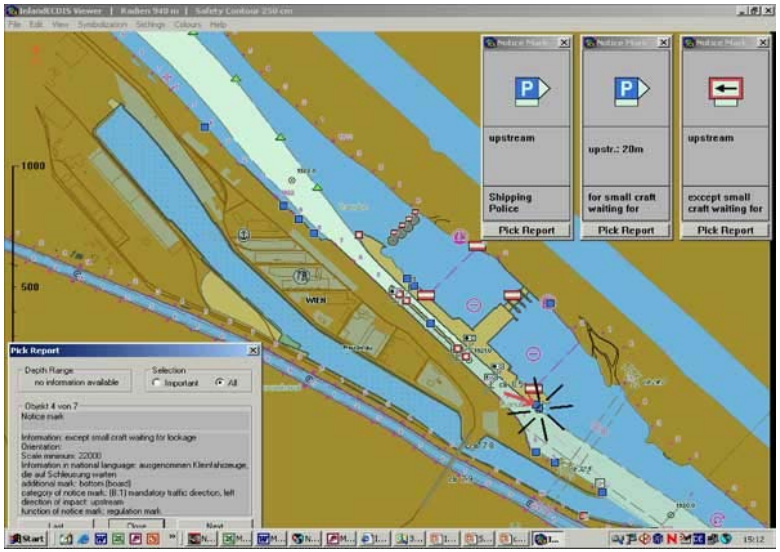

Inland ENC

Inland ENC
Harmonization Group

Content

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Inland waterways

- Maritime navigation is governed by worldwide regulations of IMO, e.g. COLREG
- Inland waterways (e.g. Mississippi, Amazon, Rhine, Danube, Volga and all smaller navigable rivers and lakes) have specific features and specific regulations (specific signals, markings, and traffic regulations, groins, groundsills, revetments, …)

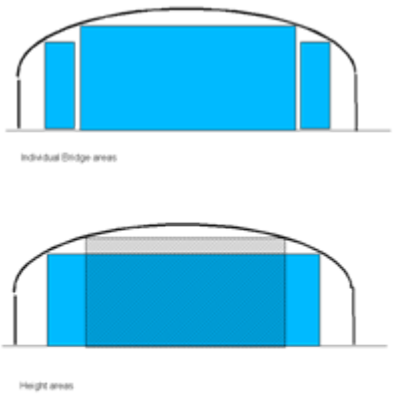
- the lower parts of the big inland waterways are used by inland vessels and maritime vessels
- Inland ENCs have to cover the specifics of inland waterways, but should also be available for maritime vessels

Why are ENCs not sufficient?

- Traffic on inland waterways is not regulated by COLREG, but by regional regulations:
  - Europe: European Code for Inland Waterways (CEVNI) of the United Nations
  - USA:
  - Russia:
  - Brazil:
- These regulations contain specific waterway signals, signs and markings

Why are ENCs not sufficient?

- Objects like bridges can only be encoded in a very basic form in S-57, but are extremely important for inland navigation
- In inland navigation it is normally not possible to take another route, if there is a problem on the original route: detailed information for voyage planning (e.g. dimensions and operating hours of locks and movable bridges) is very important



The S-100 approach

- Inland ENCs are based on an approach which is very similar to S-100:
  - Use of S-57 object classes, attributes and attribute values as far as possible
  - Introduce new combinations of existing elements if necessary
  - Introduce new object classes, features or enumerations if necessary
- As S-100 was not yet available, it was necessary to assign new small case acronyms for object classes that were used with additional or new attributes/enumerations and for new elements
- Small case elements will be replaced by elements from the HYDRO and the IENC register, when S-100 enters into force

Copied and new elements

- The S-57 attribute VERDAT, vertical datum, is containing only enumerations for vertical datums for maritime navigation
- In inland navigation there are different vertical datums in use (e.g. Ohio River Datum, Russian Project Water Level, Reference Low water Level of Danube Commission, …)
- Inland ENCs contain a copied attribute “verdat” with these additional enumerations
- Because of the copied attribute it is necessary to introduce a copied feature “m_sdat”
- For some features that are not covered by S-57 it was necessary to introduce new features (e.g. notice marks)

Features | Attributes | Enumerations

Encoding Guide for Inland ENCs

- To ensure a common understanding and the same encoding in different areas there is a very detailed Encoding Guide for Inland ENCs (which replaces the section “Use of the Object Catalogue” of S-57)
- *[add example]*

Usages

- Even on the bigger inland waterways Inland ENCs are normally used in a bigger scale then S-57 ENCs for usage 6, berthing
- New usages:
  7 river
  8 river harbour
  9 river berthing

Overlay cells

- In some areas there are different authorities for the maintenance of the waterway and for the traffic regulation (buoys, beacons, notice marks, signals,…)
- Depth information is extremely important on inland waterways (50 cm between keel and riverbed is normal) and in some areas depth is changing rapidly
- It is therefore necessary to update the depth information much more frequently then the rest of the Inland ENC
- Inland ENCs provide the possibility to use “overlay cells”

Overlay cells

- Overlay cells may not contain skin of the earth objects
- They are displayed by an Inland ECDIS together with an Inland ENC of usage 1 to 9
- The Inland ECDIS uses the display priorities to compose the display
- *[add example basic IENC usage 7, new depth data usage 8, overlay cell]*

Product Specification for Inland ENCs

- The Product Specification for Inland ENCs is based on S-57
- It contains the necessary amendments to enable the encoding of additional features for inland waterways
- It describes the differences e.g. in the cell header that identify the cell as an Inland ENC, the usage, and so on
- *[do we need a detailed list of the differences?]*

Depth data and water levels

- Depth data in ENCs is referred to a horizontal reference level
- Depth data in Inland ENCs of rivers is referred to sloped and non-linear reference water level
- The actual water level does can not been determined by tide tables, but is completely irregular and has to be derived from gauges
- Due to variations of the area of cross sections and the base slope of the riverbed different water levels are not parallel to one another
- Water level models are needed to calculate the actual depth at a specific point of the waterway at a specific moment

Depth data and water levels

- A standardized data exchange format is available to transmit the results derived from gauge readings and water level models to the on board applications
- This information can be used to display the actual water depth in the Inland ECDIS without changing the Inland ENC

The Inland ENC Harmonization Group

- **Objective**: to develop and to maintain a harmonized standard for Inland Electronic Navigational Charts (IENCs) suitable for inland navigation that is based on the standards of IHO for ‘maritime’ ENC

- **Goal**: to agree upon specifications for Inland ENCs that are suitable for all known inland ENC data requirements for safe and efficient navigation in European, North American, Russian Federation and South American inland waterways.
  - It is further intended that IENC standards meet the basic needs for Inland ENC applications, worldwide (e.g., Asia)

IEHG - recognition

- As the competent international technical group on Inland ENC technical standards development, implementation and maintenance, IEHG is recognized by:
  - Europe - European Union and the Central Commission for Navigation on the Rhine
  - North America – US Army Corps of Engineers
  - Russian Federation - Russian Ministry of Transport
  - Brazil - DHN
  - International Hydrographic Organization (IHO)
- Since there are several countries with Inland Navigation that are not Member States of IHO, IEHG does not intend to become a member of IHO.
- Instead, IEHG supports, advises and provides input to IHO regarding Inland ENC matters as an recognized NGIO.

Legal status of Inland ENCs in Europe

- Europe: the European Inland ECDIS Standard, which is containing the Product Specification for Inland ENCs and a performance and test standard for Inland ECDIS applications, has been adopted by
  - the United Nations www.unece.org
  - the Central Commission for Navigation on the Rhine www.ccr-zkr.org
  - the Danube Commission www.danubecommission.org and
  - the European Union (publication pending)
- Member states of the European Union are obliged to provide a complete coverage of the bigger waterways (class Va and above) within 30 months after the publication of the standard

Legal status of Inland ENCs

- USA:
- Russia:
- Brazil:

Coverage of Inland ENCs

- USA:
- Russia:
- Brazil:

Coverage of Inland ENCs in Europe

	Country	class	coverage	published	available for free	URL
AT	Austria	Va +	full	yes	yes	www.doris.bmvit.gv.at
BE	Belgium (Flanders)	Va +	partly	planned	yes	
BG	Bulgaria	Va +	full	planned	yes	
CH	Switzerland	Va +	full (Rhine)	yes	yes	www.portofbasel.ch
CS	Serbia	Va +	full	yes	yes	www.plovput.rs
CZ	Czech Rep.	IV	full	yes	yes	www.lavdis.cz
DE	Germany	Va +	>2300/4000 rkm	yes	no	www.elwis.de
FR	France	Va +	partly	limited	no	
HR	Croatia	IV +	full	yes	yes	www.crup.hr
HU	Hungary	Va +	full	yes	yes	www.pannonris.hu
LU	Luxemburg	Va +	full	yes	no	
NL	Netherlands	IV +	full	yes	yes	www.risserver.nl
PL	Poland	Va +		no	Not decided yet	
RO	Romania	Va +	full	yes	yes	www.afdj.ro
SK	Slovakia	Va +	full	Under disc.	yes	
UA	Ukraine	Va +	full	yes	no	

Users of Inland ENCs

- USA:
- Russia:
- Brazil:
- Europe: more than 10 000
  (commercial vessels and pleasure craft)