

From AIS signals to usable data



HELCOM

Why working with AIS data?

- Lack of knowlege on ships traffic / need to assess
 - HELCOM Monitoring and Assessment Strategy (Thematic & Holistic every 6 years)
 - Maritime Spatial Planning / Region

→ 2015 – 2017: NOW!

- Baltic SCOPE project
- Maritime Activities Assessment
- HOLAS 2

TO ASSESS, one needs DATA and INFORMATION

What is AIS data?

- HELCOM AIS data network
 - 2005 – Today
(HELCOM AIS EWG)
 - Underused!



Amount of data!

How big?

How to deal with it?

- Usable data to
 - Produce density maps
 - Generate statistics
- } Compare the years, seasons, trends, etc.

HAMONIZED DATASET for the Baltic Sea

→ HELCOM AIS Server

AIS data from the HELCOM AIS Server

- From Norway, before from Denmark
 - All signals : Baltic Sea States + Norway
 - 2005 - 2017
-
- Files of decoded data / yearly files
 - Raw NMEA sentences / daily files

AIS data from the HELCOM AIS Server

AIS Decoded data

AIS raw data

timestamp_pretty	timestamp	targetType	mmsi	msgid	posacc	lat	lon	sog	cog	draught	name	dimBow	dimPort
03/02/2017 00:00:09	148608e+12	A	230996360	5	null	null	null	null	null	3.3	ROLLI	3	3
03/02/2017 00:00:09	148608e+12	A	230996360	1	0	59.921333	22.41295	0.0	243.9	3.3	ROLLI	3	3
03/02/2017 00:00:09	148608e+12	A	244003000	1	0	62.812004	20.111834	10.6	194.6	null	null	null	null
03/02/2017 00:00:09	148608e+12	A	236644000	5	0	57.74132	57.74132	7.5	136.1	4.0	SYLVIA	97	8
03/02/2017 00:00:09	148608e+12	A	265330000	5	null	null	null	null	null	3.0	SARPEN	23	3
03/02/2017 00:00:09	148608e+12	A	219018007	3	1	54.87071	14.060145	0.6	10.9	null	null	null	null
03/02/2017 00:00:09	148608e+12	A	265291000	1	1	58.61677	16.18302	0.0	10.6	null	null	null	null
03/02/2017 00:00:09	148608e+12	A	229272000	1	0	57.783245	10.279827	5.8	316.4	null	null	null	null
03/02/2017 00:00:09	148608e+12	ATON	992614201	21	1	54.933666	18.52855	null	null	null	WGB	1	1
03/02/2017 00:00:09	148608e+12	A	257847000	1	0	59.091393	11.233185	0.0	0.0	null	null	null	null
03/02/2017 00:00:09	148608e+12	B	261020460	18	1	54.531773	19.36862	6.8	0.1	null	null	null	null
03/02/2017 00:00:09	148608e+12	B	261011180	24	null	null	null	null	null	null	GALAKTYKA	0	0
03/02/2017 00:00:09	148608e+12	A	273317640	3	0	60.159588	28.114546	14.7	321.2	null	null	null	null
03/02/2017 00:00:09	148608e+12	B	219006099	18	1	55.724236	12.603673	0.0	247.1	null	null	null	null
03/02/2017 00:00:09	148608e+12	A	219002392	5	0	55.719334	55.719334	6.8	178.2	3.4	AMANDA	60	5
03/02/2017 00:00:09	148608e+12	A	265520430	5	null	null	null	null	null	2.0	VAXO	8	4
03/02/2017 00:00:09	148608e+12	null	2655619	8	null	null	null	null	null	null	null	null	null

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AIS raw data

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03/02/2017 00:00:09	148608e+12	B	261011180	24	null	null	null	null	null	null	GALAKTYKA	0	0
03/02/2017 00:00:09	148608e+12	A	273317640	3	0	60.159588	28.114546	14.7	321.2	null	null	null	null
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03/02/2017 00:00:09	148608e+12	A	219002392	5	0	55.719334	55.719334	6.8	178.2	3.4	AMANDA	60	5
03/02/2017 00:00:09	148608e+12	A	265520430	5	null	null	null	null	null	2.0	VAXO	8	4
03/02/2017 00:00:09	148608e+12	null	2655619	8	null	null	null	null	null	null	null	null	null

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03/02/2017 00:00:09	148608e+12	null	2655619	8	null	null	null	null	null	null	null	null	null

AIS raw data

```

$PGHP,1,2005,4,18,10,46,58,818,219,0,,1,6E*5F
!BSVDM,2,1,2,B,53@noJh2=F@PuEa<0001J04pPti@00000000000t20P66400070CR3k5811Q,0*6E
!BSVDM,2,2,2,B,CP@@000000,2*2F
$PGHP,1,2005,4,18,10,47,0,349,219,0,,1,64*1D
!BSVDM,1,1,,A,D020urB<Pvfr<QN9H0,4*64
$PGHP,1,2005,4,18,10,47,0,599,219,0,,1,65*17
!BSVDM,2,1,9,A,544hIMP254sUDDU@0004mE;o;G3L000000000016;hF67=:@08DRAh@00000,0*65
!BSVDM,2,2,9,A,00000000000,2*34
$PGHP,1,2005,4,18,10,47,0,771,219,0,,1,2C*61
!BSVDM,1,1,,A,D02R3T2;A>fp,0*2C
$PGHP,1,2005,4,18,10,47,0,974,219,0,,1,65*18
!BSVDM,1,1,,A,D02R3dj:a>fp,0*65
$PGHP,1,2005,4,18,10,47,0,974,219,0,,1,7C*6F
!BSVDM,1,1,,A,D02R3UB:a>fp,0*7C
$PGHP,1,2005,4,18,10,47,1,177,219,0,,1,73*15
!BSVDM,1,1,,B,13n1Hh0PAd0ji:@P:;<725e105Bt,0*73
$PGHP,1,2005,4,18,10,47,1,396,219,0,,1,1E*68
!BSVDM,1,1,,B,13@ng7hPAd0j8Jr0JPbUKT@20@0V,0*1E
    
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- To be decoded
- To be merged : days -> year
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$PGHP,1,2005,4,18,10,47,0,974,219,0,,1,7C*6F
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!BSVDM,2,1,9,A,544bTMP254sUDDU@0004mF-o:G3l000000000016-bE67=-@08DRAb@00000,0*65
!BSVDM,
$PGHP,
!BSVDM,
$PGHP,
!BSVDM,1,1,,A,D02R30j:a>tp,0*65
$PGHP,1,2005,4,18,10,47,0,974,219,0,,1,7C*6F
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$PGHP,1,2005,4,18,10,47,1,177,219,0,,1,73*15
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!BSVDM,1,1,,B,13@ng7hPAd0j8Jr0JPBUkt@20@0V,0*1E
    
```

Harmonized in yearly files

Pre-processing AIS data Steps

Year 20XX
(all signals,
decoded)

50 to 400 GB!



- Selection **Messages Id**
- Selection **Baltic Sea**
- Remove **wrong information** (IMO, MMSI, SOG, COG, etc.)
- Remove **duplicates**

January 20XX

February 20XX

March 20XX

... 20XX

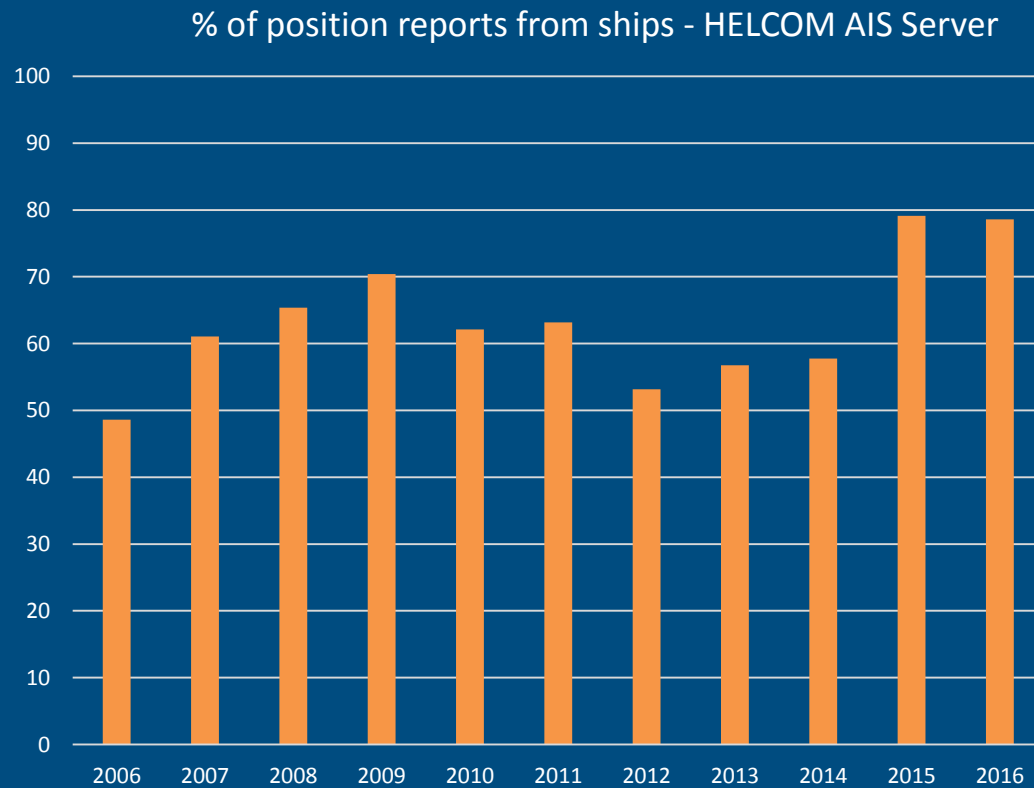
... 20XX

December 20XX

= Same process for ALL YEARS
(replace the input file and run)

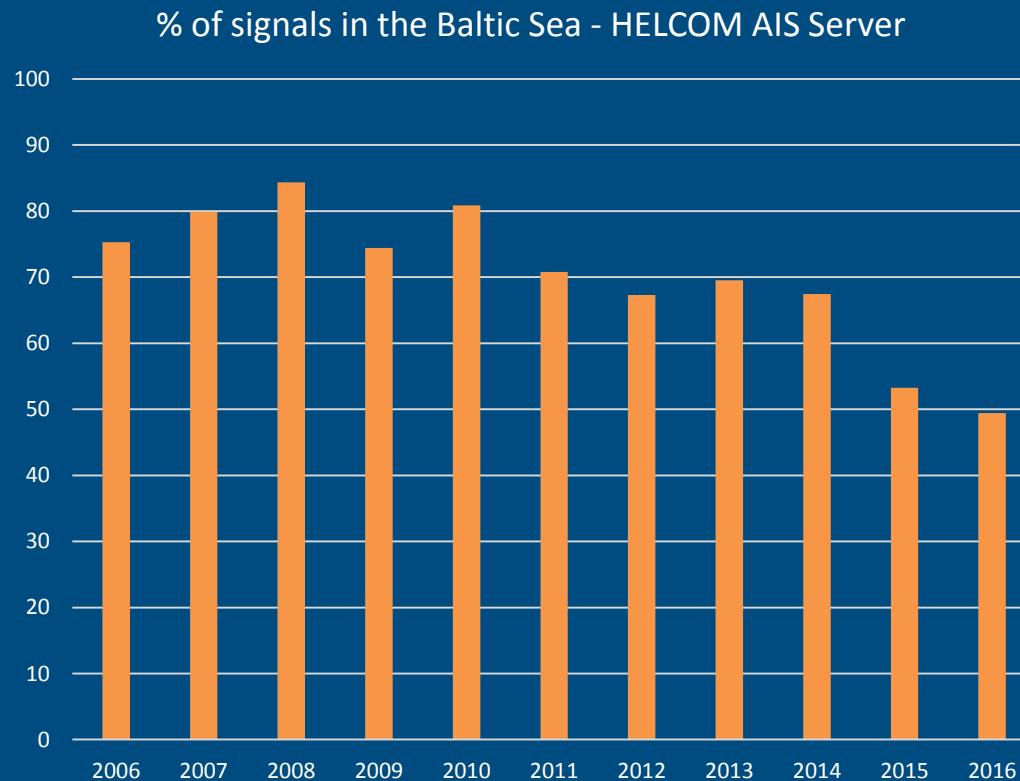
Pre-processing AIS data

Quality check



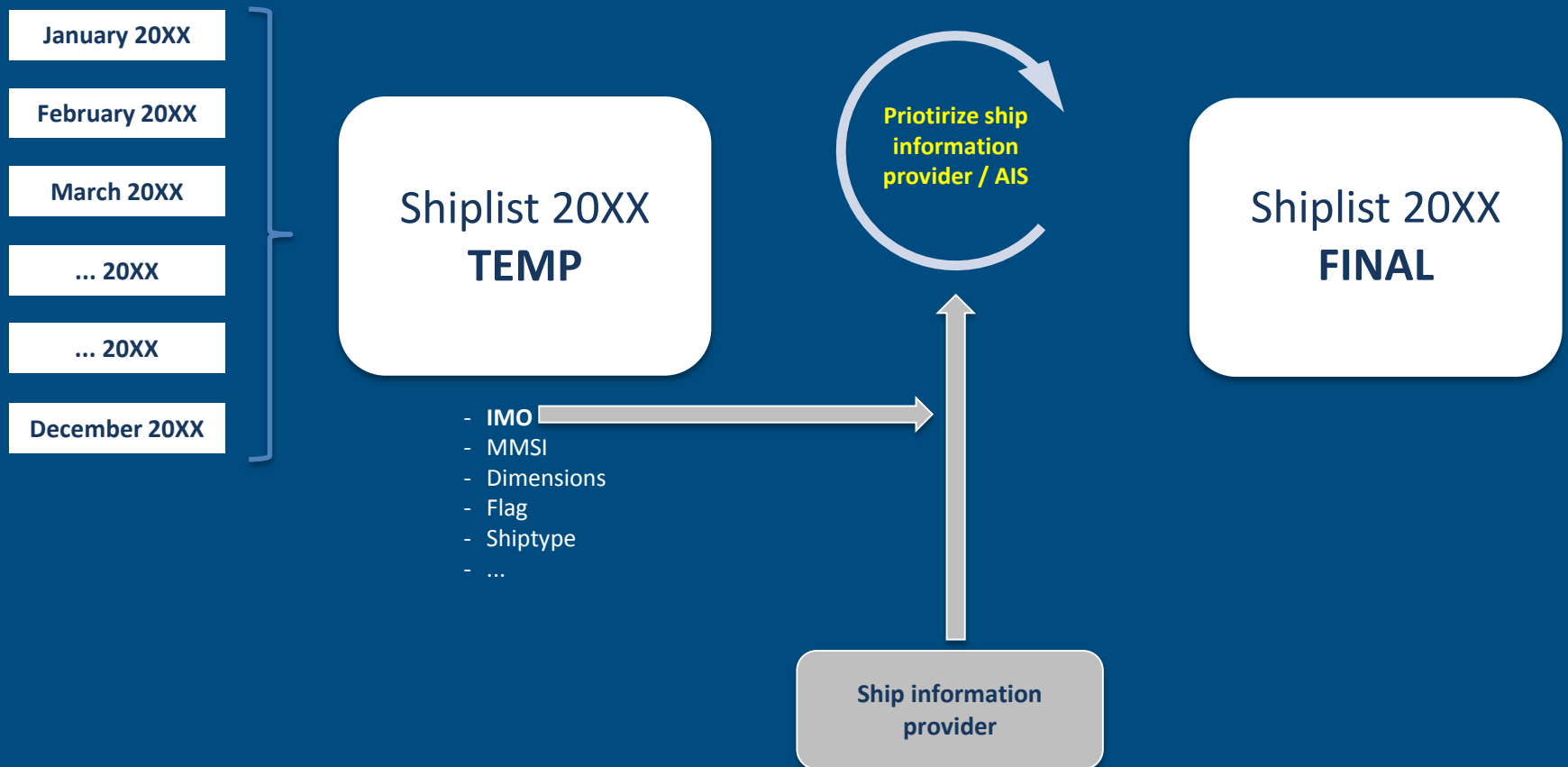
Pre-processing AIS data

Quality check



Pre-processing AIS data

Ship information



Pre-processing AIS data

Ship information

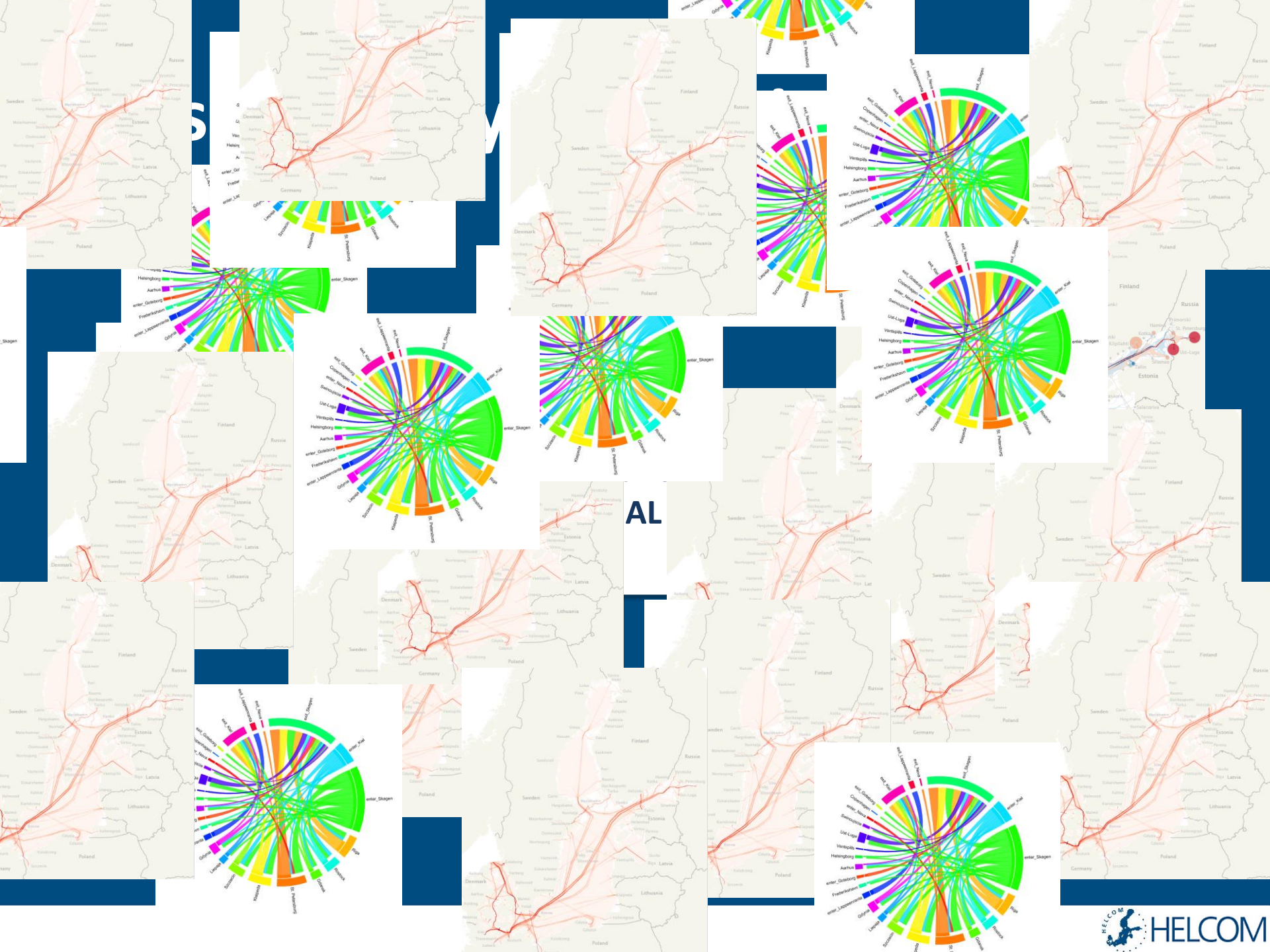
Shiplist 20XX
FINAL

- IMO
- MMSI
- Dimensions
- Flag
- **Ship type**
- ...



= New Gross ship types & Detail ship types

Gross ship type categorisation	Detail ship type categorisation
Cargo	Bulk cargo
	General cargo
	Other cargo
Tanker	Chemical tanker
	Chemical/Oil tanker
	Gas tanker
	Oil tanker
	Other tanker
Container	Container
Passenger	Cruise
	Ferry
	ROPAX
Other	Dredger
	Other
	Tug
	Yatch
Fishing	Fishing
Service	Service
Vehicle carrier	Vehicle carrier



S

M

AL



1,3 BILLION rows

**30 MILLION
A4 pages**

Only 1 year of AIS data!