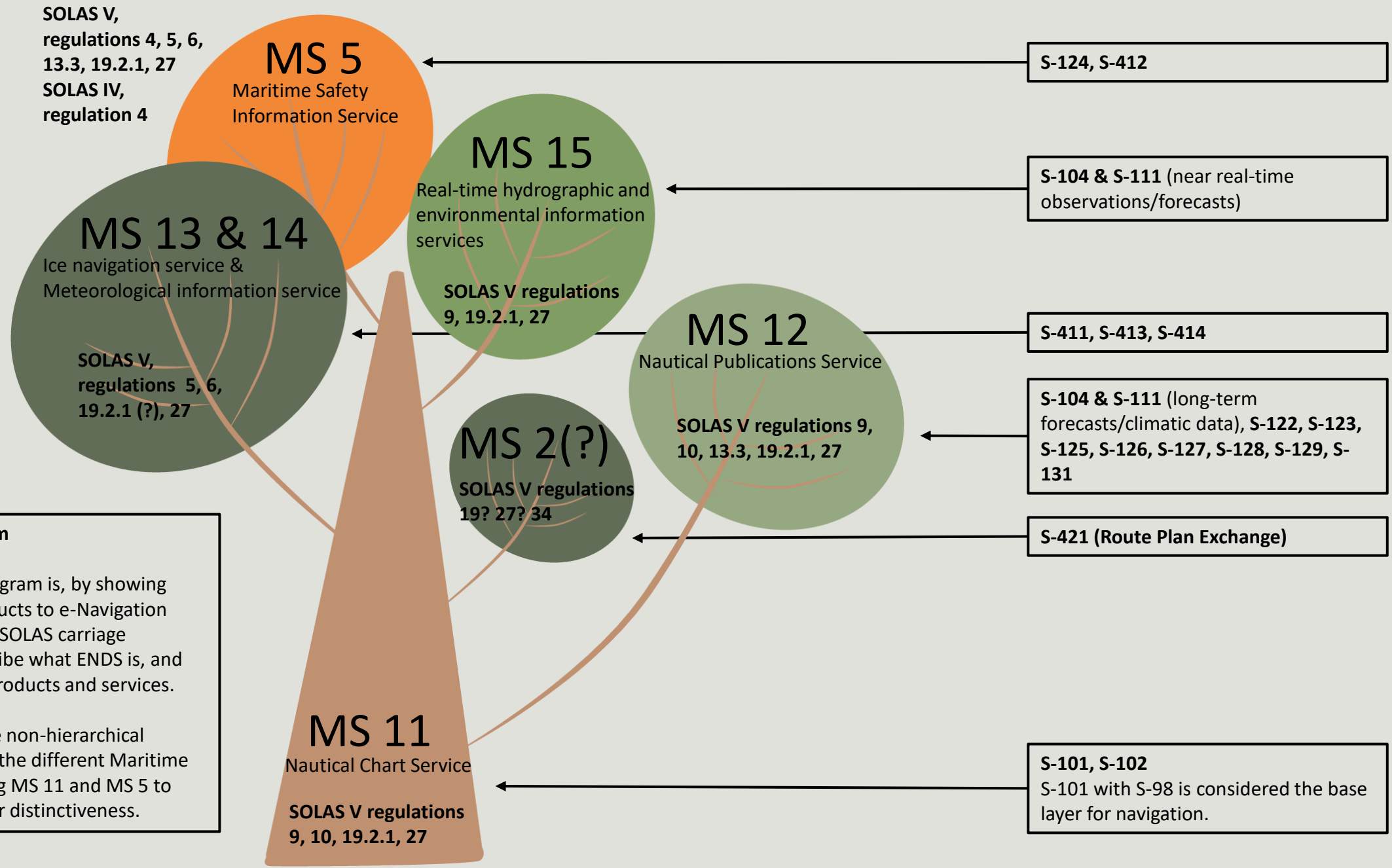


ENDS Definition

Electronic navigational data service (ENDS) means a special-purpose database compiled from nautical chart and nautical publication data, standardized as to content, structure and format, issued for use with ECDIS by or on the authority of a government, authorized hydrographic office or other relevant government institution, and conforming to IHO standards; and, which is designed to meet the requirement of marine navigation and the nautical charts and nautical publications carriage requirements in SOLAS regulations V/19 and V/27. The navigational base layer of ENDS is the electronic navigational chart (ENC). (MSC.530(106))





The ENDS Tree Diagram

The purpose of this diagram is, by showing how to link S-100 products to e-Navigation Maritime Services and SOLAS carriage requirements, to describe what ENDS is, and also to classify S-100 products and services.

The diagram shows the non-hierarchical relationships between the different Maritime Services, while allowing MS 11 and MS 5 to graphically convey their distinctiveness.

S-124, S-412

S-104 & S-111 (near real-time observations/forecasts)

S-411, S-413, S-414

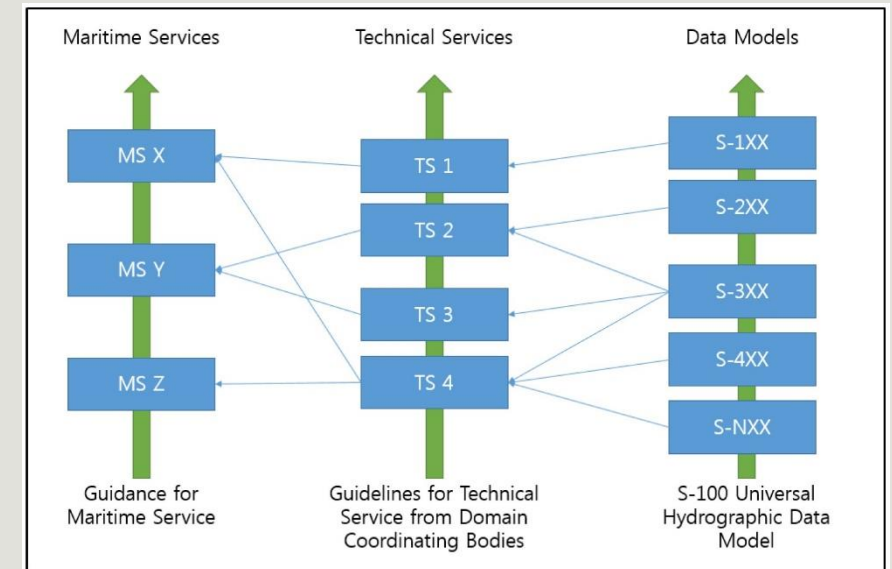
S-104 & S-111 (long-term forecasts/climatic data), S-122, S-123, S-125, S-126, S-127, S-128, S-129, S-131

S-421 (Route Plan Exchange)

S-101, S-102
S-101 with S-98 is considered the base layer for navigation.

Maritime Services and S-100

- Maritime Services: The means of providing harmonized exchange of maritime-related information and data to enhance berth-to-berth navigation and related services for safety of navigation and security at sea and protection of the marine environment.
- RESOLUTION MSC.467(101):
 - all Maritime Services be S-100 conformant as a baseline.
 - Some Maritime Services and their associated technical services may rely on information from multiple S-100 based products (are there cases with the other way around?)
 - Technical services are needed to coordinate a seamless combination between different product specifications. Information provided using S-100 based product specifications is brought together by technical services to deliver a Maritime Service (see illustration) →



Maritime Services and SOLAS

What is the relationship between Maritime Services and the SOLAS convention?

MSC 85/26/Add.1: STRATEGY FOR THE DEVELOPMENT AND IMPLEMENTATION OF E-NAVIGATION, 9.3: KEY STRATEGY ELEMENTS – Conventions and standards:

The provision and development of e-navigation should consider relevant international conventions, regulations and guidelines, national legislation and standards. The development and implementation of e-navigation should build upon the work of IMO* .

- Includes but not limited to the requirements prescribed in SOLAS, MARPOL and STCW Conventions

(Maritime Services are part of IMO E-navigation Strategy Implementation Plan)



ENDS Definition and SOLAS references

SOLAS V/2.2 (Definition of nautical charts and publications)
Nautical chart or nautical publication is a special-purpose map or book, or a specially compiled database from which such a map or book is derived, that is issued officially by or on the authority of a Government, authorized Hydrographic Office or other relevant government institution and is designed to meet the requirements of marine navigation.

(Footnote of SOLAS V/2.2)
 Refer to appropriate resolutions and recommendations of the International Hydrographic Organization concerning the authority and responsibilities of coastal States in the provision of charting in accordance with regulation 9.

PRODUCER-related

Electronic navigational data service (ENDS) means a special-purpose database compiled from nautical chart and nautical publication data, standardized as to content, structure and format, issued for use with ECDIS by or on the authority of a government, authorized hydrographic office or other relevant government institution, and conforming to IHO standards; and, which is designed to meet the requirement of marine navigation and

the nautical charts and nautical publications carriage requirements in SOLAS regulations V/19 and V/27. The navigational base layer of ENDS is the electronic navigational chart (ENC). (MSC.530(106))

SOLAS V/9 (Hydrographic services)

1 Contracting Governments undertake to arrange for the collection and compilation of hydrographic data and the publication, dissemination and keeping up to date of all nautical information necessary for safe navigation.

2 In particular, Contracting Governments undertake to co-operate in carrying out, as far as possible, the following nautical and hydrographic services, in the manner most suitable for the purpose of aiding navigation:

[...] 2.2 to prepare and issue nautical charts, sailing directions, lists of lights, tide tables and other nautical publications, where applicable, satisfying the needs of safe navigation;

[...] 2.3 Contracting Governments undertake to ensure the greatest possible uniformity in charts and nautical publications and to take into account, whenever possible, relevant international resolutions and recommendations

USER-related

SOLAS V/19.2.1.4 (All ships irrespective of size shall have) nautical charts and nautical publications to plan and display the ship's route for the intended voyage and to plot and monitor positions throughout the voyage. An electronic chart display and information system (ECDIS) is also accepted as meeting the chart carriage requirements for ECDIS detailed therein;

SOLAS V/27
 Nautical charts and nautical publications, such as sailing directions, lists of lights, notices to mariners, tide tables and all other nautical publications necessary for the intended voyage, shall be adequate and up to date.

(Footnote of SOLAS V/9)
 Refer to the appropriate resolutions and recommendations adopted by the International Hydrographic Organization.



Discussion: Criterias for ENDS

As written in the definition: services that are designed for use with ECDIS and related to carriage requirements in SOLAS V, regulation 19 and 27, have a natural place in ENDS.

What about new services, which are not specified as a carriage requirement in SOLAS V regulation 19 or 27, but are/will be included in the ECDIS Performance standard? For example S-421 (see NCSR 10-22, chapter 9)? (not included in the original diagram, but added to this version for discussion).

And **how do we react** to services that are neither related to carriage requirements, nor yet available/planned in ECDIS performance standards, but which according to SOLAS V regulation 27, may be: "necessary for the intended voyage"? See S-129 (included in both the original chart and this version).

The definition of ENDS is limited to the carriage requirements in SOLAS V, regulation 19 and 27. **How do we handle** other carriage requirements, where the service fits in ENDS. For example, Maritime Service 5, which has just as much bearing on SOLAS IV regulation 4.7?

The definition of ENDS itself states that the relevant "carriage requirements" are 19 and 27 of SOLAS Chapter V, but Regulation 27 also refers to: "all other nautical publications necessary for the intended voyage". **Which Services/S-100 standards become carriage requirements** if you look at: "other nautical publications necessary for the intended voyage"? Will this change and develop in the future?



Discussion: Criterias for ENDS. Point of view:

The actual content of the wording in ENDS definition within this context becomes; *“designed to meet the requirement of **the nautical charts and nautical publications carriage requirements in SOLAS regulations V/19 and V/27**”*. (Only the requirements related to "nautical charts and publications").

In V/19, only sub-paragraph .4 concerns nautical charts and nautical publications, and the rest of V/19 should be disregarded. Therefore ENDS is merely governed by the definitions of nautical charts and nautical publications (SOLAS V/2) and related information. (Brought up in the image.) Therefore one could argue, that anything related to MS 11 and MS 12 should get the main focus in the context of ENDS.

SOLAS V/27 refers to “other nautical publications necessary for the intended voyage”. This is in my opinion a direct reference to official publications issued by contracting Governments according to V/9.

End result is, that any information considered necessary for navigation should be published in nautical publications by the contracting Government, and thus becomes a part of MS 11 / MS12.

It is a matter of opinion as to which extent MS 5 fully fit into ENDS considering the definition? (Considering the emphasis in ENDS on the requirement of marine navigation placed on the producer, and the nautical charts and nautical publications carriage requirements of V/19).

MS 5 is said to describe the provision of navigational and meteorological warnings, meteorological forecasts and other urgent safety-related messages broadcast to ships. But also MS 12 defines following information; Marine radio services => Geographic availability of services, Frequencies and channels used and broadcast schedules, Purposes supported – weather forecasts, MSI, telemedical assistance, etc.

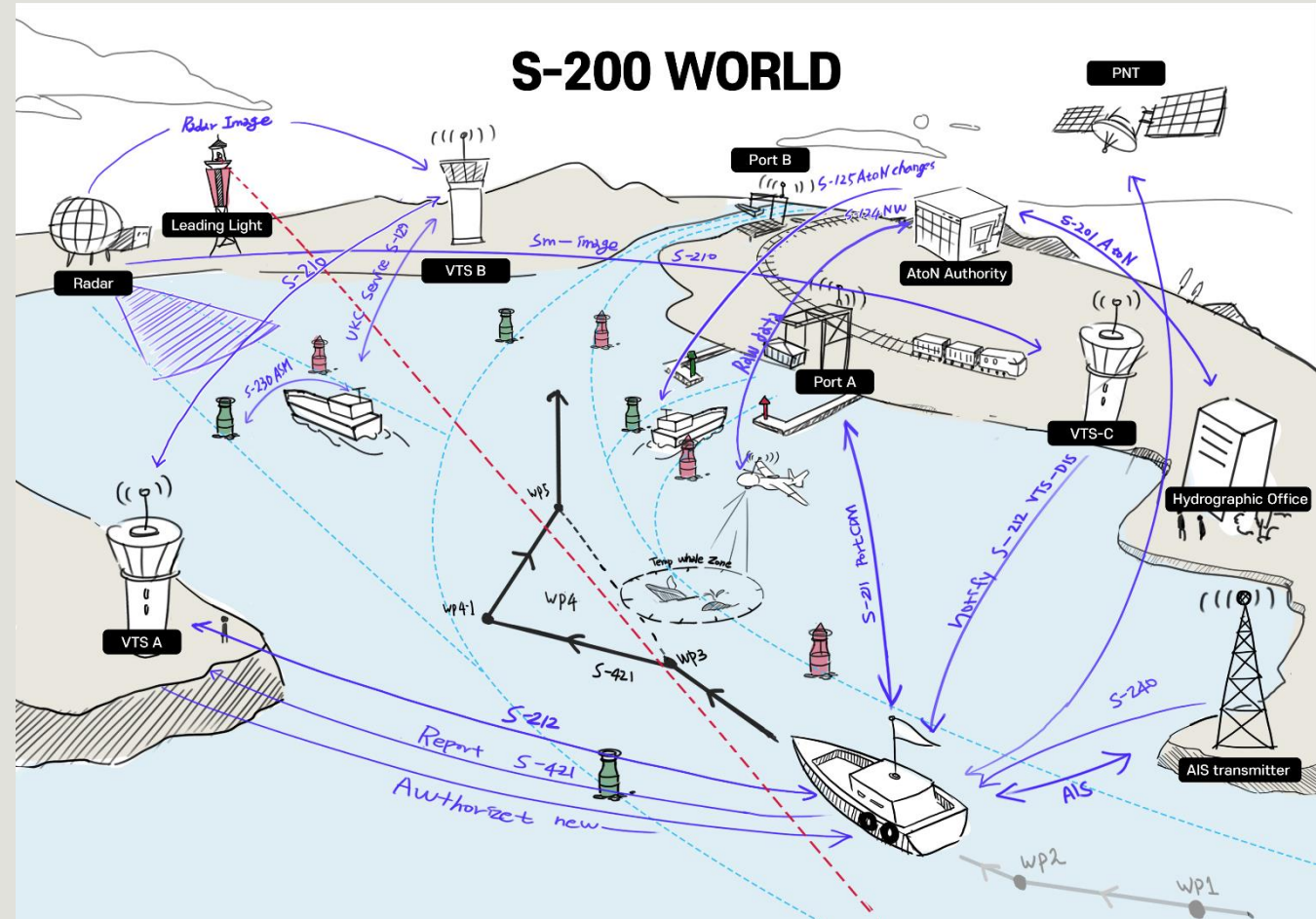
One could argue, that those parts (discovery metadata related to MS 5 and already mentioned in MS12 would form a part of (traditional publications and) ENDS, but the actual service (like S-124 datasets) would NOT be a part of ENDS.



Discussion: S-421, MS?

S-421 is very likely to be included in the ECDIS Performance Standard (see NCSR 10-22, chapter 9). Is that in itself a criterion for inclusion in ENDS?

At the moment the standard looks like it belongs best in Maritime Service 2, but services 1-3 are to be merged, and everything related to that new MS is not intended to be used in ECDIS, so how do we deal with the fact that we have an S-100 standard that fits into ENDS, but its associated Maritime Service does not? On a general and static level, Route exchange may fit into MS12, but not when it comes to dynamic ship-shore route exchange.

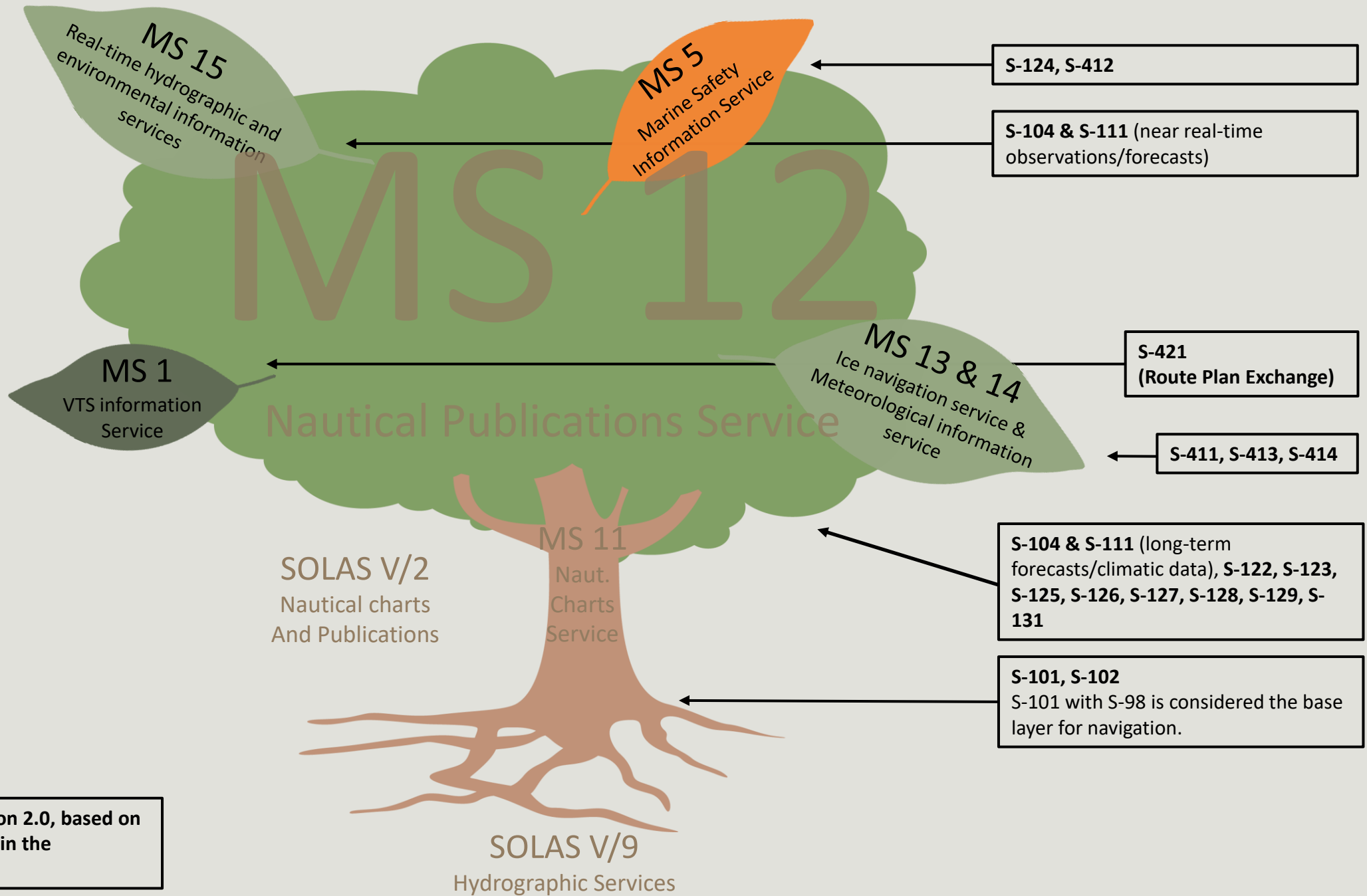


Discussion: S-421, MS? . Point of view:

There is not a direct need to include everything into ENDS simply because it is an ECDIS performance requirement. As an example, already current ECDIS performance standards include requirements for route exchange, route monitoring and route planning etc. functions, and a separate requirement for using ENC charts, but there is no relation between these requirements. Even though the route exchange format (current format is XML /RTZ) becomes an S-100 format does not by itself indicate any closer relation to nautical charts or publications and routes than before.

IF on the other hand a new use case is created, where S-421 format is used for “reference routes” etc., forming a part of the nautical publication data (sailing directions), this would form a part of MS 12. Therefore it is also good to refer “requirements” to (Maritime/Technical) services rather than individual product formats, which could serve multiple purposes.





The ENDS Tree Diagram version 2.0, based on questions and points of view in the discussion.