

# EUROPEAN SPACE WEEK

#EUSpaceWeek

ONLINE EDITION

## EGNOS maritime service

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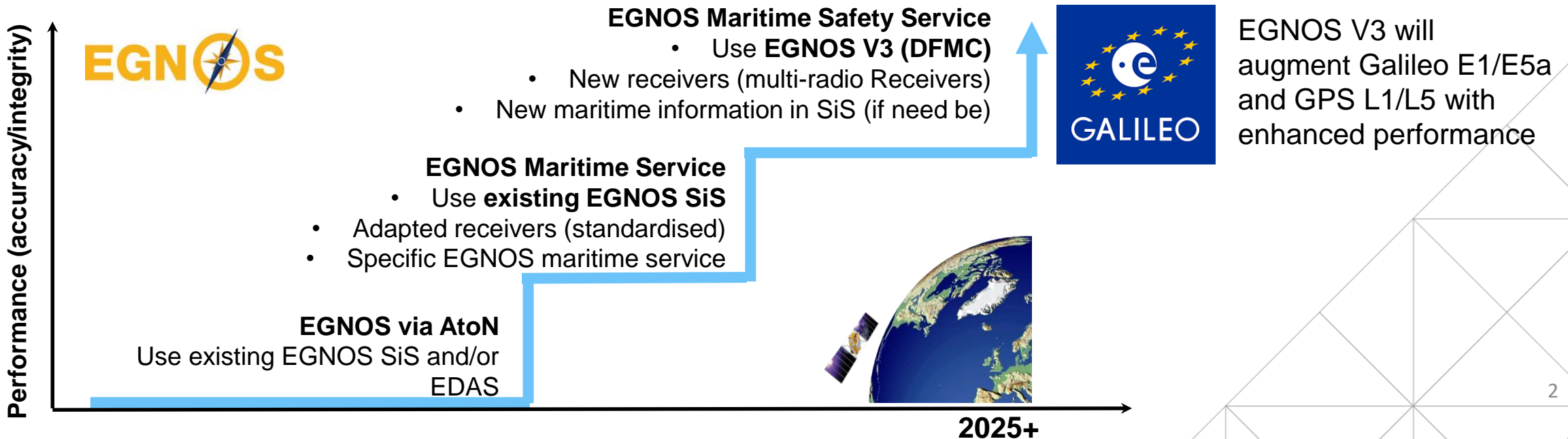
# EGNOS Maritime Service: Incremental steps



Maritime is relying more and more on GNSS for application that are critical for sustainable economic growth, safety of life and protection of the environment

3 steps for EGNOS use:

1. Use of EGNOS corrections via existing AtoN
2. Adapt receivers to use EGNOS SiS directly i.e. maritime service
3. Maritime safety message in SiS (if need be) and multi-system shipborne radionavigation receiver (MSR)



# EGNOS Maritime Service Step 2

- Use current EGNOS L1 SiS
- Adapted receivers (standardised via International Electrotechnical Commission (IEC))
- EGNOS maritime service defined in the Service Definition Document (SDD) including:
  - EGNOS L1 Signal-in-Space performance based on analysis of historical data of the EGNOS service
    - Satellite residual errors
    - Ionospheric residual error
    - Range error overbounding
  - Alarms for error protection (note: these alerts are not specific for the maritime service)
  - Indicative scaling factor to derive real UDRE and GIVE EGNOS computed values based on EGNOS historical performance
  - Even if no commitment is taken on position domain performance, performance at user level (IMO 1046) will be assessed using representative error models for local environment (SEASOLAS H2020 study). The objective is to show that EGNOS maritime service can support IMO 1046 applications.
  - Notification to mariners (MSI proposals) about predicted EGNOS outages and relevant performance degradations

## EGNOS L1 Signal In Space Mission Requirements of EGNOS Maritime Service (under consolidation)

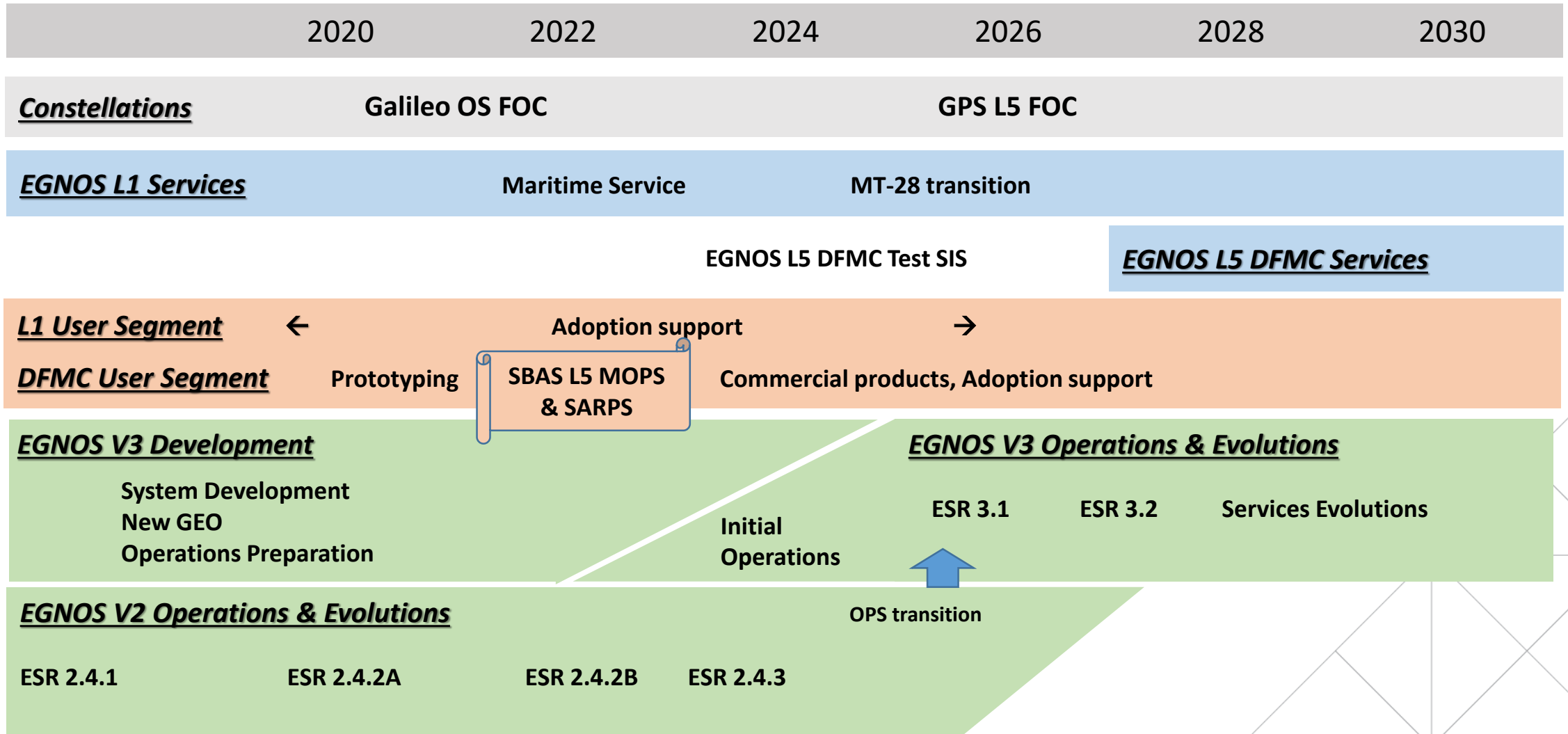
<b>Service Area</b>	waters of EU-MS, Norway and Switzerland  (50 nm from the coast line)
<b>Probability to overbound the satellite / ionospheric residual errors</b>	1-10 <sup>-5</sup>
<b>Signal in Space Time to Alert (TTA)</b>	5.2 s
<b>Satellite residual error (95%)</b>	TBD
<b>Ionospheric residual error (95%)</b>	TBD
<b>Availability</b>	TBD
<b>Continuity</b>	TBD
<b>Indicative UDRE/GIVE Scaling factors</b>  (to be applied to the 1-sigma broadcast UDRE/GIVE to characterise 1-sigma satellite and ionosphere residual errors)	<1

# EGNOS Maritime Service Step 3



Future evolution:

- Enhanced EGNOS L1 service thanks to the use of the Galileo measurements for ionosphere modelling
- Enhanced performance brought by the DFMC EGNOS service:
  - EGNOS DFMC service will provide service guarantees at SiS level
  - As shown by SEASOLAS H2020 project (<https://www.gsa.europa.eu/egnos-v3-maritime-safety-service>) which assessed the feasibility of an EGNOS Dual Frequency multi-constellation service tailored for maritime, it is difficult to define an adequate model of the nominal environmental conditions valid for all maritime use cases (size, shape and configuration of the ship, EGNSS antenna position, etc.). This option will be reviewed in the future, if new analyses become available.





# Linking space to user needs



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