Report of Expert Meeting on the Use of Digital Communication Technology in Vessel Traffic Services

1. Overview

The expert meeting on the use of digital communication technology was held from 12th to 15th March 2019, hosted by the Japan Coast Guard at its Headquarters in Tokyo. The experts on VTS and digital communication technologies from Australia, Norway, Singapore, the United States and Japan participated in the meeting. The participant list is attached as Annex 1.

2. Opening of the meeting

On behalf of the Japan Coast Guard, RADM Awai welcomed the participants. Emphasizing the importance of VTS in the safety of navigation, he mentioned the current rapid development of digital communication technology and the possibility of use of such technology in VTS for the improvement of the safety and efficiency of shipping. He hoped this meeting could contribute to the improvement of VTS through IALA and other occasions. After the self-introduction of the participants, the staff of JCG made an administrative announcement. Photo 1 shows the participants of the meeting.

Photo 1: Participants of meeting

3. Presentations

3.1. Australia

The presentation made by Mr. Neil Trainer focused on 4 elements “VTS in Australia – an overview and emerging trends” “What do we mean by digital communication technology” “Australian Examples” and “Comments / Observations”. In the first topic, the presentation showed the greater data exchange between VTSs and allied service as well as the increase of number of VTS. In the second topic, key points highlighted include that consideration might need to be given to developing a definition of digital communication to ensure a common understanding and the existing literature was quite confusing with regards to the benefits of digital communication to the end user and consideration needs to be given to clearly documenting and communicating this to stakeholders. In the third topic, three examples of communications implemented in recent times were provided that had demonstrated user acceptance include “Ship encounter information” “VTS exchange” and “Route exchange”. In concluding his presentation, the following comments and observations were highlighted:

- There is a need for ‘Digital Communication” in VTS to be clearly defined and communicated to ensure a common understanding. For example, are we talking about simple the digital transfer of data or a system that embraces, transmission, handshaking, validation, and integration?
- The advantages of digitisation for VTS could be better documented / communicated. This may provide the opportunity for ship and shore entities to embrace digital technologies in their maintenance/upgrade schedules.
- Much of the focus to date with the development of Maritime Services has been on technologies and migrating existing practices to digital services. Consideration should also be given to:
    - Reviewing/enhancing existing practices in the transition to digital services
    - Identifying new practices that digitisation may offer
- The development of IALA standards for VTS voice communications, including structure and phraseology, may provide a basis for the development for implementing standardised VTS digital communications.

Photo 2: Australia

- The transition to digital technologies provides opportunities for moving towards more “Proactive VTS”.

- VTS is expected to make a major contribution to Maritime Services, noting that VTSs are:
    - Information rich – surface picture, intent information, etc
    - Provide a communication hub
    - Resourced
    - Legal entities recognised by SOLAS

The copy of the presentation is attached as Annex 2. Photo 2 shows the presentation of Australia.

3.2. Norway

Mr. Richard Aase of Norwegian Coastal Administration (NCA) gave a presentation on the situation of Norway. Norway was working at providing Intelligent Transport Systems in an inter-agency cooperation between road, train, air and sea. Cooperation between agencies in Norway to provide safe and secure transport was described in the presentation. Automatic reporting was a central part of the future, and VDE could provide a carrier for that. However both technical and operational concepts needed further development. There was also a need to focus on standards, harmonisation and security. HW and SW solutions for VDE needed to be commercialised and implemented. DSC could be used for tracking, and also for communication. Sailing routes could be exchanged between shore and ship. A standard format was necessary, ".rtz" could be the one. Routes should be Quality assured. Means to transfer routes directly between GIS and ECDIS needed to be agreed. The copy of the presentation is attached as Annex 3. Photo 3 shows the presentation of Norway.

Photo 3: Norway

3.3. Singapore

Mr. Wey Ling Tang of Maritime and Port Authority (MPA) Singapore gave an overview of Maritime Singapore, covering the challenges of managing the many vessels that pass through the Singapore Straits and call at the Singapore port. A brief introduction of the Next Generation Vessel Traffic Management System Innovation Programme was given, which was then linked to the need for strong and robust communication technologies. In this regard, MPA introduced the work Singapore was doing on VHF Data Exchange System (Mobile Station), which culminated in sea trials done in mid-2018. MPA's VDES effort is in partnership with A*STAR I2R and STEE. It has received attention from very

senior levels, e.g. Deputy Prime Minister and Minister of Transport, and as such, gathered some prominence through local awards such as Minister of Transport Innovation Award. As a next step, MPA suggested an inter-operability testing with Norway, Japan and Australia, as well as further discussion on conducting technology demonstrations using VDES at the upcoming IALA-MPA e-Navigation Initial Operating Capability Phase workshop in Singapore from 8 to 10 April. The copy of the presentation is attached as Annex 4. Photo 4 shows the presentation of Singapore.

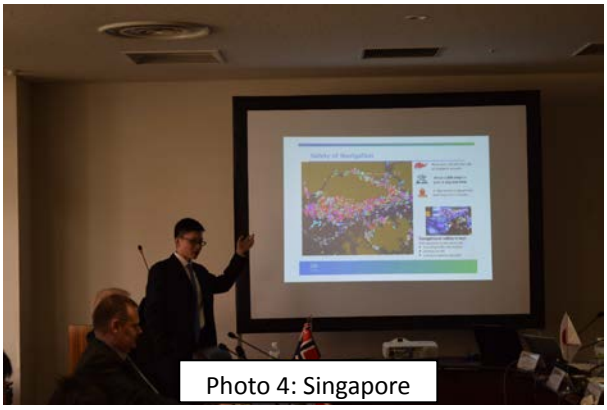
Photo 4: Singapore

3.4. The Unites States

Mr. Jorge Arroyo of the U.S. Coast Guard gave presentation that provided some background history of Vessel Traffic Services in the U.S. which highlighted how they and the bridge-to-bridge radiotelephone requirement came into being at the same time. However, participation in VTS did not become mandatory till after the EXXON VALDEZ environmental disaster in 1989, and, the subsequent U.S. Oil Pollution Act of 1990.This legislation also mandated that all future VTS be based on digital communications which lead the U.S. to join others in the development of Automatic Identification Systems. Although there are over 350 commercial ports in the USA, there are only 10 VTS, which serve unique regions of the USA where there are competing jurisdiction of port complexes or state boundaries. That said, the USCG has the USCG is very active in using digital communications to improve vessel traffic management--albeit much of it is outside their 10 VTS—by deploying over 450 synthetic and virtual AIS aids to navigation primarily in places where traditional aids cannot be deployed, such as bridge abutments. Bridges are a major area of concern in the USA, with tens of thousands of them, and the impact any damage to them could have to the transportation system and general economy. To this end, the USCG has embarked on an effort they are calling ‘Smart Bridges’ which is is the capability to improve mariner’s situational awareness by providing near real time information of status of bridges and environmental and navigational conditions through the use of

Photo 5: The United States

AIS-ATON messaging. All these efforts have been brought about with much interaction with pilots and other waterway users; which has led to broader acceptance of these new digital communication means. The copy of the presentation is attached as Annex 5. Photo 5 shows the presentation of the United States.

3.5. Japan

LCDR Yu Nemoto made the presentation on Japanese testbed of VHF Data Exchange System (VDES). The presentation describes the practical needs for VDES in the maritime stakeholders in Japan. These needs were corrected in the focus group, which were established in 2017. Based on these needs, the field trial was held and gathered comments from participants. One of the key findings from this trial was that VDES had high expectation for sending information in non-urgent situations. It also cleared that we have to cover several gaps for practical usage. The copy of the presentation is attached as Annex 6. Photo 6 shows the presentation of Japan.

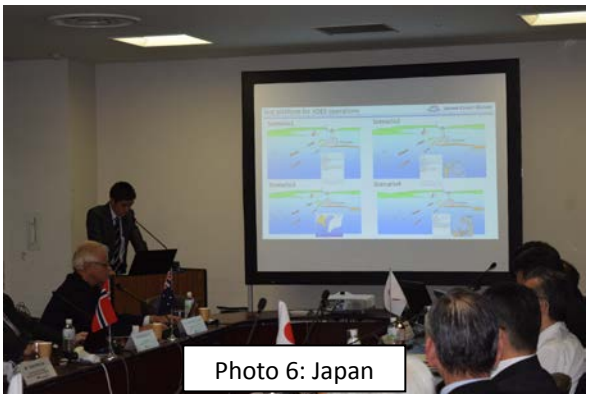

Photo 6: Japan

4. Discussion

4.1. Digital communication in VTS

As mentioned at the presentation from Australia, the experts agreed to discuss the definition of the digital communication in VTS before considering other issues. While the experts noted that there were two types of digital communication in VTS, human to human and machine to machine, the experts developed the following definition used at the meeting.

> *Digital communication in Vessel Traffic Service is exchange of validated information and data in interaction between ship and shore.*

4.2. Gaps and challenges

The experts noticed that some digital communications such as ships' reporting via satellite, virtual AIS Aids to Navigation had been effectively used in VTS. But the experts also acknowledged that some digital communications such as AIS text message, AIS Application Specific Message were still not widely accepted by mariners. The experts identified that the following gaps would prevent the application of digital communication technology.

VTS side

- Use of long AIS text message
- Lack of standardized sentence/ common communication phrase/ messaging format
- Duplication of same message from multiple AIS base stations

Ship side

- Limited display
- Unclear procedure of information management
- New processes and need for change management
- Unclear benefit
- Lack of single information station
- Need for constant connection

Others

- Lack of awareness of contribution of digital technology to enhance port efficiency
- Lack of provision of best practice
- Different status of VTS interaction with vessels compared to air traffic control with aircraft
- Possible liability issue associated with sharing and exchange of information
- Possibility of cyber attack

4.3. Possible solutions

Based on the gaps identified, the experts highlighted the following:

- Improvement of information portrayal in conjunction with the development of digital communication technology
- Harmonization of communication technologies onboard and ashore
- Development of standard sentence and common communication phraseology
- Development of operational guidance on AIS text and application specific messages
- Development of guidelines on digital communication technologies in VTS and onboard
- Periodic meeting with VTS users and stakeholders such as mariners, pilots, port authorities, shipping companies, classification societies
- Promotion of AIS and other technology's capability as digital communication tool to VTS users and stakeholders
- Information on advantages and benefits of digital communication technology to both onboard and ashore
- Development of marketing tools of digital communication with best practice

- Development of guidance on cyber security in VTS
- Promotion of awareness on VTS to users and stakeholders
- Establishment of joint task or project between VTS and ENAV Committees

Regarding the joint task or project, the chair informed the participants that although the last IALA Policy Advisory Panel meeting decided to discontinue the joint VTS and ENAV meeting, the next IALA symposium focused on VTS and e-navigation so it could be a good opportunity to discuss collaboration.

4.4. Any other business

The chair introduced two issues related to VTS in Japan and asked the experts on the information of such issues in each country.

One was anchor watch. When a typhoon hit the western part of Japan in the last year, a tanker anchored near a bridge connected to an airport dragged the anchor and collided with the bridge that suffered serious damage from the collision. A VTS nearby monitored the tanker by AIS and issued the warning but due to the strong wind the warning had no effect. This accident drew the attention of public and questioned the responsibility of VTS in such case. The JCG noticed that the responsibility of anchor watch should be ultimately borne by the master and the chair asked the situation in each country. All foreign experts answered that VTS in each country carried out anchor watch in its VTS area and also contacted to a ship if the ship dragged or lost anchor but agreed that the responsibility of anchor watch should be borne by the master. Some experts also advised that it was important to take an appropriate procedure on anchor watch by VTS since there would be many ships anchored in such case.

The other was drug and alcohol policy. Recent incidents involved airline pilots being arrested or accused by alcohol checks prior to take off and one master of Japanese cruise ship arrested for carrying out navigation while under influence of alcohol. Therefore the higher authority of the Ministry investigated an alcohol policy or guideline for JCG crew both its ships and aircraft including VTS operators. Asked by the chair on these issues, all foreign experts informed that there was a written policy in each country and a VTS operator may lose the job if he or she was found to be intoxicated. One expert also informed that drinking of alcohol was prohibited during 8 hours before the shift. Another expert also informed that the study on alcohol check of navigator by VTS communication was carried out in the Republic of Korea and the result of study could also be used for VTS operators. The experts were requested to forward the copy of their policy to the chair.

4. Conclusions and Recommendations

The experts, recognizing that some of the possible solutions identified have recently been initiated by IALA, such as the development of common VTS voice communications, including structure and phraseology, developed the following conclusions and recommendations for IALA's consideration:

- The use of digital communication technology to reduce the opportunity for misunderstanding through the provision of clear, concise and unambiguous communications offers numerous benefits to VTS, mariners and allied services.

  IALA is invited to promote the use of digital communication technologies by:

  - Preparing a high-level discussion paper to identify and communicate the benefits of digital communications technologies to all stakeholders.
  - Consider the application of digital communications in all guidance documents currently being prepared, where applicable.

    In particular, it is suggested that following the release of IALA guidance for VTS voice communications, including structure and phraseology in the near future, consideration be given to preparing guidance for digitally communicating information based on standard VTS voice phraseology.

    Note**:** it is suggested these documents could be developed jointly by the VTS and ENAV Committees.
  - Consider developing a definition for digital communication in VTS to ensure a common understanding within the maritime sector. Noting that there are two types of digital communication in VTS, human to human and machine to machine, the following draft definition was developed at the meeting.

    "Digital communication in Vessel Traffic Service is exchange of validated information and data in interaction between ship and shore."

- The portrayal of information is essential for the VTS communication purpose and although recognizing the portrayal issue is not digital communication technology matter in a narrow sense and out of the remit of IALA, IALA should continue to be involved in the development of portrayal issue at IHO, IMO, IEC, etc.
- The IALA symposium at Rotterdam in 2020 and IHMA Congress in 2020 provide a great opportunity for the promotion and facilitation of use of digital communication technology in VTS and therefore the participation of the members of VTS and ENAV Committee is encouraged.
- The IALA Workshop on initial operating capability phase for e-navigation

services in Singapore also provides a good opportunity for considering the use of digital communication technology in VTS and its output should be shared with all IALA Committees, especially VTS and ENAV.

5. Technical tour

A technical tour to the Tokyo-wan VTS center and Yokohama JCG base was carried out on the third day of the meeting. After the introduction of the overview of the center as well as the roles of patrol vessels, the participants observed the operation of VTS that monitored and interacted with one of the busiest vessel traffic flow in Japan. Along the way back, the participants also enjoyed the historical town of Asakusa. Photo 7 shows the technical tour

Photo 7: Technical tour

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6. Closing

In closing, RADM. Awai gave his deep appreciation to the all participants for their active contribution to the meeting. He also thanked the staff of JCG and the coordinator of the meeting for their excellent arrangement. He hoped that the result of the meeting would facilitate the discussion in IALA and contribute to the use of digital communication technology in VTS for safer and more efficiency navigation in future. The participants thanked the Japan Coast Guard for hosting the meeting and inviting them to the meeting. The chair wished their safe back home and closed the meeting.