FURUNO and ECDIS

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Topics

◆ Highlights of FURUNO ECDIS

◆ Furuno ECDIS - history

◆ Strong commitment on IHO technical work

◆ Manufacturer's view – Provision of standard

◆ Manufacturer's view – Provision of services

Highlights of FURUNO ECDIS

◆ In-house technology and development

◆ State of art performance

◆ Furuno is one of the major players in maritime electronics for navigation and radiocommunication

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Furuno and ECDIS - History

◆ In the beginning, 1984 we had a system to display navlines/user charts/routes on a radar, the source of these was paper charts

➢ This system evolved into a full integrated navigation system capable to perform electronic position finding using radar targets and to perform automatic track control based on planned routes. All lat/lon coordinates were obtained by the user from paper charts

◆ The use of paper charts evolved

➢ First we added a paper chart size digitizing table from where user was easily able to get lat/lon coordinates for navlines/user charts/route

➢ Next step was to add raster charts, at this stage by a system provided by a third party (Laserplot)

◆ Introduction of vector charts

➢ We became familiar to vectorized nautical charts on 1992 when we together with Technical Research Centre of Finland (VTT) studied the implementation of the first IHO ENC chart format DX-90

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ECDIS models - 1

◆ **FURUNO Automatic Navigation and Track-control system (ANTS) in 1996**
  ➢ This system used ENC charts based on IHO DX-90, the predecessor of the IHO S-57 ENC charts
  ➢ However, no commercial services of ENC charts were available. All customers used ARCS raster charts supplied by UKHO

◆ **First prototype of ECDIS to use S-57 ENC charts**
  ➢ In 1995 we were invited to join a partially EU funded project called ECHO, having an objective to create practical service for S-57 ENC charts
  ➢ The ECHO-project partners included ECC/Norway and UKHO/UK. They had established a joint ENC service called PRIMAR
  ➢ The ECHO-project developed for example
    ◆ PRIMAR-Security (encryption, permits) – Today known as IHO S-63
    ◆ Incremental updating system used by S-57 ENC charts
    ◆ Delivery infrastructure including folder conventions, availability and up-to-dateness information, today all part of S-63
    ◆ Even online delivery S-57 charts, updates, permits, availability and up-to-dateness information, etc.
  ➢ Trial customers were sailing with real S-57 ENC charts which were updated by the online update system
    ◆ Unfortunately, after the trial year, customers moved back to use of raster charts (ARCS) due to very low coverage and too high prices of S-57 ENC charts

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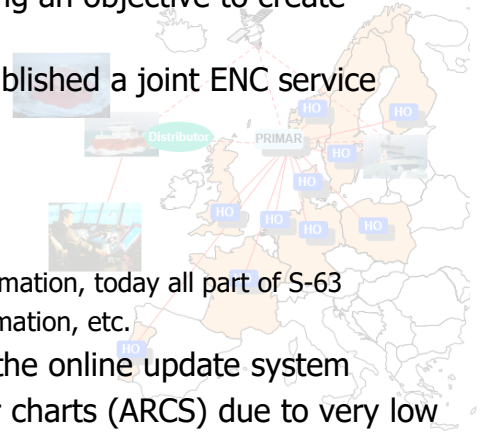
ECDIS models - 2

1999

2004

- ◆ **FEA-2105 series**
  - ➢ Introduced in 1999. Based on Windows NT operating system
  - ➢ First Furuno ECDIS type approved according IEC 61174 Ed1

- ◆ **FEA-2107 series**
  - ➢ Introduced in 2004. Based on Windows XP operating system
  - ➢ Initially type approved according IEC 61174 Ed2
  - ➢ Later upgraded to IEC 61174 Ed3 Ed4 level
  - ➢ IEC 61174 Ed4 level was introduced as part of IHO ECDIS anomalies and new edition of IHO S-52 Presentation library
    - ◆ Technical changes for presentation library, especially new rule for centered symbols, made the performance poor
    - ◆ Initially customers opted for sw upgrade of their existing hardware, but after seeing the performance difference between FEA-2107 and FMD series most of the customers opted for retrofitting the FMD series

- ◆ **FMD-series**
  - ➢ Introduced in 2012. Based on Linux operating system
  - ➢ High performance, instant update of display for pan and zoom
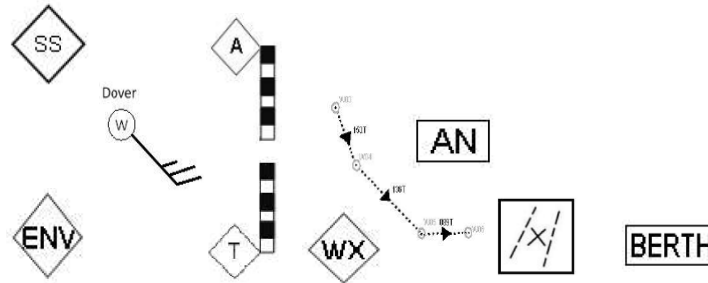
2012

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ECDIS models - 3

◆ **FMD-series based Planning station**
  ➢ Screen size similar to paper chart
  ➢ Touch screen, zoom and pan follow fingers without delay

◆ **Special versions**
  ➢ Including Additional Military Layer (AML)
  ➢ Including Maptech/NOAA raster charts (BSB)
  ➢ Including AIS Application Specific Messages (AIS ASM)
  ➢ Etc.

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Strong commitment on IHO technical work

◆ From the initial introduction
  ➢ Initially as participant of the ECHO-project, we begun to attend IHO C&SWG and meetings related to chart updating and delivery
  ➢ Original S-52 presentation library had mandatory to use machine-readable component called "DAI-file"
    ◆ Our implementation was based on this machine-readable method
    ◆ We even implemented all manufacturer features and Additional Military Layer (AML) based on this method
    ◆ The machine-readable method was however later made as optional only
    ◆ We promised at C&SWG meeting that we can provide technical support for IHO for the DAI-file method. This support has been free of charge to IHO

◆ Still strong participation
  ➢ We have observed that after the introduction of the S-52 Presentation library Ed4 upgrade for ECDIS anomalies, the number ECDIS manufacturers participating IHO work have reduced
  ➢ Already before the COVID-19 pandemic we were often the one and only ECDIS manufacturer in IHO technical meetings

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Manufacturer's view – Provision of standard

◆ **Internationally accepted**
  ➢ As an early ECDIS implementer we have faced, if not all, then most of the initial problems of international acceptance
  ➢ Based on this experience, we can say that the S-57 world is now mature
  ➢ We can also say that the S-100 world is not yet close of being mature.
  ➢ We would like to see IHO allowing individual components of the S-100 world to mature in their technical content before the components are introduced to the end users

◆ **Suitable for target customers**
  ➢ Selected technical methods should offer performance that is acceptable for the end users
    ◆ For example, using LUA-method instead of XSLT method on Portrayal is a good decision

◆ **Understandable and unambiguous to the intended audience**
  ➢ Our approach is to participate the underlaying technical work and drafting

◆ **Contributing to fair play**
  ➢ Same rules applied to all manufacturers
  ➢ No proprietary lock-in to manufacturer's internal formats (i.e. no SENC delivery)

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Manufacturer's view – Provision of services - 1

◆ Current online delivery methods for S-57 ENC charts works well

- ➢ The de-facto method is to arrange the product DVD content to appear on a mapped network drive onboard in a cyber-secure manner

- ➢ Multiple suppliers provide such services today and the services are generally interoperable with multiple ECDISes on market
  - ◆ Furuno has such service under name "Gate-1", however, most of Furuno ECDISes onboard are today server by other suppliers such as Navtor

- ➢ We would recommend to implement/endorse the same de-facto online delivery method for the S-100 online delivery system

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Manufacturer's view – Provision of services - 2

◆ We support the step-wise (two-phase) approach in introduction of S-100 products

◆ S-101 ENC alone does not offer much benefit for the end user
  ➢ We would recommend to provide additionally at least S-102 for areas covered by S-101
  ➢ Provision of S-104 (tidal) would also seem important for customers and business as a whole

◆ Provision of Nautical publications needs well thought international rules
  ➢ Especially important would be to keep IMO aware of how the S-100 based alternatives can replace the traditional printed Nautical Publication products
  ➢ Foreseen risk is similar teething problems as S-57 had initially - flag state acceptance for use of S-100 based Nautical Publications might not immediately result in acceptance by all Port State Control Inspectors

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Manufacturer's view – Provision of services - 3

◆ S-124 Navigational Warnings requires harmonisation with other MSI sources

➢ Looks like an attractive alternative for one component of Maritime Safety Information (MSI)

➢ Technically not a big issue for manufacturer

◆ We have implemented a prototype for STM-Validation project sea-trials, used by about 80 vessels having Furuno ECDIS

➢ We feel strongly that a common unique identification method for MSI elements should be developed and used

◆ IMO SOLAS mandatory carriage requirements already include multiple methods for delivery, for example NAVTEX, Inmarsat C and Iridium

◆ ECDIS needs such unique ID from the service for each MSI information so to be able to filter out redundant alerts from user potentially caused by reception of same information from multiple sources

◆ Note that possible users of S-124 service cannot avoid the use of IMO SOLAS mandatory methods – today only these mandatory methods include weather warnings and SAR related information

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Manufacturer's view – Provision of services - 4

◆ S-128 Needed early (in the 1st phase) as it is to include information about up-to-dateness

> ➢ Is analogous to a part (PRODUCTS.TXT) of S-63 for S-57 based ENC charts
>> ◆ Other parts of S-63, than the up-to-dateness support, are available in S-100 baseline, see for example S-100 Part 15
>> ◆ Support for machine managed up-to-dateness has been detected as a gap in S-100 concept
>> ◆ S-128 was proposed as a solution for the gap at NIPWG meeting Jan 2019

> ➢ Machine-readable and machine-manageable information is essential for creation of evidence for up-to-dateness of chart holdings for intended voyage, which is an IMO SOLAS requirement
>> ◆ Standardized "ENC Update Status Report"
>> ◆ Evidence is inspected by Port State Inspectors and/or Vetting Inspectors
>> ◆ Without evidence on inspection, ship is stopped in a port until the open issue is solved

> ➢ S-100 should at least provide same functionality as available for S-57 ENC charts

> ➢ S-128 should be ready early enough to allow development of related tests included in S-164

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Manufacturer's view – Provision of services - 5

- ◆ S-410 series products from WMO into the same distribution scheme
  - ➤ This is not directly an IHO issue
  - ➤ Technically not a big issue for manufacturer
    - ◆ We have had long time a possibility to receive and display weather information based on NOAA private format
  - ➤ In our view the most optimal way to handle the provision of S-410 series products to ECDIS would be through the same scheme and system as used for S-100 based Nautical charts and Nautical publications

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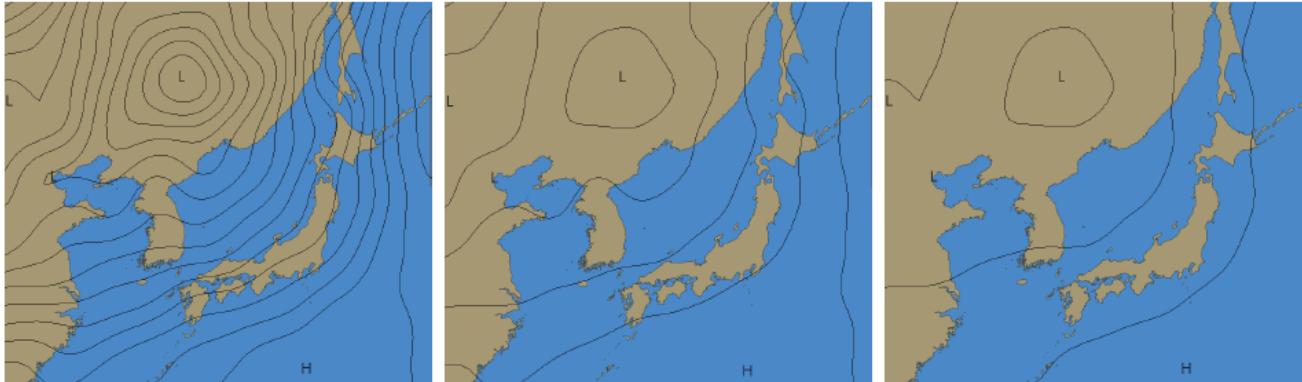
Thank you for your attention.

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