrastructure not owned by Member States.
- No authority enforcing use in fishing vessels when far from ports.

OPPORTUNITIES

- Historical data could be used for fisheries science.
- Many algorithms for large amounts of data have been developed and are available for use.

THREATS

- Data protection laws could invalidate use to enforce fishing rules.
- Larger databases owned by private companies.

3. Benefits and risks of transmitted positional data systems (3)

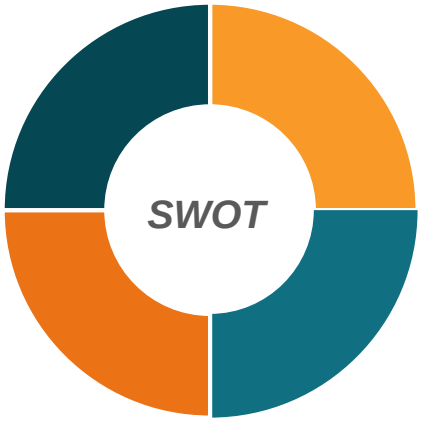
Satellite remote sensing

STRENGTHS

- Very High Resolution.
- Infrastructure is growing continuously.
- EU-funded satellites provide open data to scientists and companies.
- Algorithms for detection and classification are developed and open-sourced.

OPORTUNITIES

- Deep learning algorithms will allow huge amounts of data to be processed.
- Computing power keeps getting cheaper.



WEAKNESSES

- Legal rules not adapted to this data, no final position from the European Data Protection Board.
- Long time between transmissions.
- Confidentiality problems increase the higher the resolution of the satellite images.

THREADS

- Fisheries control could be illegal using this data due to confidentiality issues.
- Private companies are offering products similar to those developed for fisheries control to anyone with the money.

3. Benefits and risks of transmitted positional data systems (4)

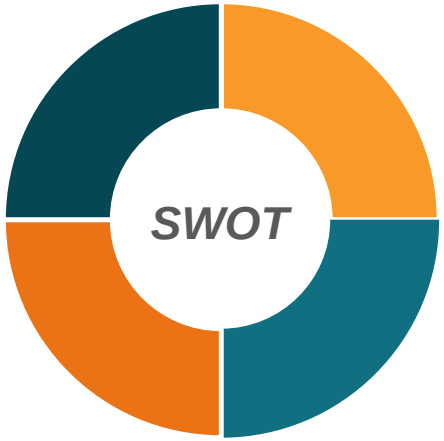
Applications combining different data sources

STRENGTHS

- Using two or more data sources enables gaps to be filled.
- They allow detection and documentation of illegal actions that cannot be demonstrated without combining data.
- Useful not only for fisheries control but for control in general.

OPPORTUNITIES

- With the increasing number of commercial satellites, the dark zones will be reduced.



WEAKENESS

- There is no specific legislation.
- Confidentiality issue
- Not applicable to routine control.
- Satellite images of a given zone only available for short periods of time.
- Not accessible from EMSA by scientists.

THREATS

- Vulnerable to confidentiality issue when used for enforcement.
- Not only in public hands.

4. Policy recommendations

Positional data devices

- **Extent** the obligation to **use tracking devices in commercial fishing vessels** to the maximum possible consensus.

- **Increase** the **accuracy of VMS positional data** so it can be of a similar magnitude as the actual data provided by **current GNSS systems** (20 metres).

Emission time

- **Reduce** the **VMS emission time** to **ten minutes** for instant transmission, and **one minute** to stored data on delayed transmission.

4. Policy recommendations

Personal data protection

- **Take the necessary actions** to **grant access to the generated data** to control bodies and scientific advisors for fisheries management while **preserving the personal privacy** of fishermen.

Satellite remote sensing and positional data

- **Follow-up** on the work started recently, by **combining VMS, AIS and VHR/SAR** images as complementary to the VMS data.