Paper for Consideration by TSMAD

Risks attached to the concept of Scale Independent and Scale Dependent (SI-SD) data sets

Submitted by:	France
Executive Summary:	Some conditions need to be achieved to succeed in the transition toward S-101 ENCs. Among some evolutions envisaged as part of S-101, the SI-SD concept appears not to be in accordance with these conditions.
Related Documents:	IHB letter S3/8151/TSMAD dated 13 July 2012
Related Projects:	

Background

The idea of the integration of the "Scale Independent and Scale Dependent" (SI-SD) concept into the future ENC product specification was first proposed in 2007 (CHRIS 19). The application to the ENCs of this concept, which stems from new production systems, has since raised a large number of questions while the initial goal was to minimize the impact of an evolution of the specification for the ENCs.
The survey that was carried out within the S-101 impact study, in particular of the HOs, shows that a significant number of these stakeholders consider that the SI-SD concept creates drawbacks and new issues.[1]

This paper summarize these issues and show how the SI-SD concept, by the extent of its impact and by the risks it involves, makes it more difficult the success of the transition toward S-101.

Analysis/Discussion

The profound modification of the ENC specification has consequences potentially very important on the worldwide system which is today the base of e-navigation. These consequences must be appreciated in terms of benefits, costs and risks to distinguish between the relevant evolutions and the others.
Any change in the product specification implies new arrangements and additional efforts during the transition period.

However, the success of the changeover to a S-101 worldwide ENC coverage depends on the speed of transition and thus on the ease of its implementation by the stakeholders involved in the production, the distribution, the marketing and the use of the product onboard.

Some answers to the impact study survey pointed out that the SI-SD concept significantly increases the difficulties of this transition:

- Major effort to change the production systems and develop the cartographers' skills,
- Major effort to reorganize the current ENC data into SI and SD and transform them into S-101 ENCs,
- Geographical re-scheming of SI and SD data sets,
- Global revision of the data set production schemes between countries according to the scale, noting that many years have already been necessary to define the current schemes so that they fit with each producer responsibilities (SI data set producer, SD data set producer - see Annex A),
- Conception and implementation of new complex models of management, distribution and marketing of the ENCs (compulsory link between SI and SD data sets),
- Change of the data management by the ECDIS,
- Training effort in favour of the mariners for the new product.

During the transition period, the S-57 ENC coverage for the existing S-57 ECDISs will have to be maintained. This implies the duplication of the production as well as of the management and distribution processes that will have to be synchronized. The management by the ECDIS user of two coexisting but very different ENC models (S-57 and S-101 SD-SI) will be complicated. The situation will be all the more complex if successive versions of S-101 co-exist and if, inside S-101, the SI-SD concept is optional.

The specific difficulties due to the SI-SD concept and making the situation more difficult will effectively lengthen the transition period and create a very long period of low and heterogeneous availability of S-101 ENCs, due to the limited and variable HOs capacities and to the size of each country ENC portfolio. The major benefits expected with S-101 ENCs will then be very long to get worldwide.

[1] HO' survey on SI/SD concept :15% didn't answer and 37% saw drawbacks

Besides, the benefits of the SI-SD concept in terms of data volume optimization are not so obvious. One example is a ship that only uses a medium scale ENC for transit off the coast and that will then have to load all the data of the underlying SI. This SI will contain many more elements than necessary for this ship's transit navigation (details on the coast such as aids to navigation)[1]. This will involve a large amount of dense data, mostly useless, to be supplied and then managed onboard in the ECDIS. See figures in Annexe B.

In addition, these dense SI data will generate an important flow of updates, again useless for the medium scale ENC used by the ship.

It is also to be noted that the benefits of the SI-SD concept are already a reality for the ENC producers and users: new production systems are able to replicate the instance of a same source data element in ENCs at different scales, and thus avoid redundancy in the production process. Such systems will reduce significantly the cost of production of ENC updates by automating them. They also ensure consistency between ENC data at different scales as would the SI-SD concept do, if applied to the product. So, further investments for profound modification of the product appear unnecessary.

Conclusions
Theoretically, the innovative and sophisticated SI-SD concept is quite relevant. It allows optimizations such as non-redundancy of data and updates. It would have been interesting to develop such a concept if an ENC coverage did not yet exist. The situation today is different. The issue now is to transform an existing global S-57 ENC coverage into a global S-101 ENC coverage, without any risk of destabilizing the worldwide production of ENCs

This changeover requires to succeed in the transition while making the economy of the human and financial investments already made. Let us recall that it has taken 16 years[2] to build the current ENC coverage which is not yet complete everywhere. The success of this transition has its own requirements which seem incompatible with the too complex implementation of the SI-SD concept, whose aspects and benefits are questionable. A specific study and production tests would be necessary to study the risks identified above. Time and efforts are unfortunately limited

Given the arguments here stated, France consider it is not relevant to test the concept any further and is in favour of a rapid development of S-101. Such a decision will spare a lot of efforts and will allow to concentrate on the resolution of ECDIS anomalies and on the development of S-100 standard derived products. These products are part of the primary attractiveness of the standard and correspond more to real needs of the end users such as they are identified, among others, by the "gap analysis" conducted by the IMO (http://www.e-nav.no/media.php?file=121).

Recommendations
It is recommended that the SI-SD concept be set aside in the framework of the elaboration of S-101 standard, Edition 1.

Justification and Impacts
The cancellation of the SI-SD concept will allow better mastering the issue of the changeover to S-101 by all stakeholders. It will reduce the risks to face a long and uncontrolled transition period. The changeover of the worldwide ENC coverage will be easier to plan and coordinate, what seems impossible with the SI –SD concept.

Such a decision will reduce the burden of studies and tests for the TSMAD in a context of very tight resources and will accelerate the development of S-101 on a shorter and better controlled schedule.
Member States will be more available to contribute to the development of other S-100 services also expected.

Action Required of TSMAD

The TSMAD is invited to:

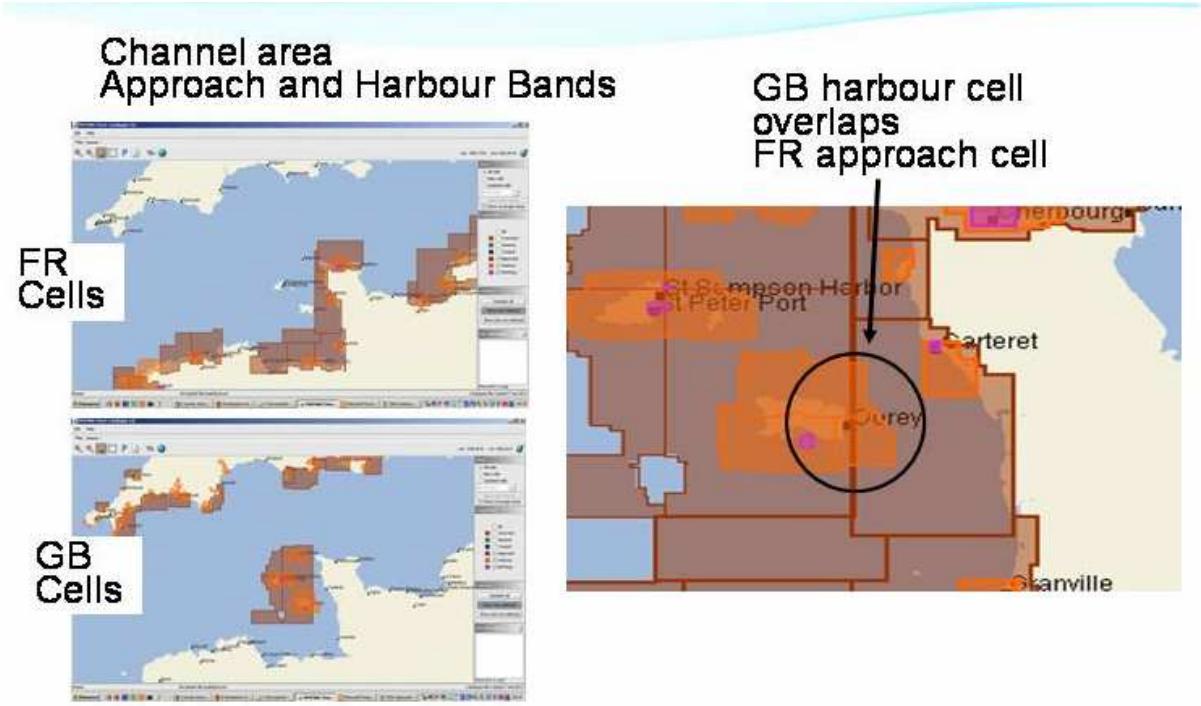
a. note the proposal,
b. vote to decide the future of the concept of SI-SD in S-101.

[2] Since the publication of S-57 edition 3.0 I November 1996.

Annex A

Issue of the revision of the data set production schemes between countries according to the scales

An example: the Channel Islands



Issues:

- links between SD and objects of SI from different countries,

or

- partition of SD according to SI ?
- synchronization of the production of SI SD between countries.

Annexe B

Ratios (objects in ENC)/(objects in SI data set) - Estimation in the French part of the Channel.

Objects classes listed in SHOM database (SI) and contained into the 2 lists UKHO FODB and NOAA SI features.	Small scale : 1:500 000 - Number of objects	Medium scale : 1: 150 000 (8 cells) - Number of objects	SHOM Database (SI) - Number of objects	Ratio : small scale / database	Ratio : medium scale / database (SI)
BCNxxx, BOYxxx	26	281	2494	1%	11%
TOPMAR	25	178	715	3%	25%
FOGSIG	0	29	31	0%	94%
LIGHTS*	95	452	1000	10%	45%
LNDMRK	11	251	2293	0%	11%
RADSTA, RTPBCN	7	13	11	64%	118%
RDOSTA	0	2	10	0%	20%
Sum				**3%**	**18%**

* The number of LIGHTS in SHOM database is the number of light support, and not the number of LIGHTS including the sector lights.