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TBO with regional SWIM services and AMHS

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U. Kaage, SWIM Solution Consultant, Frequentis

Lessons learnt from car-GPS

GPS systems cause over 200,000 accidents every year in the U.S.
These accidents are a result of

- inaccurate navigation maps, → Data consistency and accuracy
- incorrect directions, → Functional consistency and accuracy
- wrong locations,
- and distracted driving.

Digital transformation

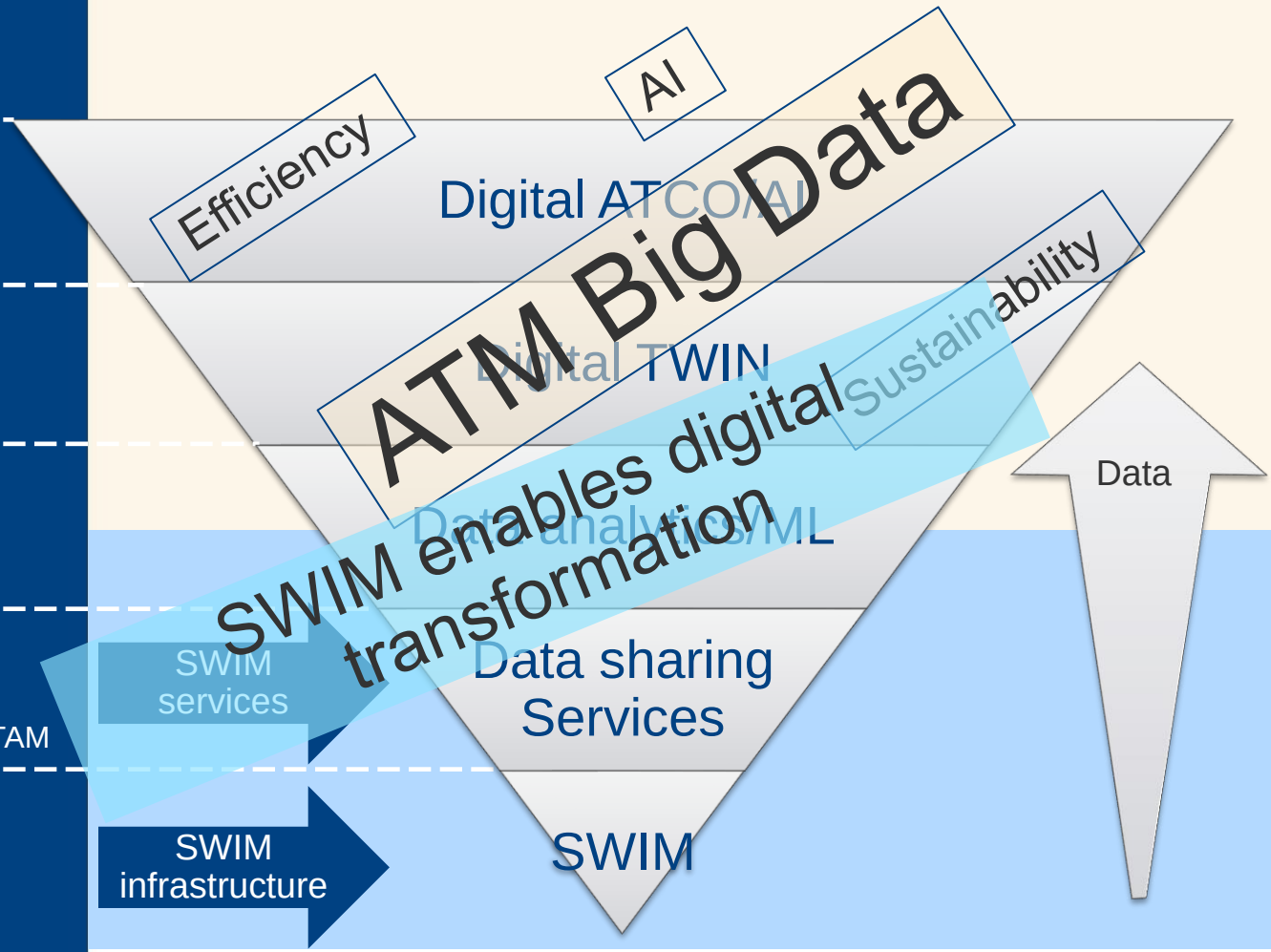
- Automation at network level supports ATCO tactical decision making

- Decision making (network level)
- Network planning
- Operational (cost) efficiency

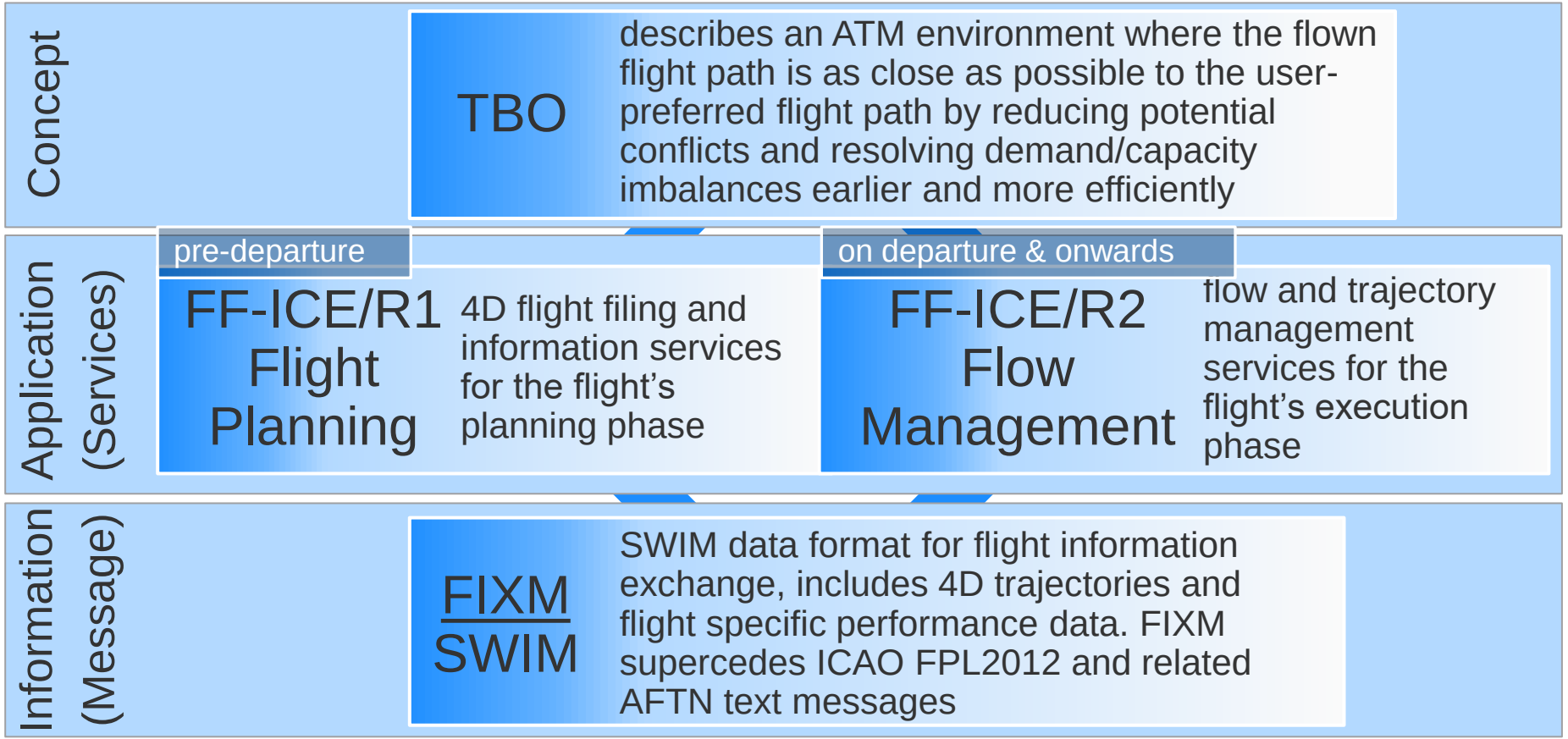
- KPIs
- Trend/pattern analysis
- Predictions (trajectory)

- TBO/FF-ICE
- LRATFM
- IAD/XMAN
- A-SMGCS
- UTM CIS
- Digital NOTAM

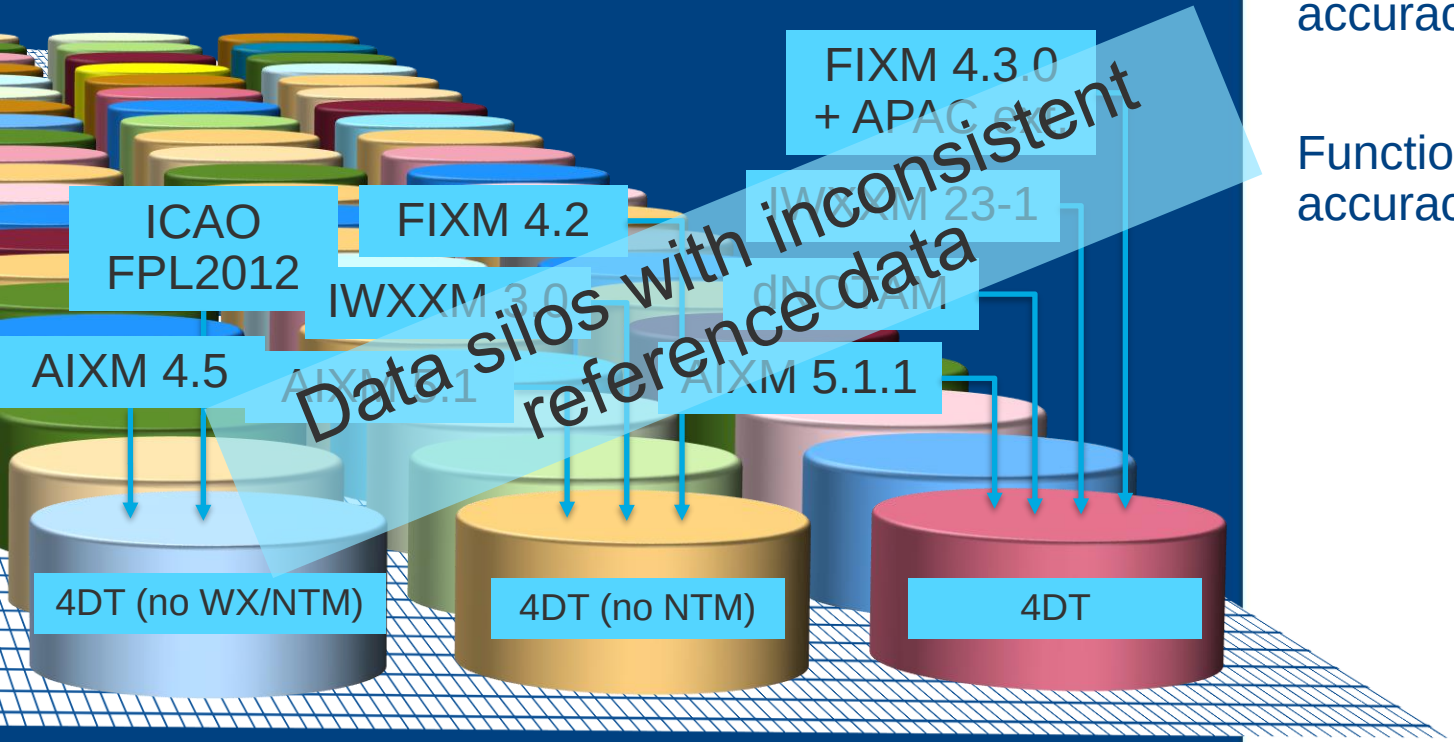
- Data format and IF definitions
- Service registry
- PKI & IP infrastructure



TBO concept and implementation



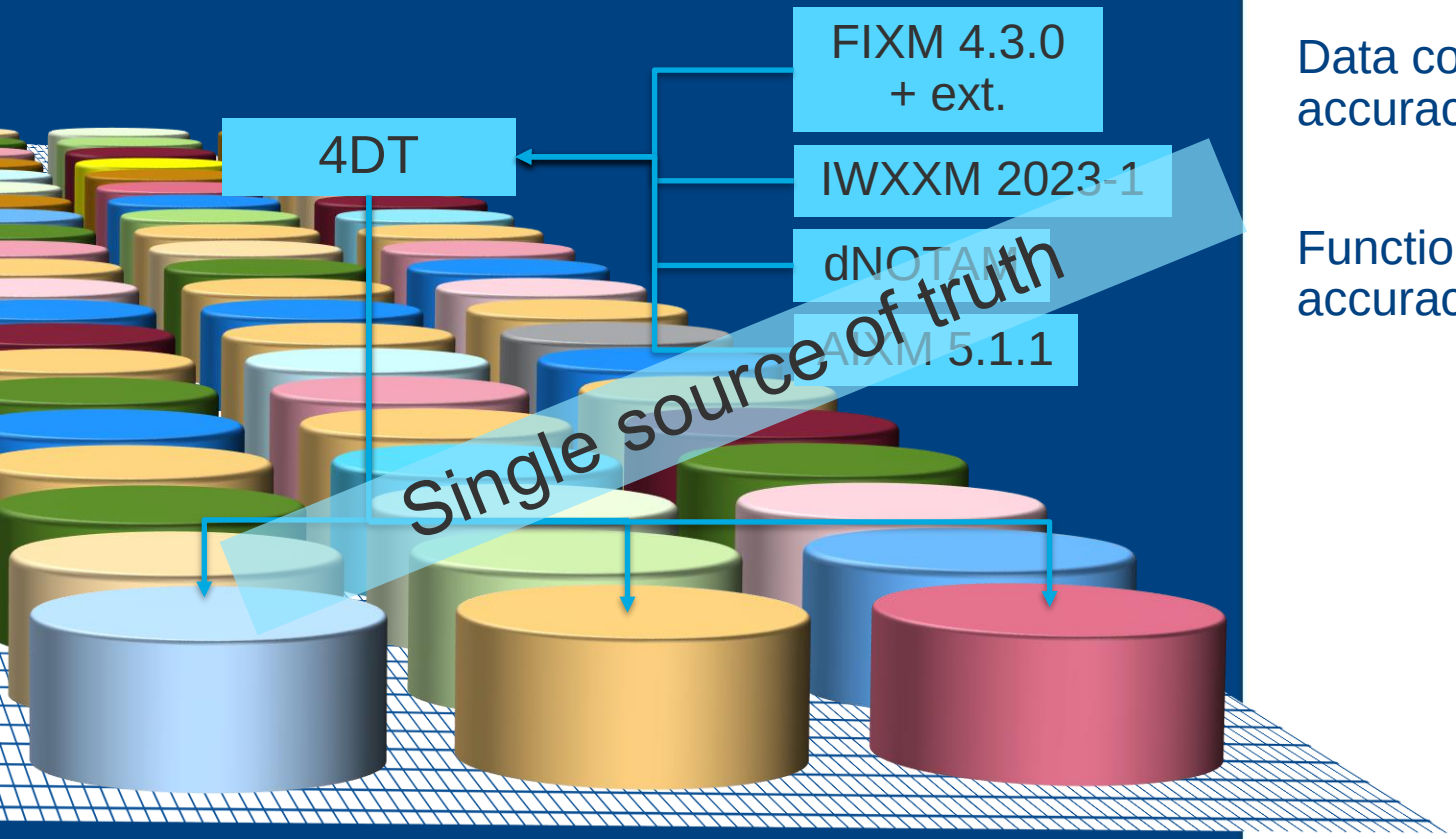
Domestic/regional operational infrastructure



Data consistency and accuracy

Functional consistency and accuracy

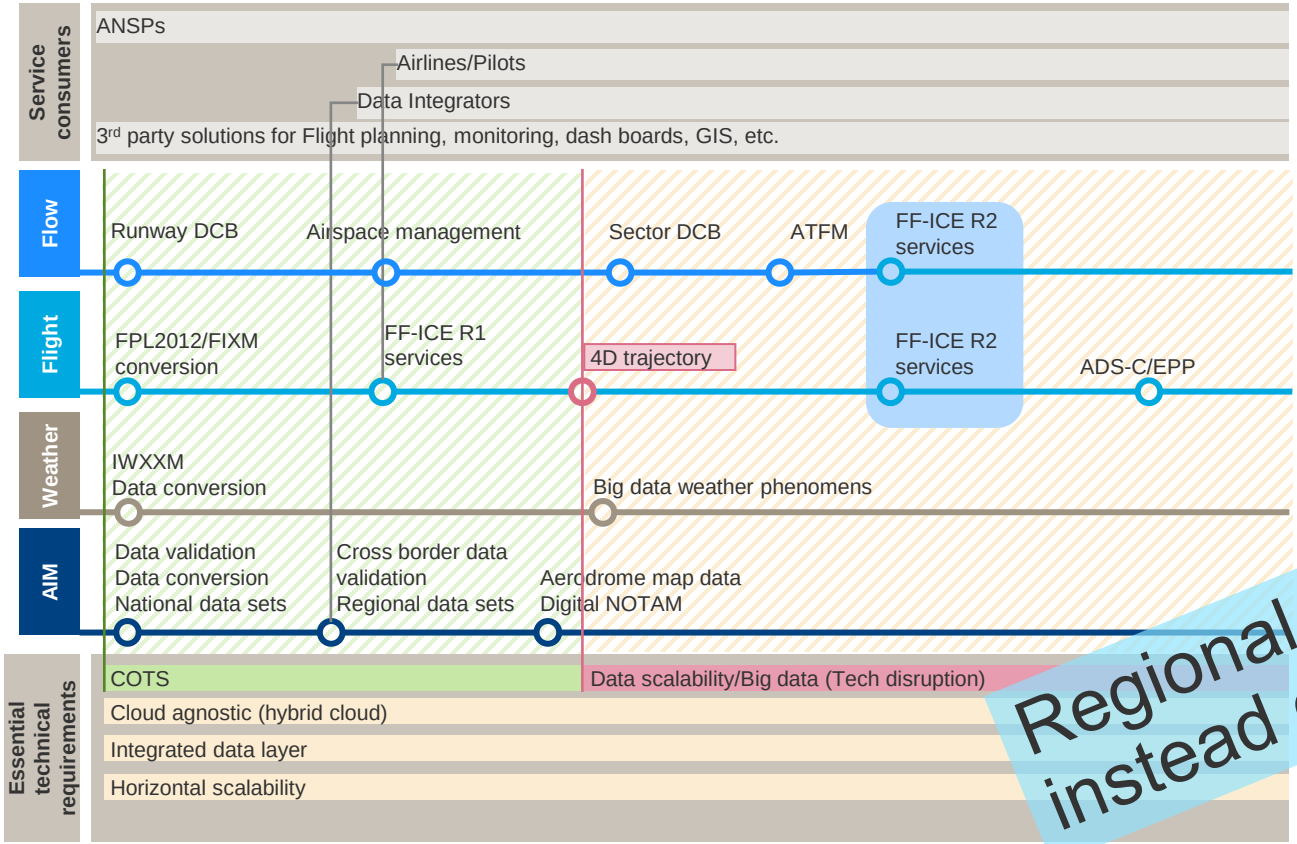
Domestic/regional operational infrastructure



Data consistency and accuracy

Functional consistency and accuracy

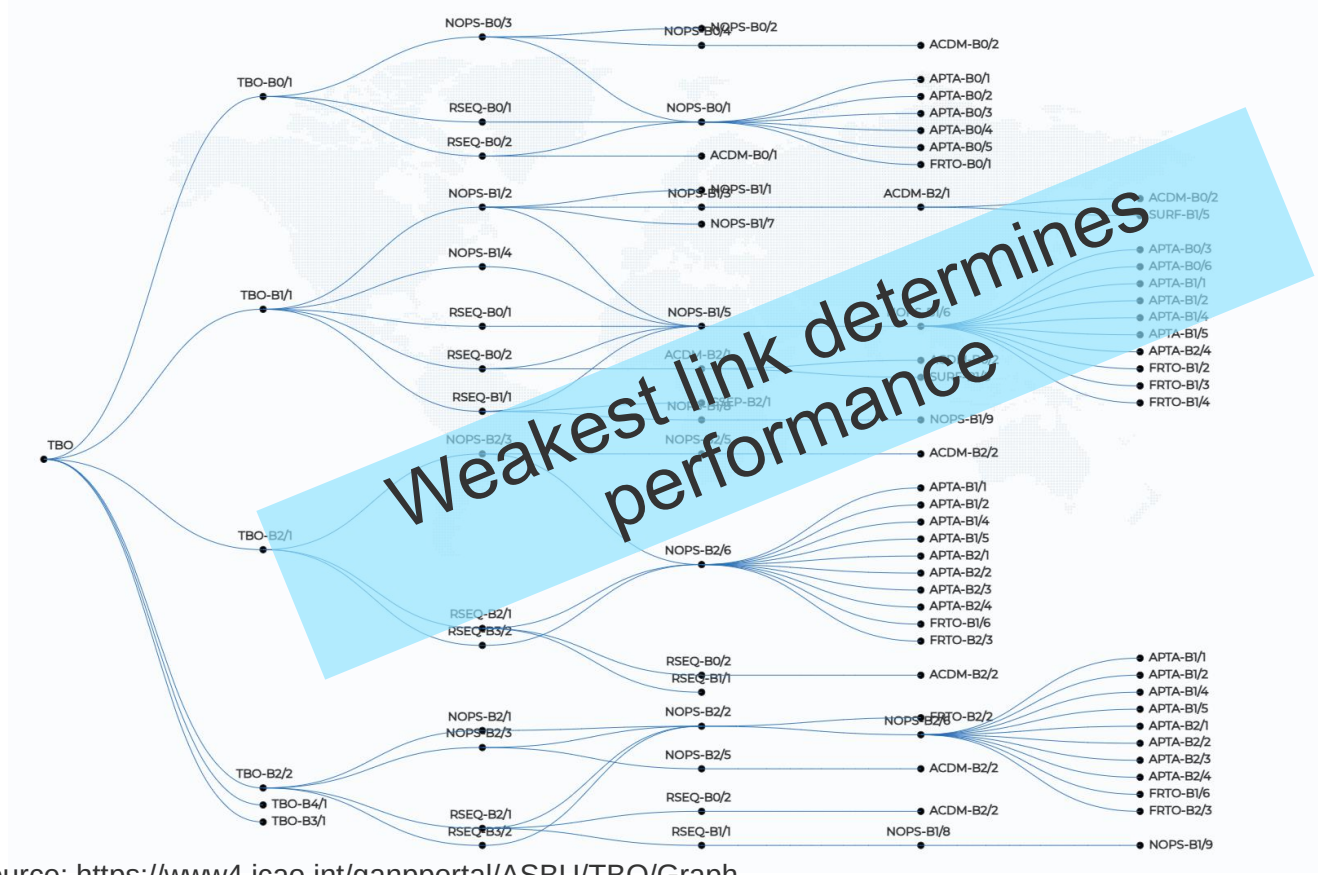
Regional ATM operational SWIM service roadmap for TBO (example)



Regional services instead of national silos

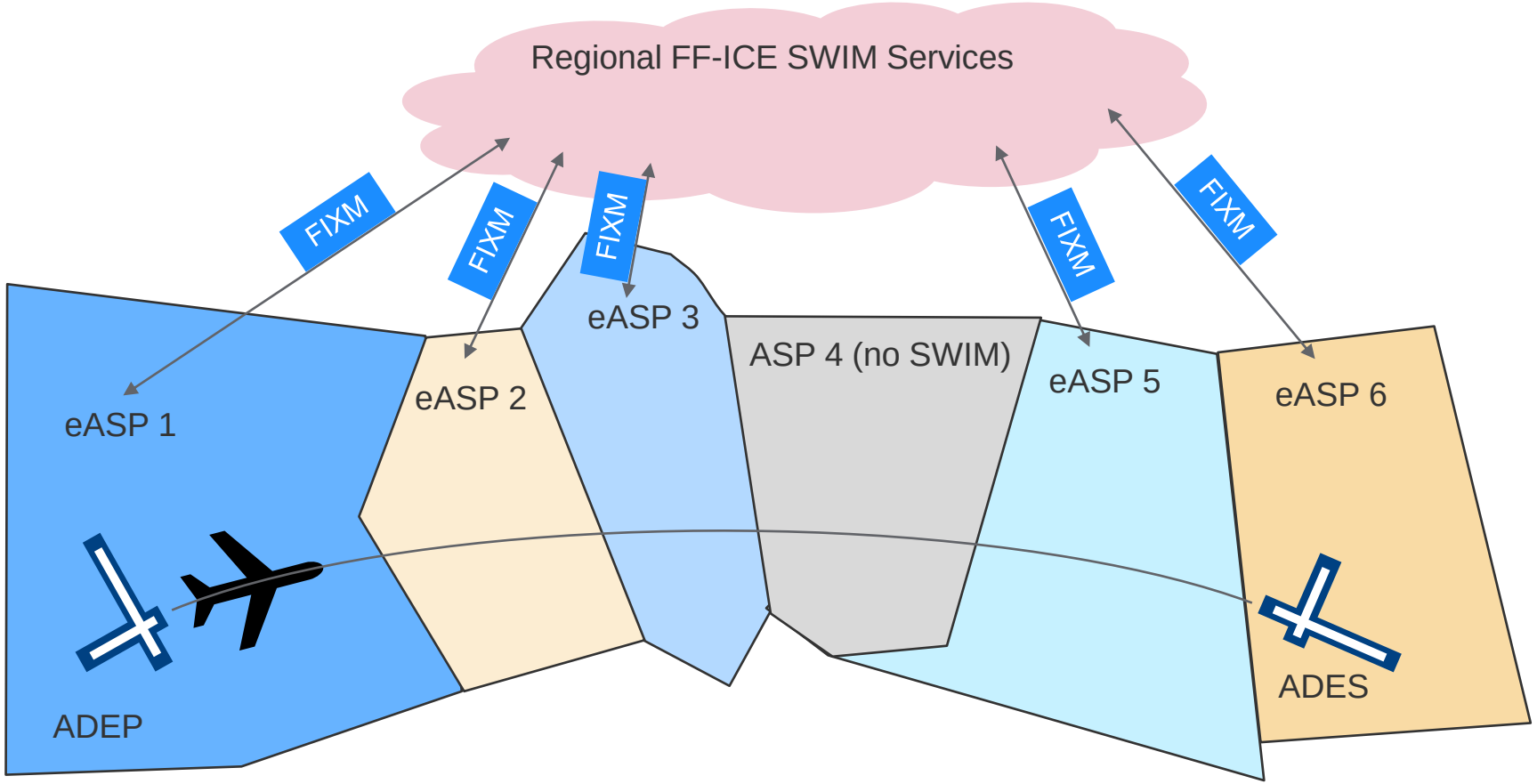
poster

Trajectory based operations (TBO) HowTo

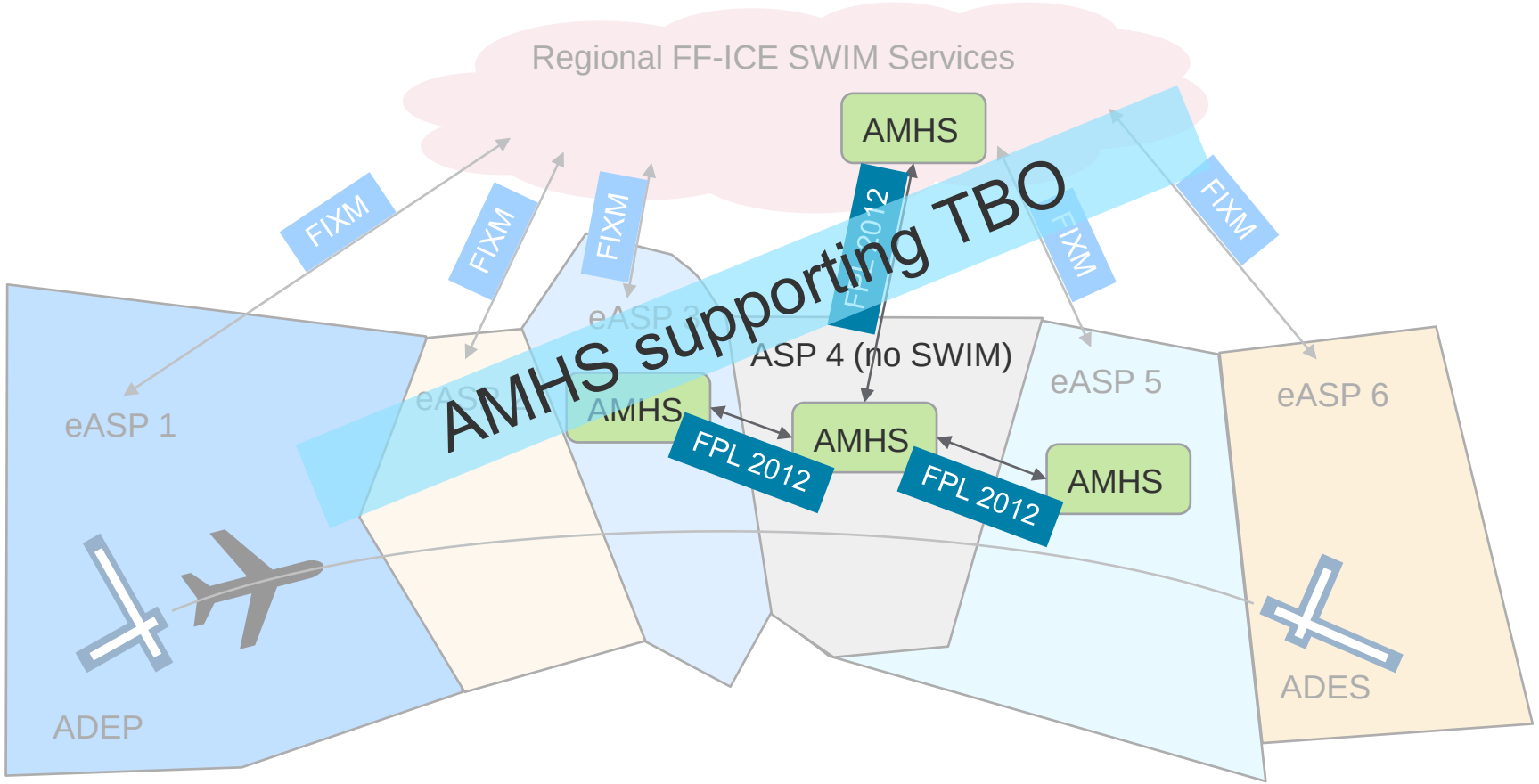


Source: https://www4.icao.int/ganpportal/ASBU/TBO/Graph

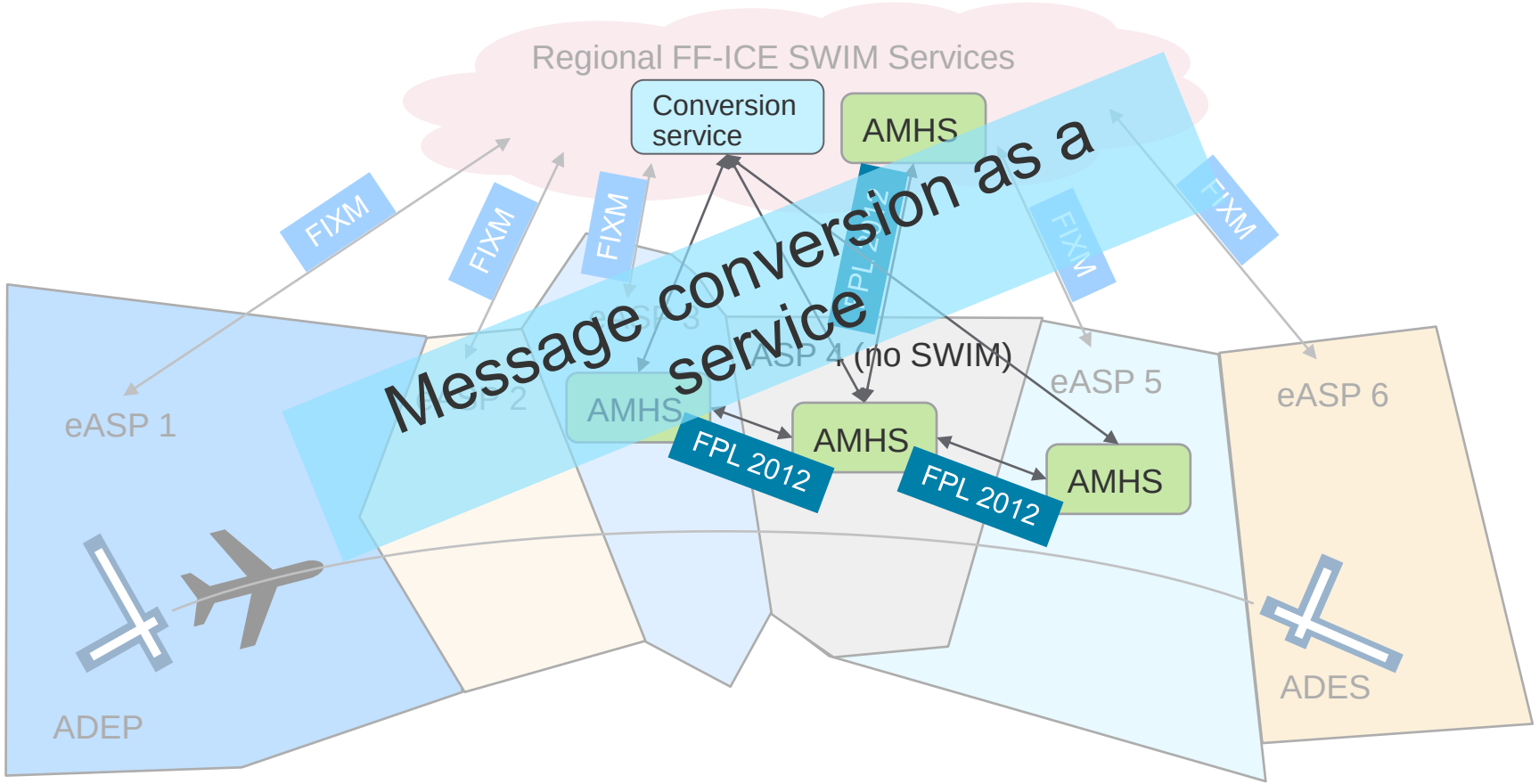
TBO mixed mode transition (I)



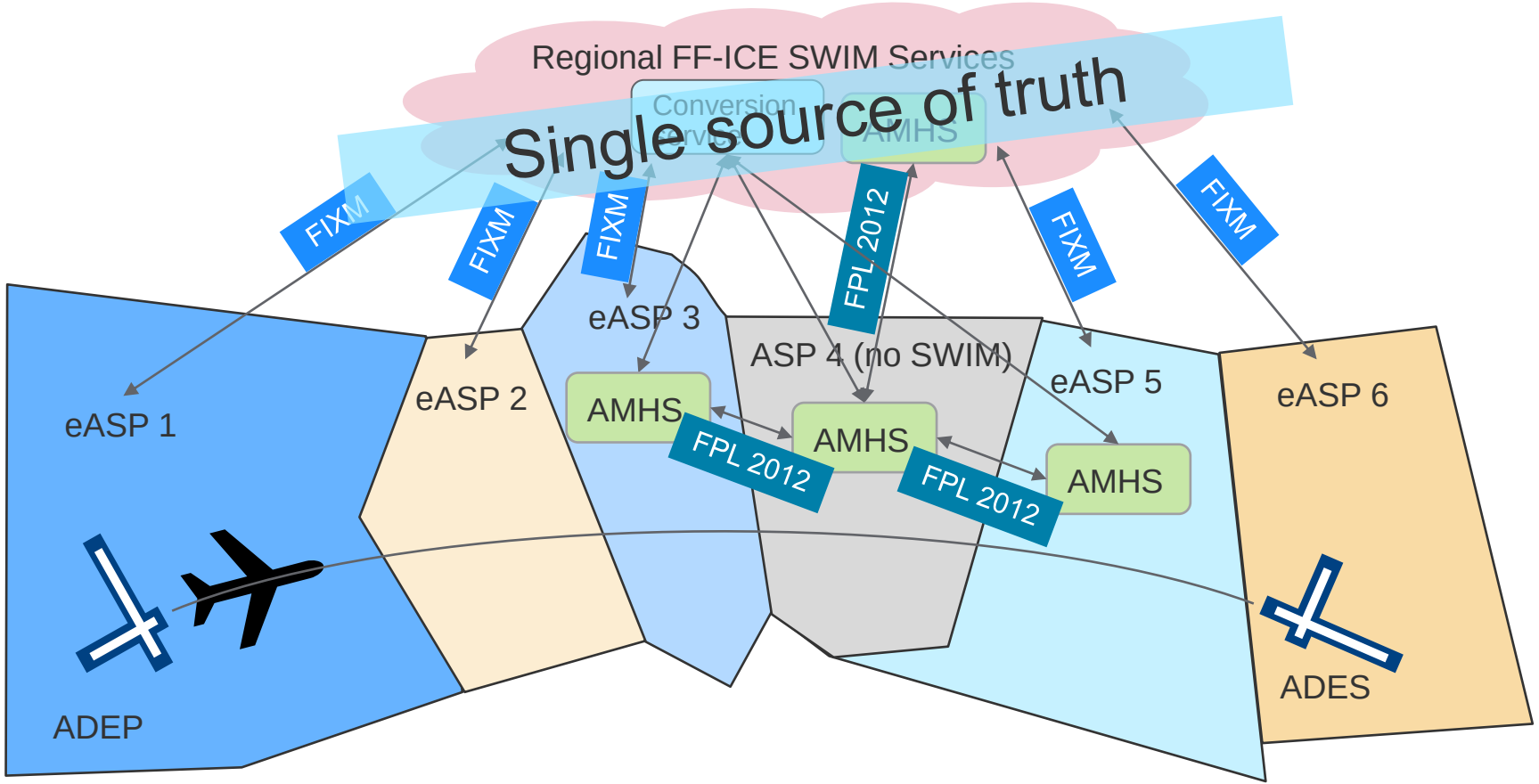
TBO mixed mode transition (II)



TBO mixed mode transition (III)



TBO mixed mode transition (IV)



AMHS and SWIM message conversion

AFTN/AMHS/Legacy	Conv	SWIM
FPL2012	→ ←(*)	FIXM
TAC (TAF, SPECI, SIGMET,…)	→ ←(*)	IWXXM
ICAO Text NOTAM	→X ←(*)	AIXM 5 digital NOTAM
AIP (PDF)	→(***) ←	AIXM 5 AIP data set
AIDX (IATA)	→ ←(*) (**)	FIXM
AMXM	→ ←(*) (**)	AIXM 5

SWIM evolution eventually will break compatibility

(*) compatibility not guaranteed with future FIXM versions
(**) potential information loss
(***) manual conversion/migration
X conversion not safe

Managing the transition

- Conversion:
  - FPL2012 ←→ FIXM – OK
  - TAC ←→ IWXXM – OK
  - ICAO Text NOTAM ←→ digital NOTAM (AIXM 5) – critical
- Mixed mode with ICAO FPL 2012 and FIXM more complex than centralised approach with regional services
- AMHS/SWIM GW for „tunneling“ FIXM messages and/or convert them into ICAO FPL2012 AFTN/AMHS format
- AMHS to connect the SWIM world with legacy systems
- AIDC could probably be a candidate for trajectory information sharing between ANSPs through AMHS
- ADS-C for air/ground link, SWIM for data sharing, and AMHS to support clients that are not SWIM enabled.

AMHS to support transition

Summary

SWIM an data sharing enable the digital transformation towards TBO. Existing AMHS infrastructure supports the transition

- SWIM enables the digital transformation
- Data silos jeopardise both data and functional consistency
- Regional services instead of national silos
- Weakest link determines performance
- AMHS supporting TBO
- Message conversion as a service
- Single source of truth with regional services
- SWIM evolution eventually will break compatibility
- AMHS to support transition

No country left behind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