The digitalisation of the maritime domain

or how it all fits together

- in the context of e-navigation

Thomas Christensen
Secretary General of
The Maritime Connectivity Platform Consortium

So, what do we have (building blocks for digitalisation);

Maritime Services - in the context of e-navigation

Technical services (that can actually be implemented) following G1128

Data models in S-100 format (product specifications)

Unique identifiers (MRN)

And then we are missing something (will get back to that)

The familiar Maritime Services described in MSC.1/Circ.1610 Initial description of Maritime Services in the context of e-navigation

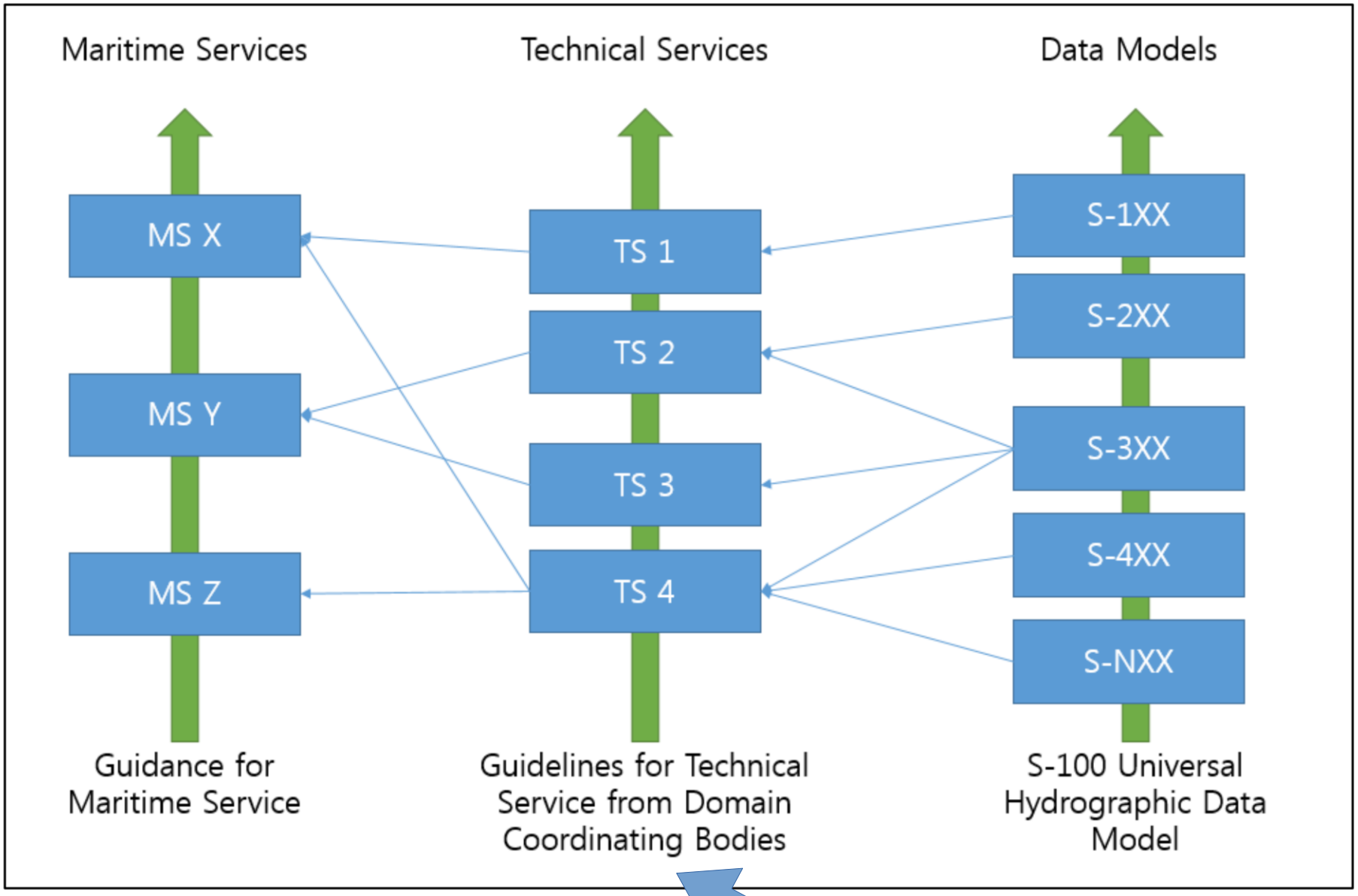
MS1	VTS Information service (INS);
MS2	Navigational assistance service (NAS);
MS3	Traffic organization service (TOS);
MS4	Maritime safety information service (MSI);
MS5	Pilotage service;
MS6	Tug service;
MS7	Vessel shore reporting;
MS8	Telemedical assistance service;
MS9	Maritime assistance service (MAS);
MS10	Nautical chart service;
MS12	Nautical publications service;
MS13	Ice navigation service;
MS14	Meteorological information service;
MS15	Real-time hydrographic and environmental information service; and
MS16	Search and rescue service.

Regarding the relationships, we have some explanation in

IMO resolution MSC.467(101) ‘guidance on the definition and harmonization of the format and structure of maritime services in the context of e-navigation’

We find

Relationship between Maritime Services, technical services and product specifications


Maritime Services
Technical Services
Data Models
MS X
MS Y
MS Z
TS 1
TS 2
TS 3
TS 4
S-1XX
S-2XX
S-3XX
S-4XX
S-NXX
Guidance for Maritime Service
Guidelines for Technical Service from Domain Coordinating Bodies
S-100 Universal Hydrographic Data Model

G1128

in IMO resolution MSC.467(101)

We also find

Template for Maritime Services

and

Template for associated technical services
which happens to match the structure of G1128

(no reason that each domain coordinating body should have each their guideline for technical services)

A bit further down the rabit hole

Maritime Services (in the context of e-navigation)
- Maritime service portfolios (collection of Maritime Services)

Technical services (identified with MRN) following G1128
- Service specification (data model: S-100)
- Service design (describing how to implement using specific technology)
- Service instance (endpoint, coverage etc)

Maritime Service - Technical service; one to many (several)
Service specification - service design; one to many (several/few)
Service design - service instance; one to many (literally many)

And MRN in everywhere

G1128

Maritime Service	**Technical Service specification**	**Technical Service design description**	**Technical Service instance description**
VTS service	Inter VTS information exchange S-210	Web service using REST	Provided by Sound VTS
			Provided by Helsinki VTS
		Web service using SOAP	Provided by Zandvliet VTS
		Other technical design for VTS information exchange	Another instance of that design provided by someone somewhere
	Route exchange ship to shore S-???	Some technical design	Some instance
		Another design	Another instance
	Another technical VTS service	…	...
Another Maritime service	…	…	...
…	…	…	...

On technical designs

Ideally only one technical design

But possibly a need for more because of different technologies

Many will be using internet technology, but there may be cases where other technologies are used, which require a different service design

The internet is there for you

IALA has developed Guideline G1157 for web-based S-100 data exchange (references IEC 63173-2 SECOM)

Developing technical services...

We do not only need harmonised data (product specifications)

We need means to exchange those data (technical services) - which should also be harmonised

There is a draft specification of a technical service for promulgating Navigational Warnings (S-124) - please adopt

IALA is now developing two technical services for the provision of

AtoN information to end-users (S-125) - on behalf of IHO

Enhanced AtoN information (S-201)

So - do we need anything more?

Well, in principle no - BUT

When we have all these wonderful harmonised services -
everyone can exchange any data with everyone

Anyone could for instance provide a VTS technical service of navigational warning

We don't want that, so we want

Authentication

And integrity and sometimes authorisation and confidentiality

i.e. elements of cybersecurity

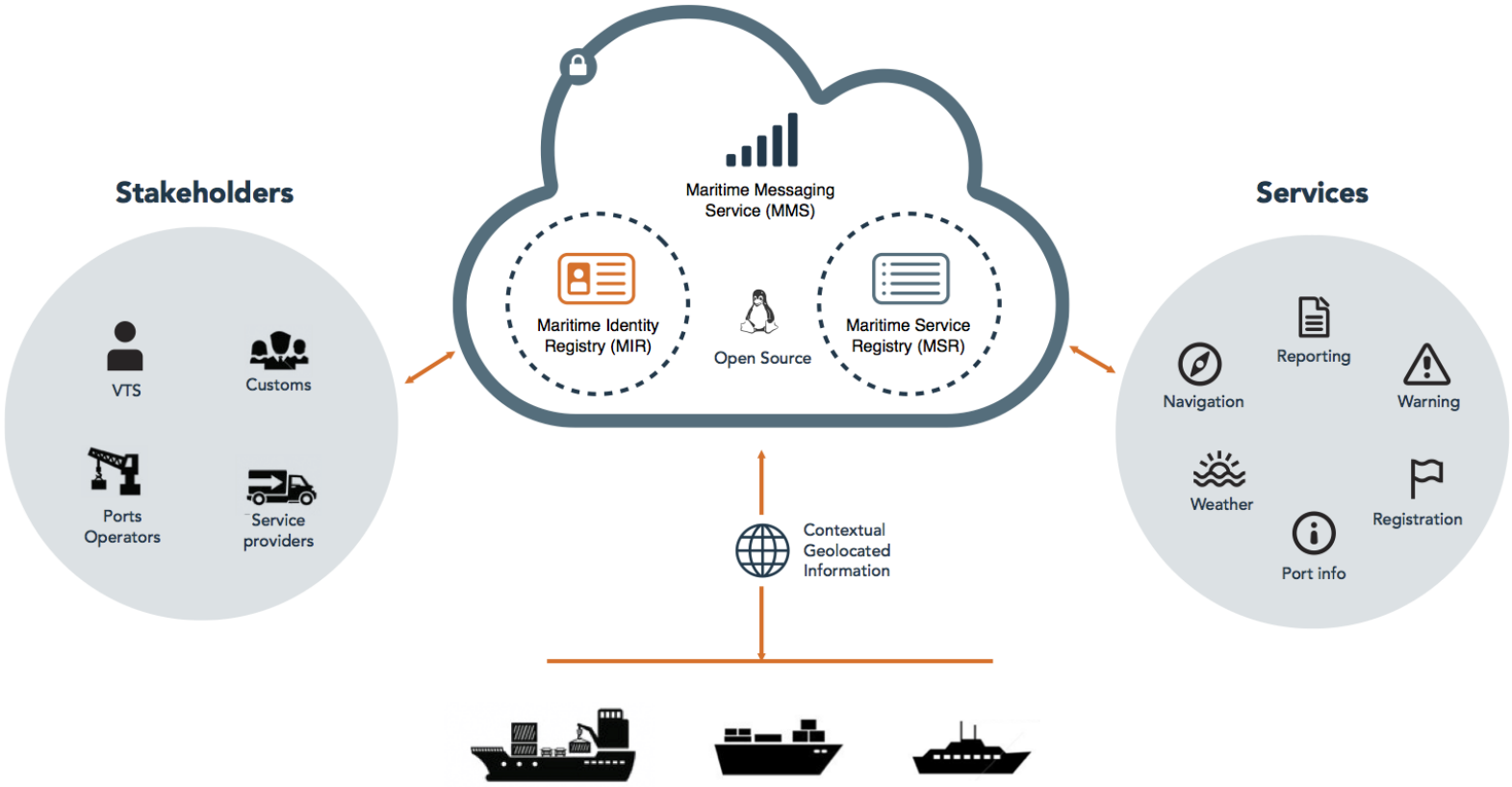
Furthermore

When delivering services in the internet jungle

Service discoverability becomes an issue - a mechanism to reliably search for and discover services are needed (google is not the answer)

The answer is (or could be)...

THE MARITIME CONNECTIVITY PLATFORM



Technical challenge

Governance challenge

MIR - Maritime Identity Registry

Contains identities for users, ships, devices...

Using unique identifiers (MRN - Maritime Resource Name)

Facilitates standardised single login to access services (OpenID Connect)

Facilitates standardised secure machine to machine communication (X.509 certificates)

Facilitates security; confidentiality, integrity & authenticity

MSR; Maritime Service Registry

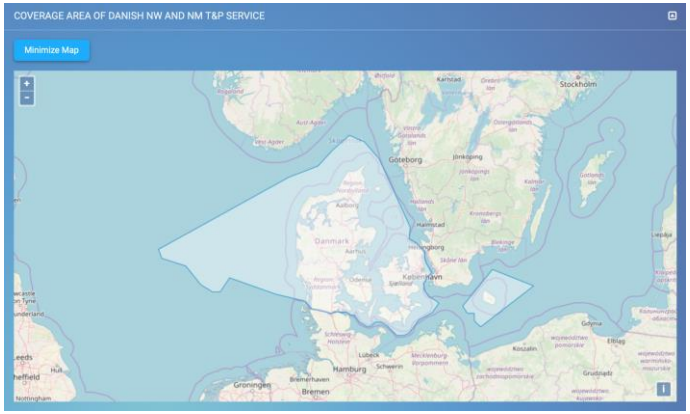
Contains service specification on different levels (G1128)

- Service specification (data model: S-100)
- Service design
- Service instance

Searchable for endpoint to services

Criteria: keywords, geographic coverage, etc

Endorsement of services



MMS; Maritime Messaging Service

Seamless communication using different physical channels
IP & non-IP

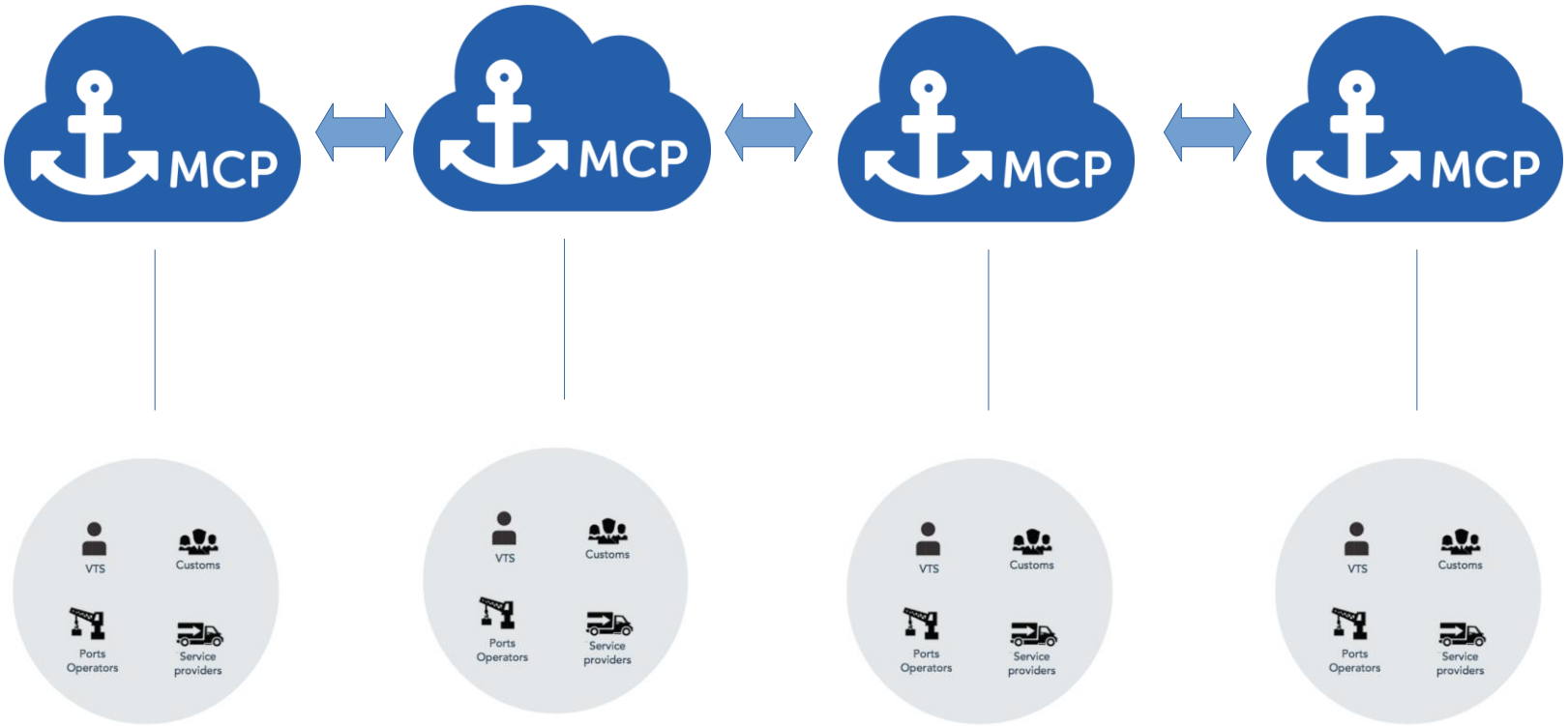
Logical roaming for point-to-point communication

Store-and-forward functionality

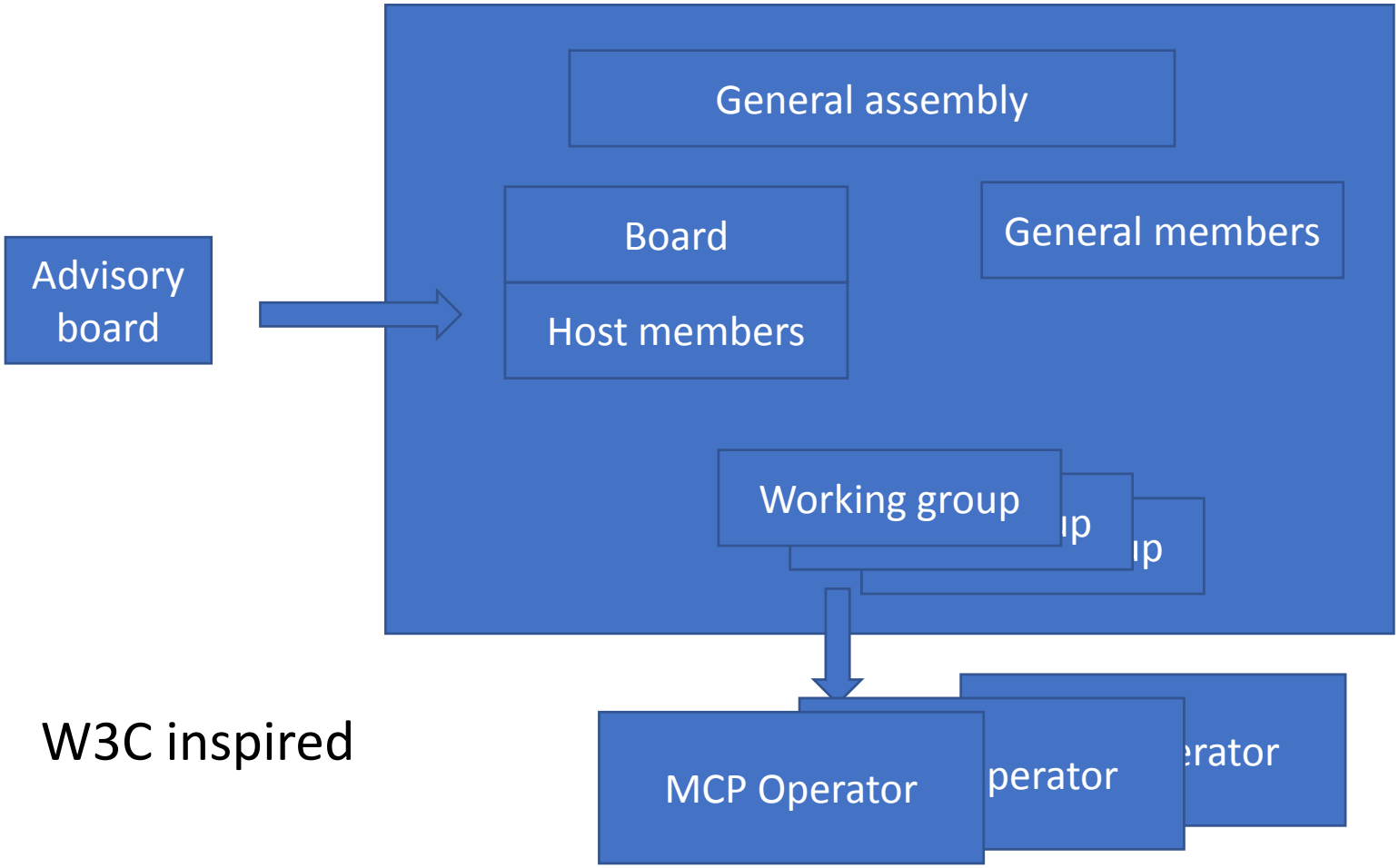
Geo- and groupcasting

Providing single data stream from several services

Multiple MCP instance providers



Maritime Connectivity platform Consortium; MCC



W3C inspired

So, the MCC

Does NOT run an operational instance of the MCP

Does everything necessary for others to do so, including:

- Maintaining all standards relating to MCP - including a reference implementatio
- Run a test instance of MCP
  - – in order to validate the reference implementation
  - - And provide a public open MCP demonstrator
- Define criteria for operating MCP instances
  - - Technical
  - - Procedural (including validation of identities)
- Endorse organisations to run MCP instances

MCC members

Hosts	Members	Advisory board
OFFIS (DE)	SSPA (SE)	IALA
RISE (SE)	Fraunhofer (DE)	CIRM
UCPH (DK)	Frequentis (AT)	IHO
KRISO (KR)	Bergman Marine (DE)	
GLA (UK,IE)	VTS Finland (FI)	
Observers	P3KI (DE)	
MOF (KR)	Vissim (NO)	
SMA (SE)	Iridium (US)	
DMA (DK)	National Technical University of Athens (GR)	
	Australian Maritime Safety Authority (AU)	
	SeaTopic (FR)	
	MarineFields (CY)	
	Navelink (SE)	
	Sternula (DK)	
	Kronshtadt Technologies (RU)	

Status

MIR instances operated by

Ministry of Oceans and Fisheries (MOF), Korea
Navelink (SAAB, Kongsberg, Wärtsilä)
Fintraffic (not yet operational)

MSR prototype operated by Navelink

MMS prototype operated by MOF

Test instance at Kronshtadt, possibly others

More info and access to the testbed at

www.maritimeconnectivity.net