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| Annex 2: Examples of e-navigation solutions | | |  | |  |  |  |
| Solution | | Justification | | |  |  |  |
| *No.* | *Short description* | *Primary user need* | | *User type* | *Other user needs* | *Hazard description* | *Origin* |
| S1 | Ergonomically improved, harmonised and standardised bridge and workstation layout (IBS). | Improved ergonomics | | Shipboard user | Familiarisation requirements | Accident due to pilot or OOW not familiar with bridge equipment / slow response due to pilot or OOW not finding the correct information/control/alarm. | 134-Gte01, 134-Gre01, 134-Gre03, 134-Gre04, 134-Gop01 |
| S2 | Extended use of standardised and unified symbology for relevant bridge equipment | Standard interface | | Shipboard user | Improved ergonomics | Accident due to misinterpretation of information or problem locating correct information. | 113-Gre01, 134-Gte01, 134-Gte03, 135-Gte01 |
| S3 | Standardised digital familiarisation material for relevant equipment | Familiarisation requirements | | Shipboard user | Standard interface | Accident due to pilot or OOW not familiar with bridge equipment. | 150-Gte01, 113-Gtr01, 134-Gtr01 |
| S4 | Standard default interface setup option on relevant equipment ("S-mode") | Standard interface | | Shipboard user | Familiarisation requirements, Improved ergonomics | Accident due to pilot or OOW not familiar with bridge equipment. | NAV 56/WP.5/Rev.1 Annex 2 |
| S5 | Integration of available real-time information in nautical graphical displays (including MSI, AIS, charts, radar, etc.) | User-selectable information received via communication equipment | | Shipboard user | Maritime Safety Information (MSI), Improved target detection, Guard zones | Accident due to poor situational awareness | 111-Gte06, 134-Gte04, 135-Gte01, 135-Gte02, 135-Gte03 |
| S6 | All bridge equipment to follow IMO BAM (Bridge Alert Management) performance standard | Alert management | | Shipboard user |  | Accident due to not responding to relevant alert. | 134-Gre03 |
| S7 | Information accuracy/reliability indication functionality for relevant equipment | Indication of reliability | | Shipboard user |  | Accident due to actions taken based on inaccurate information. | 112-Gte01, 132-Gte03 |
| S8 | Standardised self-check/built-in integrity test (BIIT) with interface for relevant equipment  (ex.: bridge equipment). | Improved reliability | | Shipboard user |  | Accident caused by bridge equipment failure. | 132-Gte02 |
| S9 | Standard endurance, quality and integrity verification testing for relevant bridge equipment, including software | Improved reliability | | Shipboard user |  | Accident caused by bridge equipment failure. | 134-Gre02, 120-Gte01, 112-Gre01 |
| S10 | Single-entry of reportable information in single-window solution | Standardised and automated reporting | | Shipboard user |  | Accident caused by distraction / high workload. | 140-Gte02, 140-Gte03, 140-Gte05, |
| S11 | Automated collection of internal ship data for reporting | Standardised and automated reporting | | Shipboard user |  | Accident due to distraction / high workload. | 140-Gte04 |
| S12 | Automated or semi-automated digital distribution/communication of required reportable information, including both "static" documentation and dynamic information | Standardised and automated reporting | | Shipboard user |  | Accident due to distraction / high workload. | 140-Gte01, 140-Gte02, 140-Gte03, 140-Gte05, 140-Gre04, 140-Gre05, 140-Gop01 |
| S13 | All national reporting requirements to apply standardised digital reporting formats based on IMO FAL forms and SN.1/Circ.289 | Standardised and automated reporting | | Shipboard user |  | Accident due to distraction / high workload. | 111-Gte02, 140-Gre04, 140-Gre05, 140-Gop01 |
| S14 | Improved display of status of available data and indication of available updates. | Automated updating of baseline data and documents | | Shipboard user |  | Accident due to overburdening/out of date navigational documentation | 136-Gte01, 136-Gop01 |
| S15 | Automated and timely updating of charts, nautical publications and other documentation | Automated updating of baseline data and documents | | Shipboard user | Provision of information to vessels | Accident due to overburdening / out of date navigational documentation. | 136-Gte01 |
| S16 | Extended use of IMO Standard Marine Communication | Effective and robust communications | | Shipboard user |  | Accident due to overburdening. | 120-Gop01 |
| S17 | GMDSS equipment integration - one common interface | Effective and robust communications | | Shipboard user |  | Failure to mitigate accident due to poor communication. | 120-Gte05 |
| S18 | Mandatory integrated central bridge display for improved access to shipboard information | Effective and robust communications | | Shipboard user | Improved ergonomics | Accident due to not applying available information / overburdening. | 136-Gop02 |
| S19 | All onboard information to be searchable | Effective and robust communications | | Shipboard user | Improved ergonomics | Accident due to not applying available information / overburdening. | 136-Gte01 |
| S20 | Task-based information management | Effective and robust communications | | Shipboard user | Improved ergonomics | Accident due to not applying available information. | 136-Gte01 |
| S21 | Improved communication of VTS service portfolio | Provision of information to vessels | | Shore-based user |  | Accident due to not applying available information. | 260-Gtr02 |
| S22 | Integrated system for improved and harmonised presentation of domain awareness | Management of information | | Shore-based user | Improved target detection | Accident caused by poor situation awareness. | 235-Gop01 |
| S23 | Standardised and unified symbology for relevant shore equipment | Management of information | | Shore-based user |  | Accident due to equipment symbol misinterpretation. | 235-Gop01 |
| S24 | Shore monitoring of quality / integrity of navigation systems, quality of onboard information and effectiveness of communications. | Quality assurance | | Shore-based user | Improved reliability | Accident due to navigation or communication equipment failure / poor onboard navigation documentation. | 260-Gte03, 260-Gte07 |
| S25 | SAR communication priority solution | Priority for distress communications | | SAR user |  | Failure to mitigate accident due to communication failure. | 320-Gre01 |
| S26 | Automated network for communication and data coordination/distribution among SAR stakeholders | Effective communication and information sharing | | SAR user |  | Failure to mitigate accident due to poor SAR operation coordination. | 320-Gte01 |
| S27 | Automated SAR information collection | Effective communication and information sharing | | SAR user | Access to relevant information within the e-nav domain | Failure to mitigate accident due to poor situation awareness / lack of information. | 310-Gte01, 310-Gop01, 310-Gop02, 330-Gte01 |
| S28 | Improved reliability of onboard PNT systems by integration with external systems | Improved reliability | | Shipboard user |  | Accident due to poor information from PNT systems. | 132-Gte01 |
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