Workshop on the Improvement of the Integrated Expression of Next-Generation Hydrographic Information

S-100 Portrayal Harmonization Project

A Conceptual Study on ENC Colours & Symbols

Presented by KHOA

Project objectives

1. Conduct **a literature review** of current practices, guidelines, and regulations related to the combined portr ayal of safety-of-navigation and nautical chart data.
2. Identify **successful examples/demonstrations** of harmonizing the portrayal of safety-of-navigation and nautical chart data.
3. Develop **proposed guidelines** for harmonizing the portrayal of safety-of-navigation and nautical chart data based on the results of the *SMART e-Navigation Project*.
4. **Propose guidelines** for harmonizing the portrayal of saf ety-of-navigation and S-101 ENC data for consideration and subsequent adoption or incorporation in the relevant items in **the IHO work plan**.

- Portrayal harmonization guidelines should address, at lea st the following:
  a. Simplicity of presentation
  b. Be as intuitive as possible
  c. Be acceptable to the mariner
  d. Enable the type or source (and hence user confidence level) of underlying data to be easily distinguished
  e. Provide flexibility in what the mariner can display according to the task and the situation
  f. Distinguish between static and dynamic chart and safety-of-navi gation information (including radar overlay, ARPA, AIS, AtoNs, tides, STM, etc.)

A Study on the Development of ENC Colors and Symbols for S-101

As a basic research project in 2018, a draft form of **symbol design application guide and production process** were developed. Since then, we have continued to study symbol design and establish a guide for colours and symbols, and try to find out some challenges in terms of display issues.

- SVG creation using KHOA SVG Generator – Applied to ENCs to monitor and identify issues
- Case study on 10 point symbols such as buoys and wrecks

Development of design application guides and draft production processes

Symbol Design Guide

Symbol Production Process

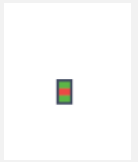
10 Representative Point Symbols Design

Before

Design similar to the existing symbols

Easy portrayal design for ENCs

A simplification plan



In twilight & night mode

Symbol color and lines & colors

- Developed a guide for colors and lines thickness, taking into account the visibility and attention of symbols in accordance with the environment of day (low), twilight (yellow) and night (night) mode provided in ENCs.

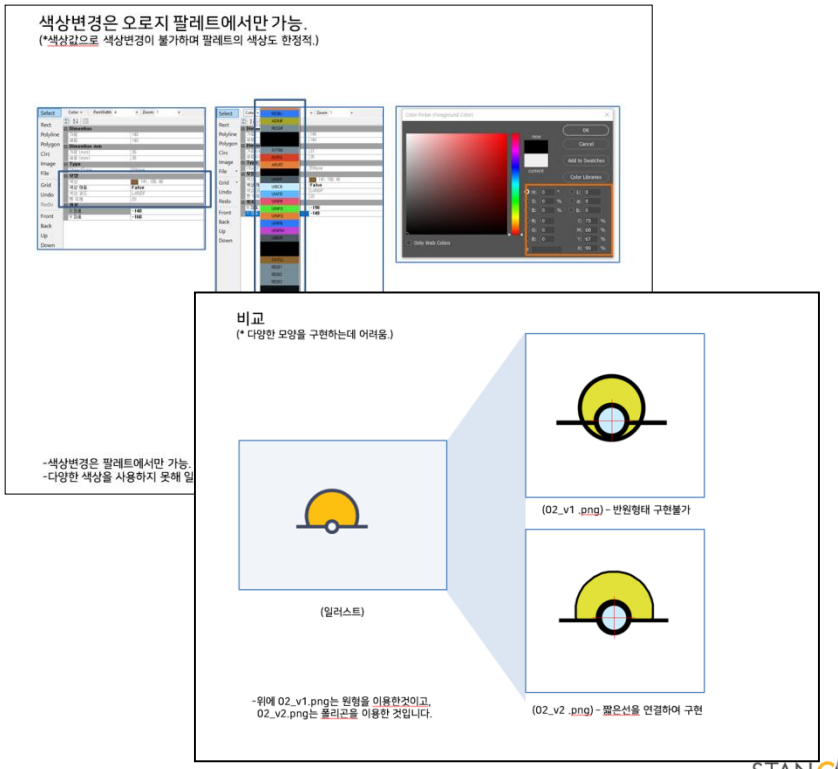
10 Representative Point Symbols Design

As a pilot project in 2018, 10 representative symbol symbols were produced in two styles – simplified plans for small-scale, and electronic products in three different styles (day, night and twilight mode).

Creation and Testing of Symbol SVG

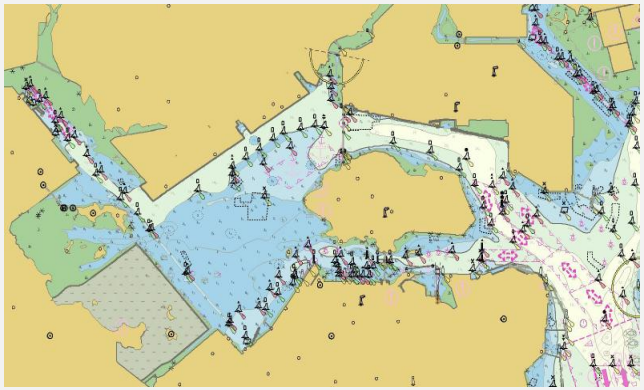
Made two types of 10 symbols

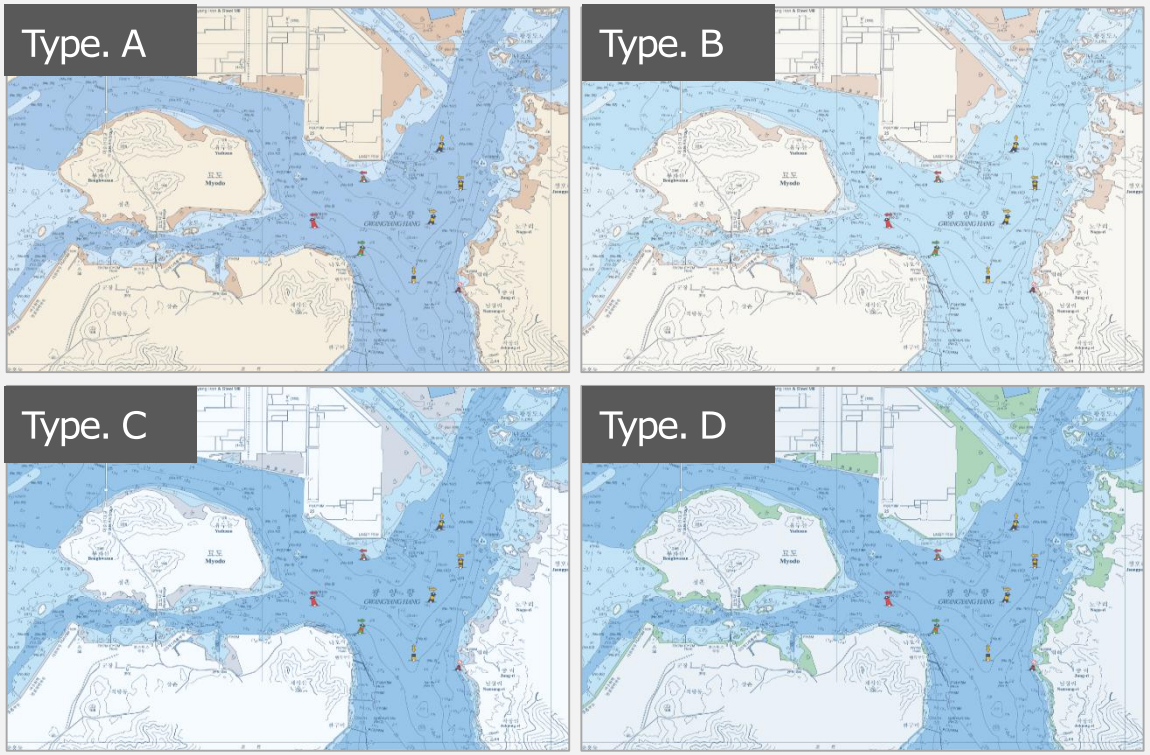
Preparation of problems and improvement plans for SVG production tool portrayal limits



Basic Base Map Portrayal Study

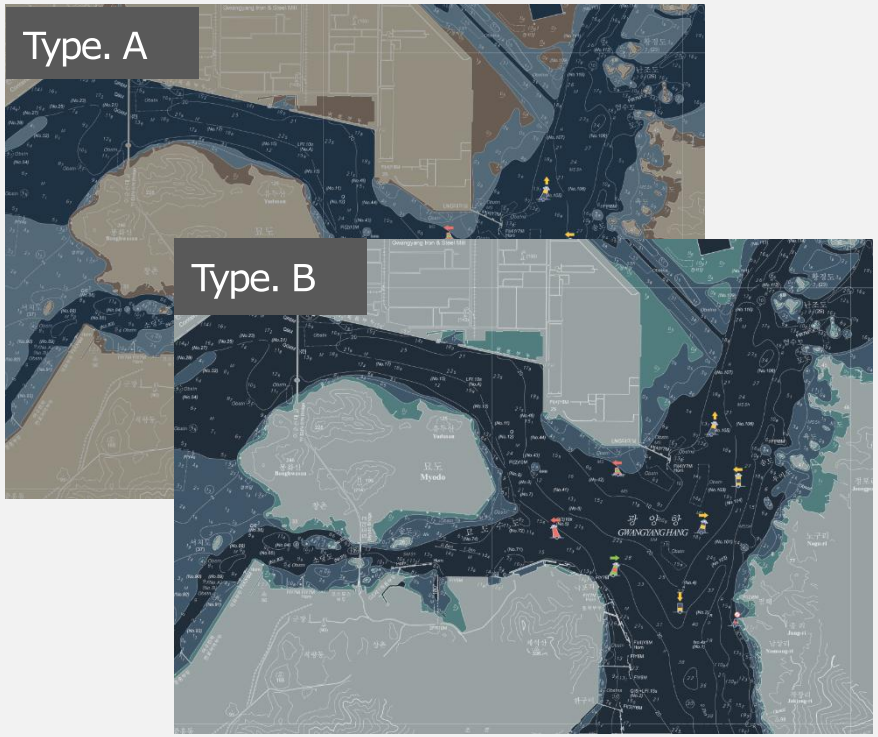
Daytime Mode



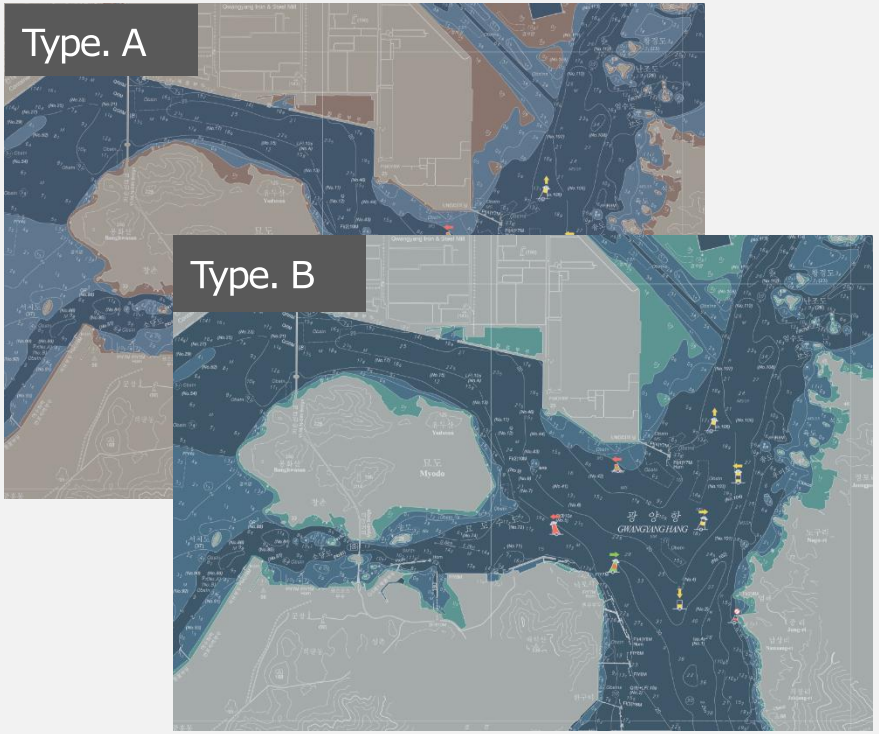


Basic Base Map Portrayal Study

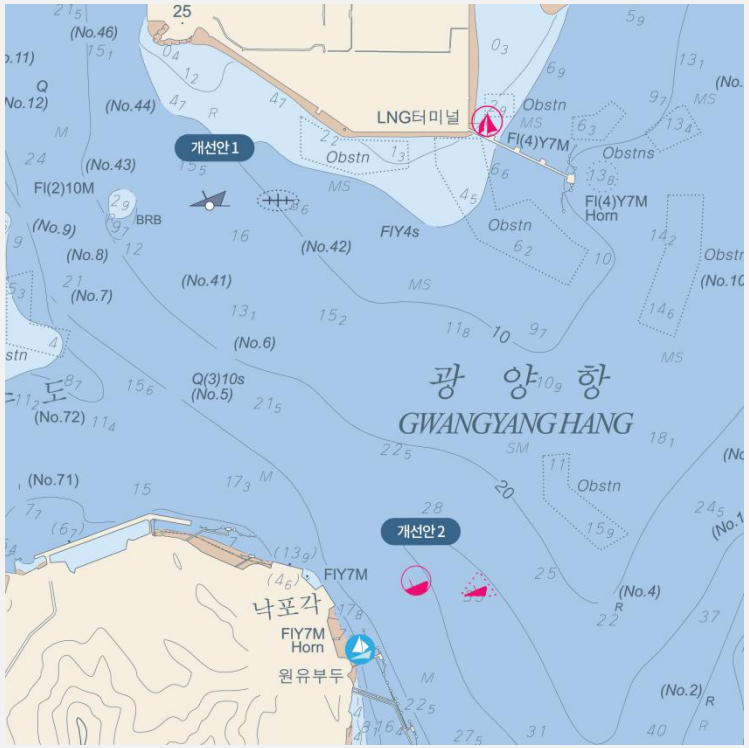
Night Mode



Twilight Mode



Point Symbol Style Study



- Various visual presentations such as exterior shapes and line styles, as well as solid and line styles
- Symbols need to be categorized – define the characteristics of each symbol, such as safety, direction, location and facilities, and establish appropriate color policies
- Overall, existing colors and shapes need to be discussed after establishing a new color guide.

Wreck

Existing Symbol

The form is inherited, but visually supplemented.

A conceptual study on the improvement of readability and intuitive meaning transfer.

Application of hazardous color for safety reasons.

Marina, Boat Harbor

Existing Symbol

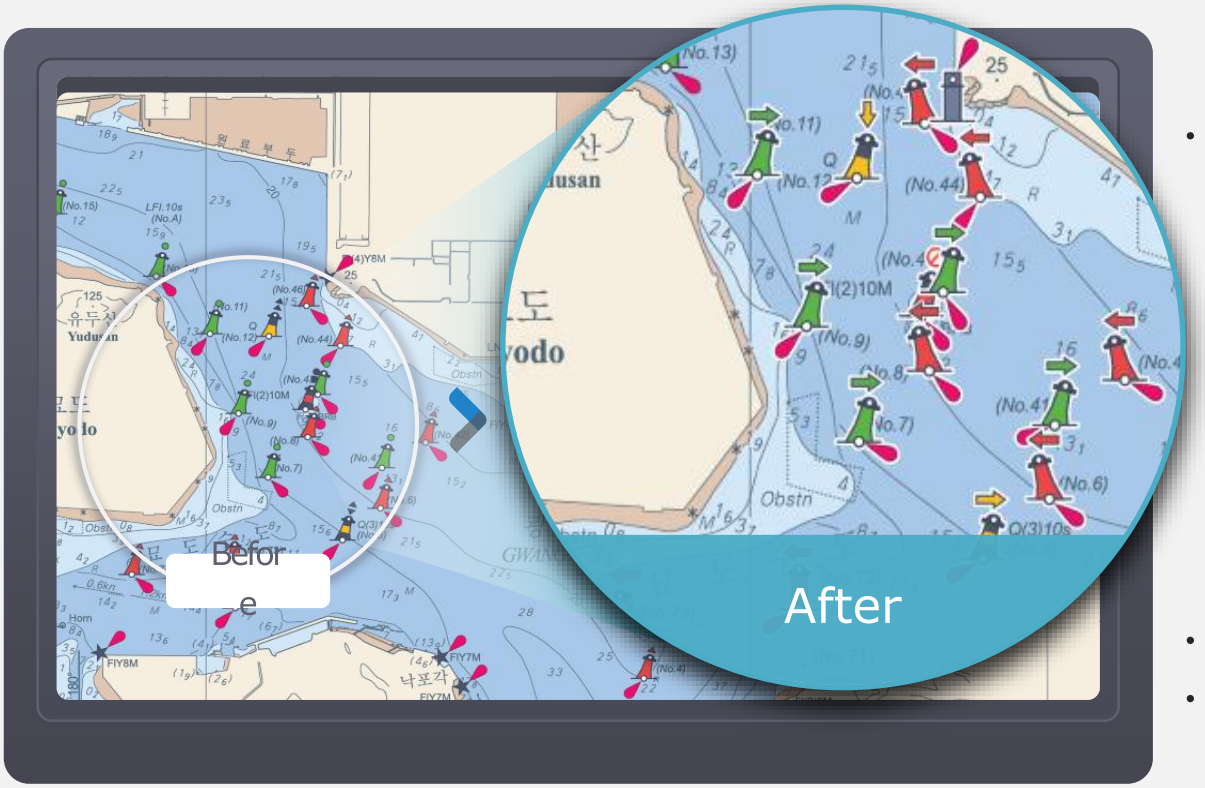
The form is inherited, but visually supplemented.

A conceptual study on the improvement of readability and intuitive meaning transfer.

Application of comfortable color in leisure symbolism.

Study on Regulation of Portraying Overlapping Symbols

A Study on Overlapping Symbol Portrayal



Improvement goal

- If existing symbols are overlapped on an ENC, add white lines to the rim of the symbol to increase legibility and clarity

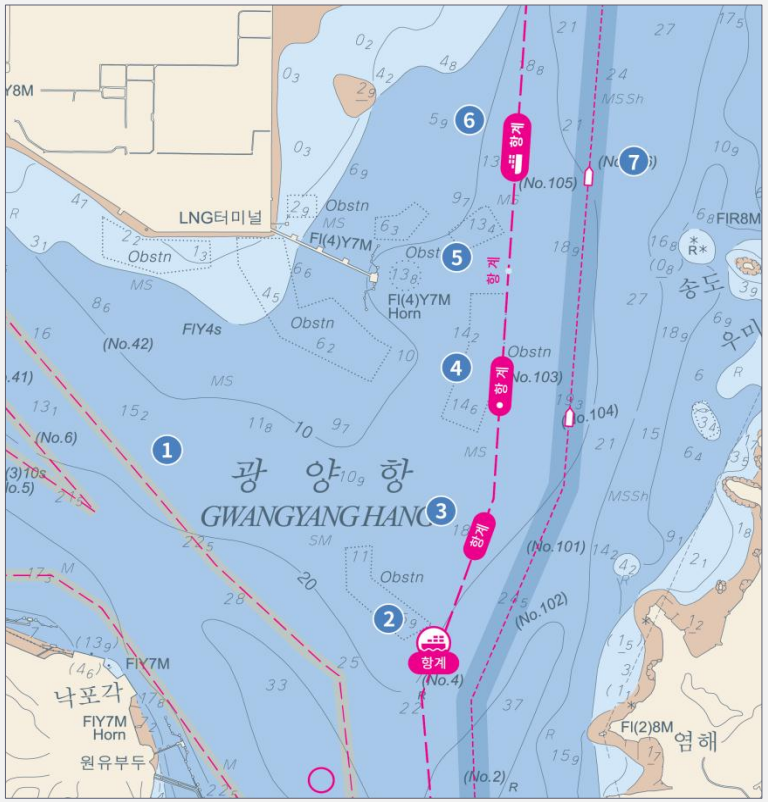
legibility + clarity

Color & Stroke

- RGB 100%, 100%,100%
- 0.75pt

Line Symbol Basic Guide Study

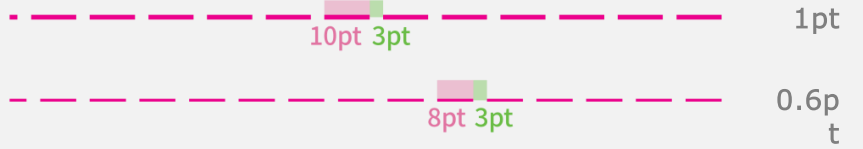
Area/line style



Harbor limit

Ferry route

Line style



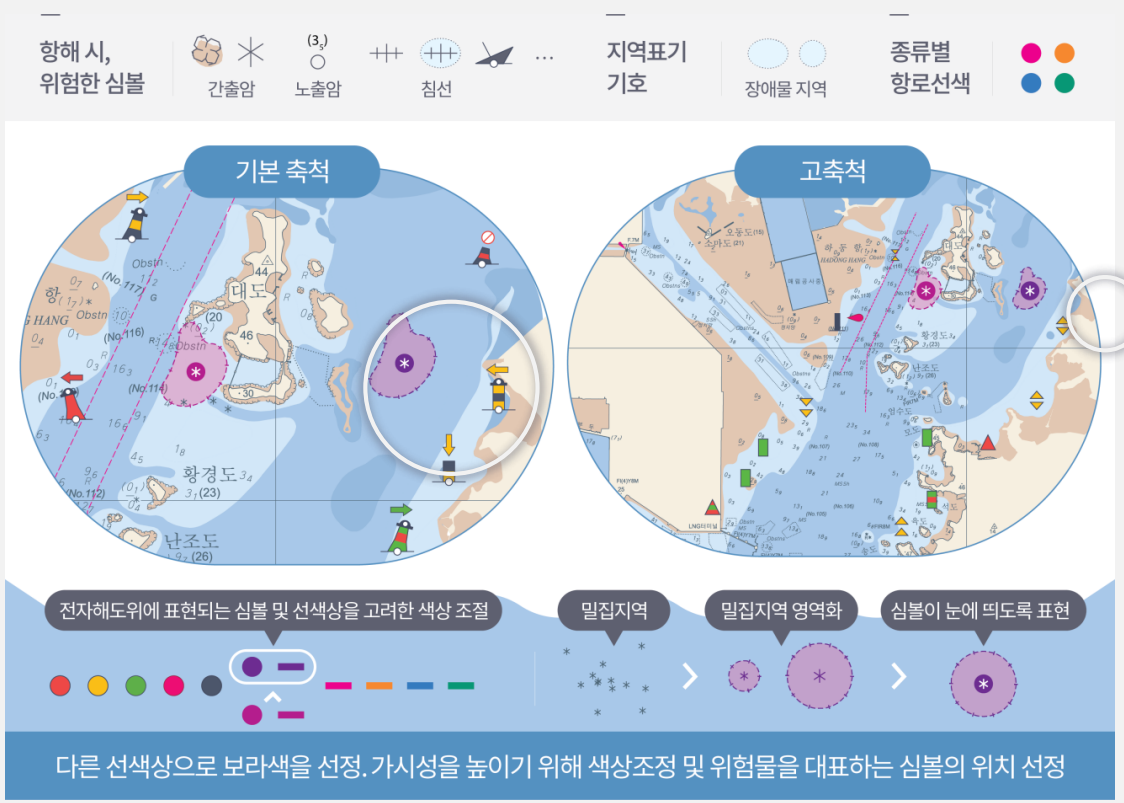
Main color #ec008c

sub color #ffffff

- Currently, existing color policies are maintained and forms & styles are being tested.
- When color policy is finalized in the future, various attempts are being prepared to take into account visibility.
- We're also studying portrayals that combine lines and polygons.

Area Symbol Portrayal Study

Caution Area Portrayal Study (Regulation, Colour and Symbol Layout)



Polygon symbol portrayal in hazardous area – In case of rock which covers and uncovers

- Tried to color the colors of the lines of dangerous areas, obstacle areas and types of fairway symbols in order to distinguish the colors portraying the dangerous areas from other colors -> magenta or purple.
- When marking congested areas, a representative symbol is portrayed in the center. Conducted other visibility tests.

Line Color

- RGB 109%, 44%,145%

Area Color

- RGB 236%, 0%,140% / Alpha 30%
- Area colors are transparent so that purple is shown when portrayed on the sea.

2018 Pilot Project

It is necessary to establish a foundation for policy direction and goals, although there have been more tasks found to be addressed than problem solving.

2018

Pilot Project

- Proposal of 3 types of 10 ENC symbols selected as the main symbol and pre-design by 3 modes.
- Created & tested 10 kinds of symbols made by design tools with SVG production tools.
- Created detailed proposal manuals, basic design guides, and symbol production process guides for each symbol.

1. Design attempt to portray from multiple perspectives beyond the limits of portraying traditional paper chart/ENC symbols.
2. Prototypes inherited the symbol form of traditional paper charts, then an intuitive prototype form was created for ENCs. Three-type prototypes of simplified simples on small-scale were developed and were suggested in daytime/night/twilight modes.
3. Identified the basic improvement directions for water depth, color representation of land, minimum size for readability of symbols, line splashing, and color regulation suitable for ENCs.
4. Prepared the foundation for improving the SVG production tools for ENCs by summarizing the limitations of producing appropriately designed symbols with SVG production tools.

Problems and Solutions of the Pilot Project in 2018

To improve the visual elements and UI/UX required for ENCs, categorization must precede by classifying the meaning and nature of each symbol and object. It is urgent to establish policies on how to visualize the data being portrayed.

Problems and Solutions of the Pilot Project in 2018

- Lack of information sharing on key symbols and data to portray
- SVG file application monitoring environment with real-world ENC viewer is poor
- Exposure to basic color guides and the need to establish policies based on the importance of categorization/portrayal by symbol meanings

Establishing policies for data acquisition, analysis and performance use

- Information collection and analysis of each element of portrayal required for symbol and object portrayal.
- Select priorities by importance, then categorize symbols by characteristics and meanings.
- First of all, establish color policy and portrayal policy of base map that is based on all visual elements, then select priorities by importance, then categorize symbols by characteristics and meanings.
- Create basic guides for classified symbols and objects. Confirm color markers, line portrayals and symbol styles by referring to existing domestic/international policies.

Advanced Production of SVG Symbols

- The new symbol produced in 2018 has a problem that is different from the one designed for use on ENCs.
- Reflected the process of monitoring with the new ENC viewer in the production process.
- The current process is designed to rework design tools similarly in SVG Editor-> The shape and color of the symbol have limitations in portraying on SVG Editor-> Wrote down improvements and forwarded it to KRISO.

Thank You