

## AtoN Planning and Service Requirements

- Obligations and regulatory compliance
- AtoN Planning (Offshore signals, bridge signals, traffic signals, MBS, fairway design)
- Virtual marking
- Levels of service (objectives, Availability and Categories)
- Risk Management
- Quality management

## AtoN Design and Delivery

- Visual signalling (Vision, Colour, Conspicuity, Rhythmic characters)
- Range and performance (visual and audible)
- Design, Implementation & Maintenance
- Power systems
- Floating AtoN (buoys, moorings, stability...)
- Environment, Sustainability & Legacy

## Radionavigation Services

- Satellite positioning and timing
- Terrestrial radio positioning and timing (including eLoran, eChayka, R-mode)
- RACON & Radar positioning
- Augmentation services including SBAS & GBAS

## Vessel Traffic Services

- VTS implementation
- VTS operations
- VTS data and information management
- VTS communications
- VTS technologies
- VTS Auditing and assessing
- VTS additional services

## Training and Certification

- Training and assessment
- Competency certification and revalidation
- Simulation in training
- Human factors and ergonomics
- Capacity building

## Digital Communications Technologies

- Wide/Medium bandwidth systems (AIS & VDES)
- Narrow bandwidth systems (NAVDAT, MF beacons)
- Harmonised maritime connectivity (Maritime Internet of Things (Intelligent sensors, AtoN monitoring))

## Information Services

- Data models and data encoding (MSPs, IVEF, S-100, S-200, ASM)
- Data exchange systems
- Terminology, symbology and portrayal