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*I am not representing Korean Government and Hydrographic Authority.
My presentation may differ from the authorities' policy.*



Project Overview

- ❖ **Duration** : 2012.6.1 ~ 2016.5,31 (4 years)
- ❖ **Investment** : US\$ 9.7mn Equiv.
- ❖ **Matching Funds** : 75% from Ministry of Knowledge Economy

25% from Hyundai + Hanjin

❖ **Team** :

 **HYUNDAI e-MARINE**

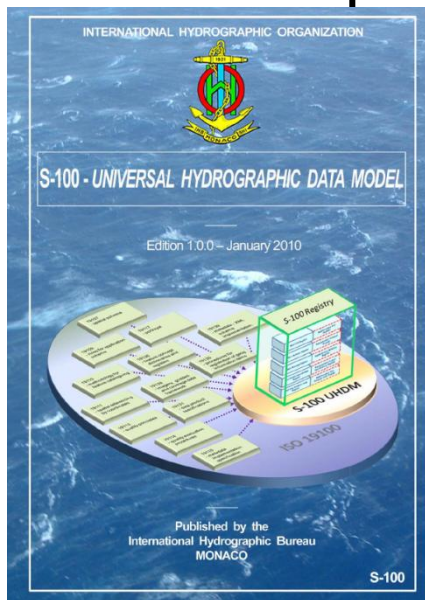
 **ETRI**

 **DSU**





Background



S-100 version 1.0.0

January 2010

Foreword

Development of S-100 – the *IHO Universal Hydrographic Data Model* was included in the IHO Work Programme in 2001. S-100 has been developed by the IHO Transfer Standards Maintenance and Applications Development (TSMAD) Working Group with active participation from hydrographic offices, industry and academia.

S-100 provides a contemporary hydrographic geospatial data standard that can support a wide variety of hydrographic-related digital data sources, and is fully aligned with international geospatial standards, in particular the ISO 19100 series standards, thereby enabling the easier integration of hydrographic data and geospatial solutions.

The primary goal for S-100 is to support a greater variety of hydrographic resources, products, and customers. This includes the use of imagery and enhanced metadata specifications, unlimited encoding formats and maintenance regime. This enables the development of new applications the scope of traditional hydrography - for example, high-density bathymetry, marine GIS, et oetera. S-100 is designed to be extensible to meet requirements such as 3-D, time-varying data (x, y, z, and time) and Web-based services. S-100 is designed to be extensible to meet requirements such as 3-D, time-varying data (x, y, z, and time) and Web-based services. S-100 is designed to be extensible to meet requirements such as 3-D, time-varying data (x, y, z, and time) and Web-based services.

The S-100 development and maintenance process is specifically aimed at receiving input from non-IHO stakeholders, thereby increasing the likelihood that they will maximise their use of hydrographic data for their particular purposes.

S-100 will eventually replace S-57 – the established *IHO Transfer Standard for Hydrographic Data*. Although S-57 has many good aspects, it has some limitations:

- S-57 has been used almost exclusively for encoding Electronic Navigational Charts (ENCs) for use in Electronic Chart Display and Information Systems (ECDIS).
- S-57 is not a contemporary standard that is widely accepted in the GIS community.
- It has an inflexible maintenance regime. Freezing standards for hydrographic data is counter-productive.
- As presently structured, it cannot support future requirements (e.g. high-density bathymetry, or time-varying information).
- Embedding the data model within the encapsulation (i.e., file format) reduces the flexibility and capability of using a wider range of transfer mechanisms.
- It is regarded by some as a limited standard focused exclusively for the production and exchange of ENC data.

The transition from S-57 to S-100 will be carefully monitored by the IHO to ensure that existing S-57 users, particularly ENC stakeholders are not adversely affected. S-57 will continue to exist as the designated format for ENC data for the foreseeable future.

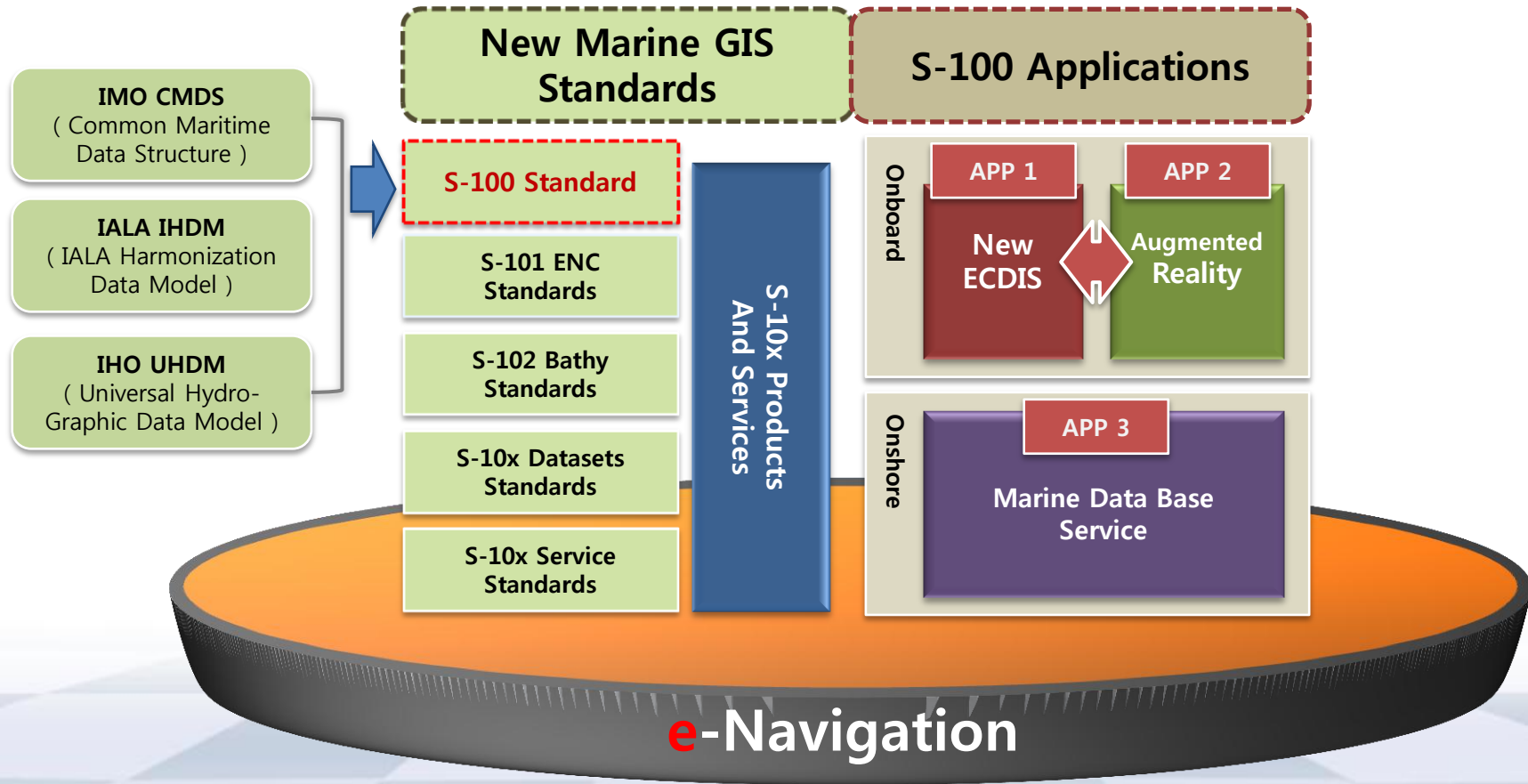
In the meantime, all existing and potential users of hydrographic information and data are encouraged to use S-100 as the basis for new applications, seeking input to the further development of the standard if their particular requirements are not yet catered for.

International Hydrographic Bureau
MONACO

... This enables the development of new applications that go beyond the scope of traditional hydrography – for example, high-density bathymetry, sea floor classification, marine GIS, etc. S-100 is designed to be extensible and future requirements such as **3D, time-varying data and web-based services** can be easily added when required.



Project Scope





S-100 App.1 : ECDIS

Next Generation ECDIS

IHO S-100 Single Window

R&D Targets

S-100, S-101, S-10x Standards



Chart Manager

S-101 (Next Generation ENC)

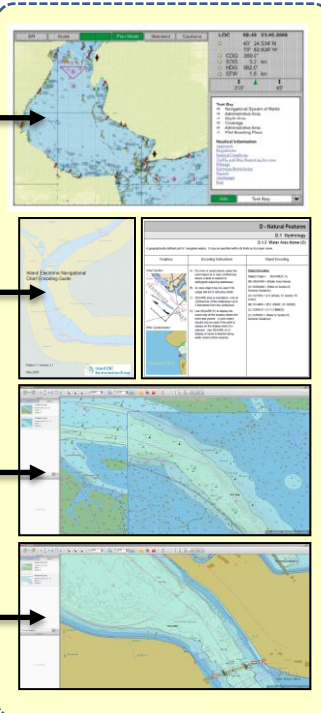
S-102 (Bathymetric)

S-10x (Inland)

S-10x (Elec. Nautical Publication)

S-10x (Weather/Environment)

S-10x (Marine Safety Overlay)



- ✓ S-57 to S-101 conversion
- ✓ S-101 implementation
- ✓ S-101 Display
- ✓ S-100 products overlay
- ✓ Conventional ECDIS functions
- ✓ New ECDIS functions
- ✓ 3D, 4D, Dynamic, Web
- ✓ S-101 ENC Onboard Test
- ✓ S-101 ENC Quality Assessment
- ✓ S-101 ENC Protection
- ✓ S-100 Registry Input



S-100 App.2 : AR (Augmented Reality)

Core Technologies

Transparent Display

Image Synchronization

3D Real Image Generation

3D AR Image Generation

AR Virtual Image Generation

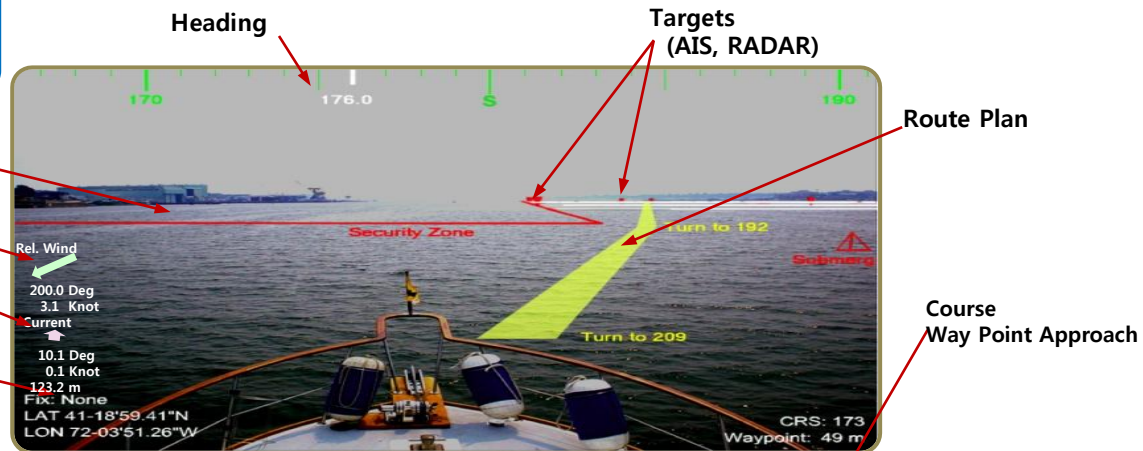
3D Visualization of
S-100 Navigation Information

Traffic Lane & Safety Zone

Wind

Current, Depth

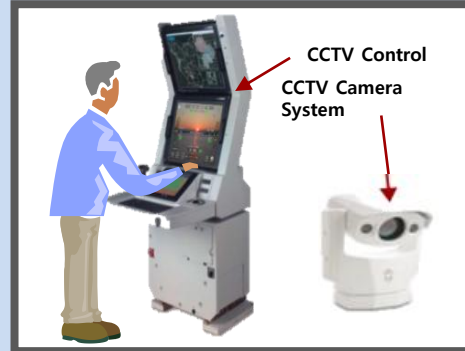
Ship's Position



AR Monitor Example

AR Navigation System

CCTV integration

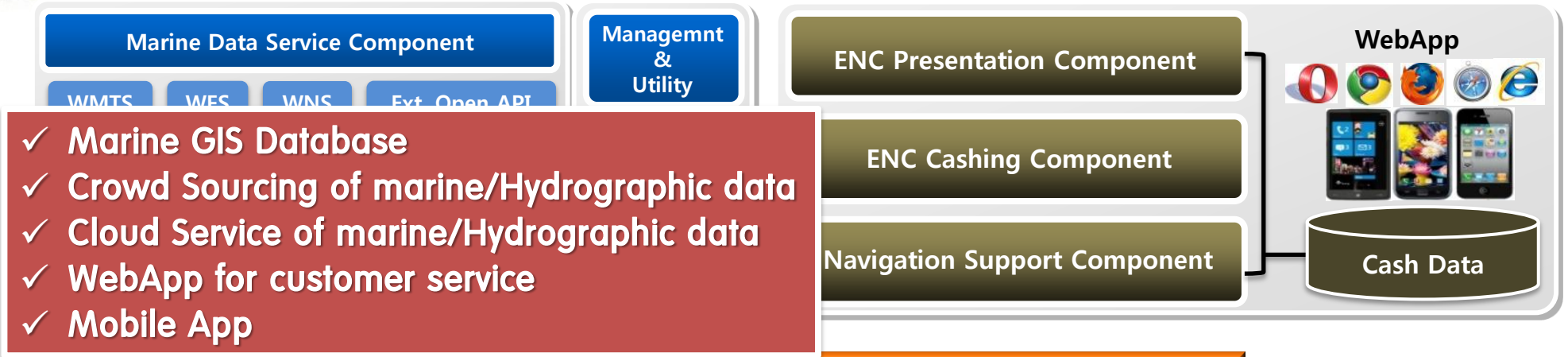


Transparent Monitor System

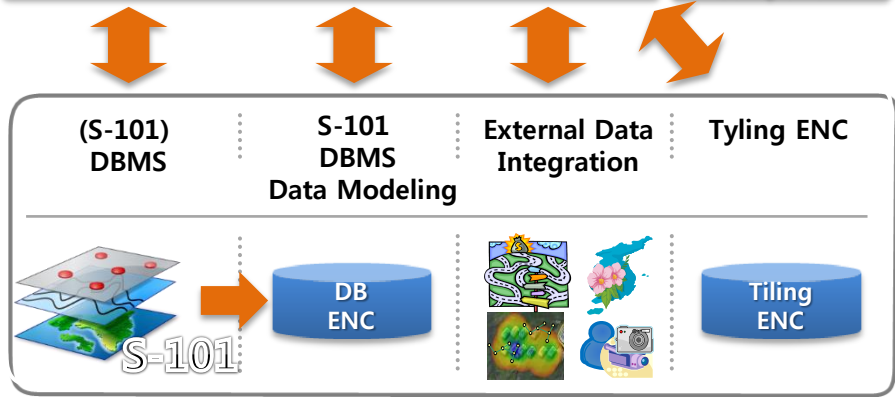




S-100 App.3 : Marine Data Service



- ✓ Marine GIS Database
- ✓ Crowd Sourcing of marine/Hydrographic data
- ✓ Cloud Service of marine/Hydrographic data
- ✓ WebApp for customer service
- ✓ Mobile App





Teamwork

HYUNDAI e-MARINE

- ECDIS Manufacturer
- AtoN Monitoring& Control
- SAN(Ship Area Network)
- Remote maintenance system
- Hyundai Ship Yards/Green&Smart Ship

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- Hanjin Shipping IT management
- Vessel Portal
- Ship's Cargo Automation
- Terminal Operation

KIOST
 한국해양과학기술원

- Hydrographic Office Think Tank
- ENC Research
- Navigational System research

ETRI

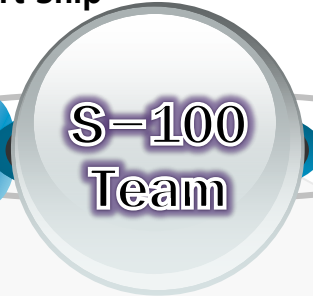
- GIS Technology
- Sea Communication – Ad Hoc Network
- New VTS
- SAN

DSU

S-100 research

 **INHA UNIVERSITY**

- Augmented Reality
- Image Processing





Contribution

- ◆ **To International Hydrographic Community by;**
 - **Feedback from S-100 Implementation and onboard/onshore test about its applicability, quality and end users' response**
 - **Possible input to Registry**
 - **Developing more idea for future application**
 - **Effort To lay bridge from S-100 to e-Navigation**

- ◆ **To Maritime Industry by;**
 - **Sharing Knowledge of new standards through Paper, Seminar, Forum and Report**
 - **Encouraging market players to develop S-100 applications**
 - **Drawing market attention toward new market demands from S-100**



Next Move

◆ New S-10x Implementation

Bathy Data
Nautical Publication
Dynamic Navigation Data

◆ Toward e-Navigation

INS
Aids to Navigation
Sea Communication Network
Ship's Area Network