Summary

of

Stakeholder Engagement Workshop 1

MarRINav is a project delivered on behalf of the European Space Agency
Summary
The MarRINav (Maritime Resilience and Integrity of Navigation) project is exploring in depth maritime requirements for Resilience and Integrity in Position, Navigation and Timing (PNT).

A key element of this exploration is engagement with stakeholder groups from industry and academia. Innovate UK’s knowledge transfer network are facilitating this stakeholder engagement via meetings and workshops. This report is a summary of findings from the first stakeholder workshop held in London on 15th May 2019.

Workshop Objectives
The workshop was established to
• Explain the project’s objectives and approach thus promoting awareness of the activity and the wider issues of resilient PNT in the maritime domain
• Learn from stakeholders about current capabilities and the technology maturity of emerging systems
• Identify gaps in capability affected by PNT integrity and resilience
• Consult the maritime user community on the project approach
• Identify priorities in requirements and gaps
• Identify operational risks (safety, efficiency and environmental impact)

Delegates
The workshop gathered together over 30 stakeholders from the maritime sector for a day of discussion and facilitated sessions.

Expertise in the room included:
• Commercial shipping
• Government and regulation in maritime
• Ports (ship-to-shore information exchange)
• Navigation and positioning
• PNT vulnerability resilience
• Cyber security
• Aids to navigation
• Hydrographic survey
• Vessel operators

The workshop identified the following topics where the project would benefit from additional expertise:
• Autonomy (vessels and port systems)
• Use of precise timing in maritime (vessels and port systems)
• Landside infrastructure in ports and its GNSS dependency
Agenda
Introduction
The challenge of resilience & integrity
The ship’s & cargo’s journey
Workshop organisation – open space workshop
Open space 1 – user needs, requirements and systems using PNT
Plenary discussion of open space 1
Open space 2 backup solutions and wider considerations
Plenary discussion of open space 2
Summary

Approach
The day was separated into an initial briefing and then two facilitated open space activities, each of which was divided into 3 groups as follows.
• Ocean - anchorage
• Anchorage - port
• Berthing - gate

These groups represented the journey of cargo on board a vessel from open ocean to the leaving the port gate. This journey is representative of the value chain elements within the maritime domain.

Delegates were invited to join any group they wished to and could move between groups if they felt they wanted to contribute to or learn from more than one. Each group was facilitated by a member of the MarRINav project team.

‘Open space’ workshop part 1 (1 hour)
The first open space activity focussed on user needs, requirements and systems. This activity was designed to extract insights from delegates that the project team in isolation may not have uncovered.

‘Open space’ workshop part 2 (1 hour)
The second open space activity focussed on back-ups and wider considerations. This activity was designed to tap into the knowledge of delegates and their creativity with a view to informing an understanding of existing levels of resilience and possible future solutions.
Summary of outcomes from the workshop

The summary below is taken from facilitator notes and the open space group flip charts.

Current practice

- IMO requirements do not mandate GNSS carriage, but data from an electronic position system (EPFS) may be essential for compliance and reporting, without which ships may not be allowed to sail.
- GNSS inaccuracies can occur which are sufficiently large to affect safety but not so large as to be immediately noticeable by the mariner, whilst the GNSS bridge applications may not alarm giving rise to hazardously misleading information.
- For larger GNSS errors, multiple bridge systems may alarm simultaneously leading to sensory overload of the mariner.
- Principal backup systems to GNSS are terrestrially based, with limited coverage range, but there are more PNT alternatives to GNSS close to shore, e.g. radar and VDES R-Mode.
- Dependence of ships’ internal systems on GNSS timing is not understood, since vessels typically have multiple GNSS receivers each feeding many different applications, with ships’ architecture not always fully documented in terms of GNSS use.
- Relative immaturity of port coordinated decision making (port CDM) and e-navigation services for ship-to-shore information exchange inhibits the situational awareness picture available to port operators.
- Limited information conveyed to ports from ships is available only to the immediately next port of call and further ports in the voyage plan do not receive information, hence ports often receive information too late.
- Port theft is endemic and the insurance situation limits value and types of cargo going by sea.
- Generally, end-to-end cargo or container tracking is not in place throughout the journey (from ocean, interlining at ports and through to the hinterland).
- Inefficient use of port capacity and ship delays due to lack of port awareness of the ships’ estimated time of arrival.
- Inefficient steaming (emissions and fuel) by ships unaware of port and dock availability, arising from lack of advanced information.
- Of all port infrastructure, straddle carriers are thought to be the most dependent on GPS.

Future to 2030

- Autonomous vessels will never rely on GNSS alone.
- Standards for autonomous vessels may be higher than for manned vessels, which is being investigated under current IMO scoping study into the impacts of marine autonomous surface ships (MASS) on the regulatory framework, scheduled to report in October 2019.
- Optical positioning techniques are promising for the future (e.g. cameras with image processing, SLAM techniques and digital position – c.f. ePelorus).
- Potential use of automated-celestial positioning.
- 5G may supplement GNSS timing.
- Portable atomic clocks, gravity sensors and quantum inertial sensors may eventually supplement GNSS.
• Large scale renewable energy generation and fish farms will take more sea space
• Polar routes may become feasible, noting the Russian fleet of nuclear icebreakers in the 2030 timescale accompanying ships along the northern sea route (for a fee)
• Autonomous drones will have an intermodal role (e.g. inspection of containers on ships approaching ports)
• Floating offshore habitation may be necessary to mitigate loss of land from rising sea levels
• Cargo conditioning monitoring will be increasingly important
• On-board manufacturing within ships in transit will increase
• More data bandwidth will be needed
• Less bulk fuel will be transported
• Port handling will use more automation
• Data flow will increase for customs pre-clearance (e.g. EU’s e-maritime and e-customs concepts and application single windows
• AI will be used increasingly for anomaly detection in cargo / paperwork / vessel activity
• Business models for ports may become more vertically integrated in supply chains – e.g. Amazon-owned ports, noting that UK ports are privately owned whereas European ports are predominantly state owned

Gaps identified in project knowledge
• Use of precise timing in maritime
• Requirements for autonomous vessels
• Requirements for autonomous port handling
• Detailed information on GNSS use on the land side at ports

Post-workshop follow up
Delegates are invited to comment on the summary report. Input will be considered for inclusion by the MarRINav project team.

The project team will obtain additional information on topics identified above.

This report will be published to delegates and via the project mailing list as well as the project website www.marRINav.com

The follow-up stakeholder engagement workshop is provisionally booked for 13 November 2019 in London (KTN Islington)

Thank you
The project team would like to thank all those who attended and contributed to this workshop for their time and valuable insights.

Bob Cockshott 30 May 2019