SOME SEMIOTICAL ASPECTS OF SYMBOLS
CONSTRUCTION IN NAUTICAL NAVIGATIONAL
CHARTS
(AT THE EXAMPLE OF UKRAINIAN LARGE-SCALE
NNC )

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During last decades one could observe a rapid development of such branch of cartography as a nautical one. The existence of such a phenomena in Ukraine is conditioned by the geographical position of the country and "the spirit of the age". Joining of Ukraine to several international organizations which have considerably expanded their activity has led to the necessity to ensure safety of navigation in territorial waters (Black Sea and Azov Sea). Since 1992 the Ukraine has a national program "Hydrography". This program includes development of scientific and technical base, preparation of experts, infrastructure of data acquisition for sea mapping.

Nautical charts are specific geographical maps aimed at the ensuring of specific tasks at sea (dead reckoning, determination of the vessel position at sea, orientation in a certain situation and graphic solving of other navigational tasks). One can qualify nautical charts as schematic ones because only general principles of cartography remained invariable: such as projection, coordinates, etc. However, in creation of nautical charts quite another symbols and principles of their creation are used.

The specific sign system, used in electronic nautical cartography, has been developed. The classification of all the objects, attributes and their meaning is given in this system. Selected semiotic aspects of nautical cartographic sign system are discussed.

MAIN PROVISIONS

Last ten years the nautical cartography has rapidly developed. As for Ukraine that is stipulated by geographical position of the state, as well as by "the spirit of the age". It caused the necessity to ensure the safety of navigation in territorial waters conditioned by receiving independent statehood and admission of Ukraine to several international organizations, which have significantly energized their activities and also by rapid development of computer technologies and technics.

I will not cover all problems and aspects, studied by "discoverers" of Ukrainian nautical cartography. I’d like to mention only the main problem we had to face – I mean everything that we had been used in the traditional cartography or better say in the land cartography, was not suitable to nautical cartography. Nautical charts can be qualified as pure thematical since the general principles of cartography, such as projection, datum etc., were left unchanged and as for nautical charts compilation – absolutely new symbols and principles of their creation are applied.

(Nautical charts are special geographical charts, intended to provide safe navigation, to decide special tasks at sea (dead reckoning, vessel positioning, environment orientation and graphic solution of other several common navigational problems while sailing). The main functions performed by up-to-date nautical charts include: navigation; information; jurisdiction (legal); presentation; historico-methodical /Gordeev 2000/).

In their turn they affect the information contained in nautical charts symbology and their meaning load. We’ll consider the main chart-semiotical aspects of constructing symbology for nautical charts concerning large-scale charts (plans).

The following table shows the large-scale charts position in the common system of nautical charts and their peculiarities.
Nautical charts system for Ukraine. Large-scale nautical charts (plans)

<table>
<thead>
<tr>
<th>Spatial submodule</th>
<th>Subject-content submodule</th>
<th>Subject-visualization submodule</th>
<th>Functional submodule</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aquatorial coverage</td>
<td>Scale line projection</td>
<td>Special geographical charts (nautical charts)</td>
<td>Syntactic-semantic submodule</td>
</tr>
<tr>
<td>Harbour, water area</td>
<td>Large-scale charts Mercator projection</td>
<td>Navigational</td>
<td>Graphic elements, graphic variables Cartographic method of presentation</td>
</tr>
</tbody>
</table>

Current branch development specifies the use of advanced production technologies, computer technics, etc. These peculiarities dictate their requirements in such an aspect as chart-semiotics in symbology.

Nowadays it’s not a news for anybody, that processes of compiling current nautical charts are closely connected with creation and maintenance of electronic databases of cartographic information, in particular object-oriented, where usual for us symbols of these or those objects have been transferred into quite another plane.

Symbols, so usual for us by chart paper analogues, are given as a summary meaning of attribute subfields of information database of chart electronic analogue in the process of paper chart compilation. Compiling paper chart from electronic one is carried out via converter of electronic chart digital data into digital paper chart file. While converting, lots of the same object examples with minor variations are taken into account, which directly affect the symbol to be shown on paper chart. With the purpose of maximum identification of different situations, and as a result of tedious work the whole symbology system has been developed, which is reflected in electronic nautical cartography.

In the mentioned system all objects, attributes and attribute meanings have been classified. While developing the base model of this system we took into consideration all peculiarities of creating symbols, legends, etc, for large-scale charts. At this stage of work the first problem had arisen, caused by the existence of the whole sequence of functioning symbols and requirements to them, concerning national nautical chart folio as well as other collections, produced in Ukraine (collection of so-called INT-charts (international charts)).

To solve the mentioned problem the great complex of analytical work had been carried out on reduction of all existing publications and symbol requirements to the unified integrity. All a newly created symbols were given the unique identifier, formed by method of uniting the content of all attributable object subfields. On this base new symbol object/situation had been defined more precisely. Up till now this system is being improved and is undergoing changes, in general due to the main problem: symbol-designatum.

Starting from syntactic (symbol links) there are still some unsolved semantic problems, which cause the continuous changes in symbology. There are many nuances in pragmatics too – the problem of symbol interpretation by different users, especially in large-scale charts or plans. But this issue is practically solved since the unified international system of symbology for nautical charts has been already developed, clear of national peculiarities. This system is usually taken for the basis while creating national symbology for nautical charts. As far as creation of nautical symbology is a rather complex cartographic process which is to consider cartographic process of different contents, it may be recommended to divide the entire complex of works between three categories, starting from the experience of large-scale charts compilation as the most typical and at the same time rather arguable for different users of the material:

<table>
<thead>
<tr>
<th>Category Sheet</th>
<th>It includes sheet frame with lines and legends, special symbols, post-office, police, etc., geodetic fixes, north direction pointer and various inserts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chart frame</td>
<td></td>
</tr>
<tr>
<td>Category Symbols</td>
<td>It includes the whole symbology, bridges, texts, marks of navigational route conditions, special symbols and proper inserts</td>
</tr>
</tbody>
</table>
go constant consideration, which contributes to changes of symbology and nautical chart production
standards. Regarding some problems, arising from the usage of such semiotic terms as "decoat" – that
means a symbol in a definite situation and "designat" – information, that symbol carries about
designation, at the given stage works on maximum unification of unified international symbology for
nautical charts are in progress.

All abovementioned tasks and problems continue to introduce changes not only to the symbology and
nautical chart production standards, but also to software and, that is not unimportant, to production
structure and production line.

CONCLUSION

In conclusion, I’d like to note that problematic aspects of chart-semiotics in nautical cartography exist
and answers do not "lie on the surface”, that is significantly assists the "merging” of nautical and
traditional land topography under the flag of chart-semiotics, inspite of all differences between them.