Legal, economic and regulatory aspects of ATM data services provision and capacity on demand as part of the future European air space architecture

Presentation of results

Agenda item 2 Overall approach and the structure of the study

The ADS study is a direct continuation of the Airspace Architecture Study: we are taking economic, legal and regulatory analyses further

ATM data services study focusing on the framework dimensions

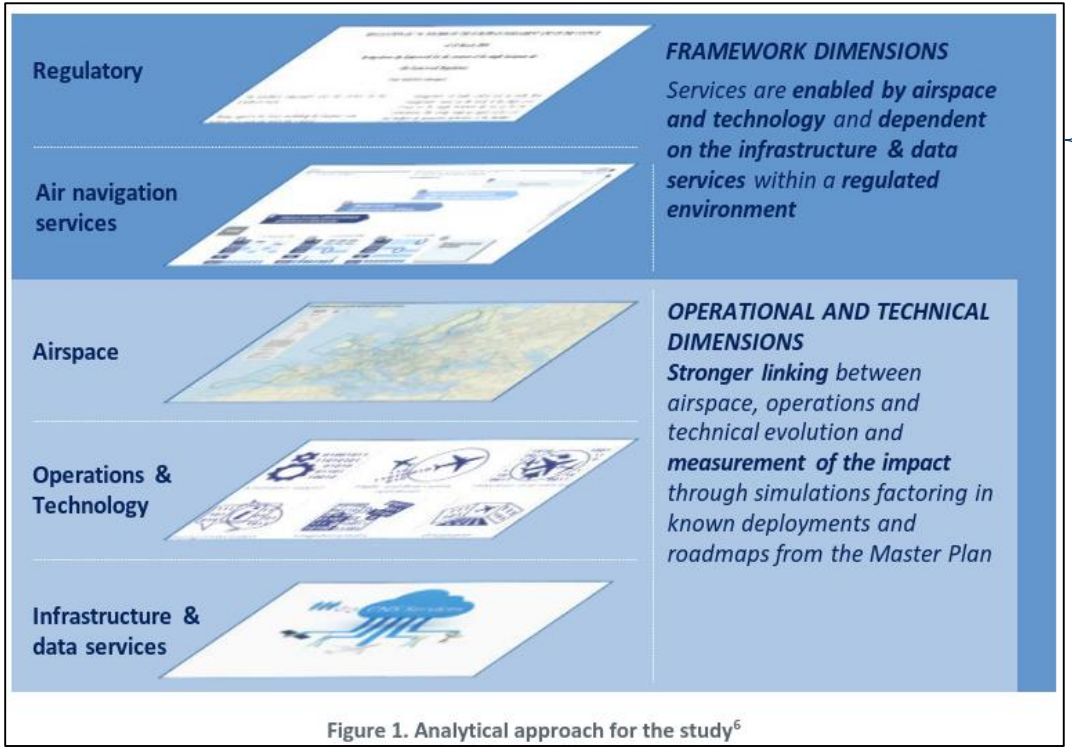
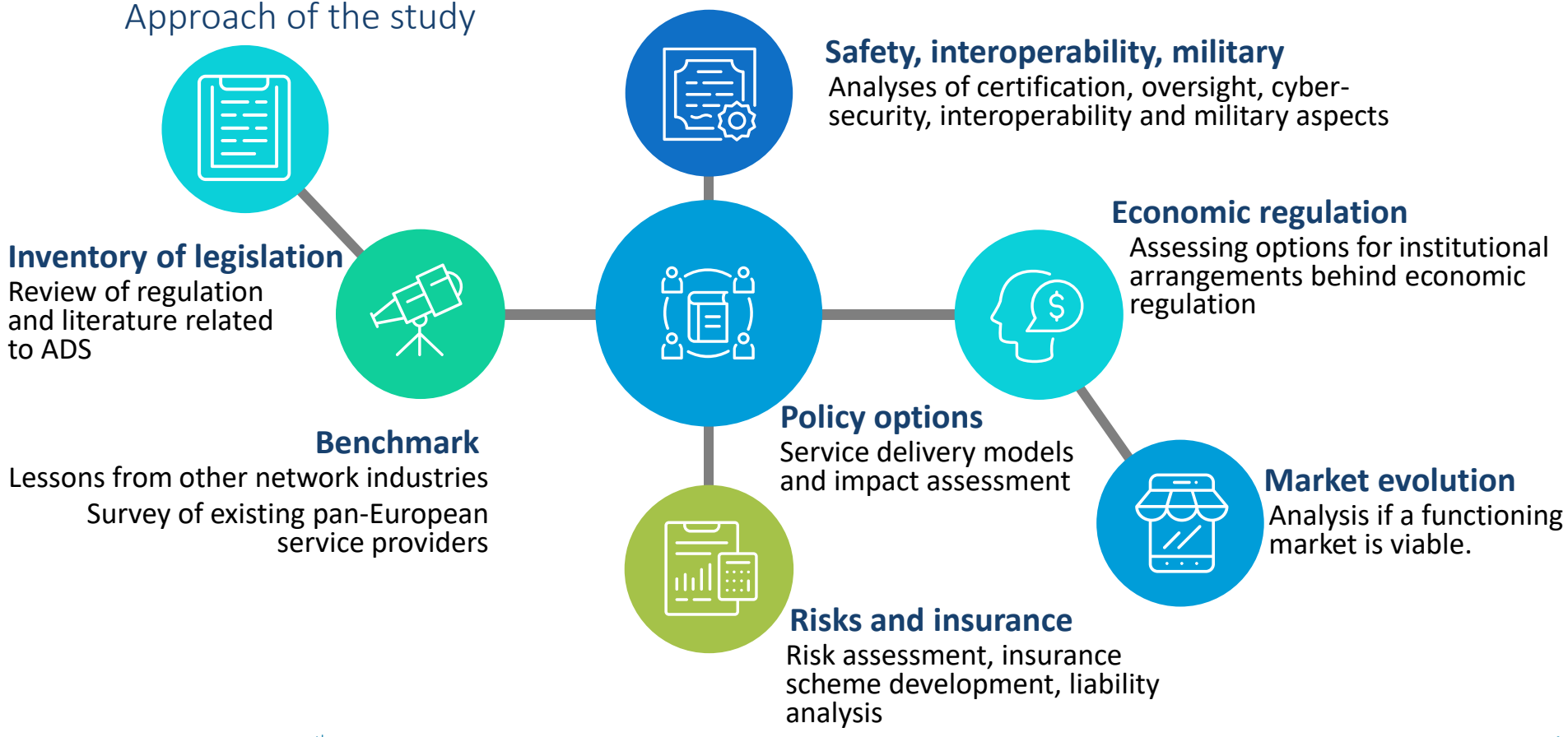


Figure 1. Analytical approach for the study[6]

- Scope focused on ATM data services
- Legal, economic and regulatory analyses will be conducted, complementing AAS
- Considering the whole ANS/ATM landscape, and the effects of ADS on other services (i.e. ATC)
- Working directly with the findings and definitions from the AAS, building on the same concepts

In the study, we are building on current legislation and lessons learned from existing examples, then develop policy options, which are assessed from different aspects

Approach of the study



Agenda item 3 Definitions and scoping of ATM data services

Formal, high level definition of ATM data services

We derived an output-based definition of the service

- ATM data services provide ANSPs/AUs/Airports with information on the **intended movement of each aircraft, or variations therefrom**, and with current information on the actual **progress of each aircraft**, based on **operational data** received from Surveillance, AIS, MET, network functions and any other relevant operational data.

- ATM data services also provide **decision advisory services** to ATSUs based on advanced data processing and transformation technologies (machine learning, AI, etc.)

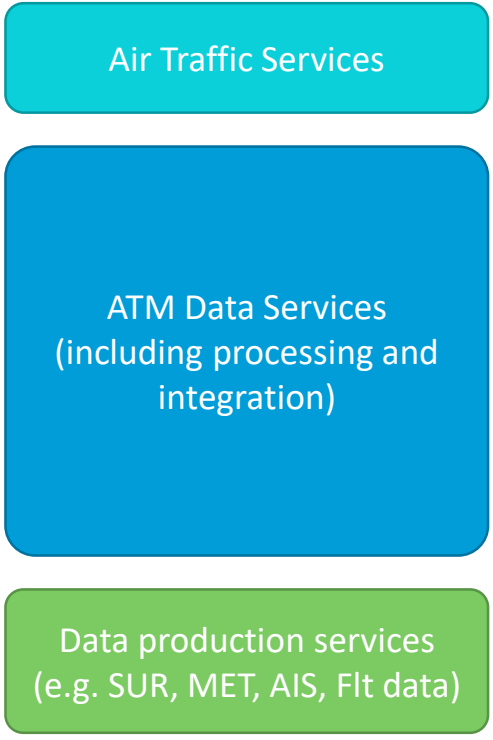
- An ATM data service provider may or may not provide **subsets** of the above defined services/information.

Formal, high level definition of ATM data services

Boundary considerations for the service

- The boundary between ATM data services and Air Traffic Services is defined at the point **where the data / information / application is presented on the screens of the controller working positions**
- The boundary between ATM data services and data production is initially defined at the point where **operational data enters the surveillance data processing systems** (trackers) or the flight data processing systems or the more advanced tools (applications)

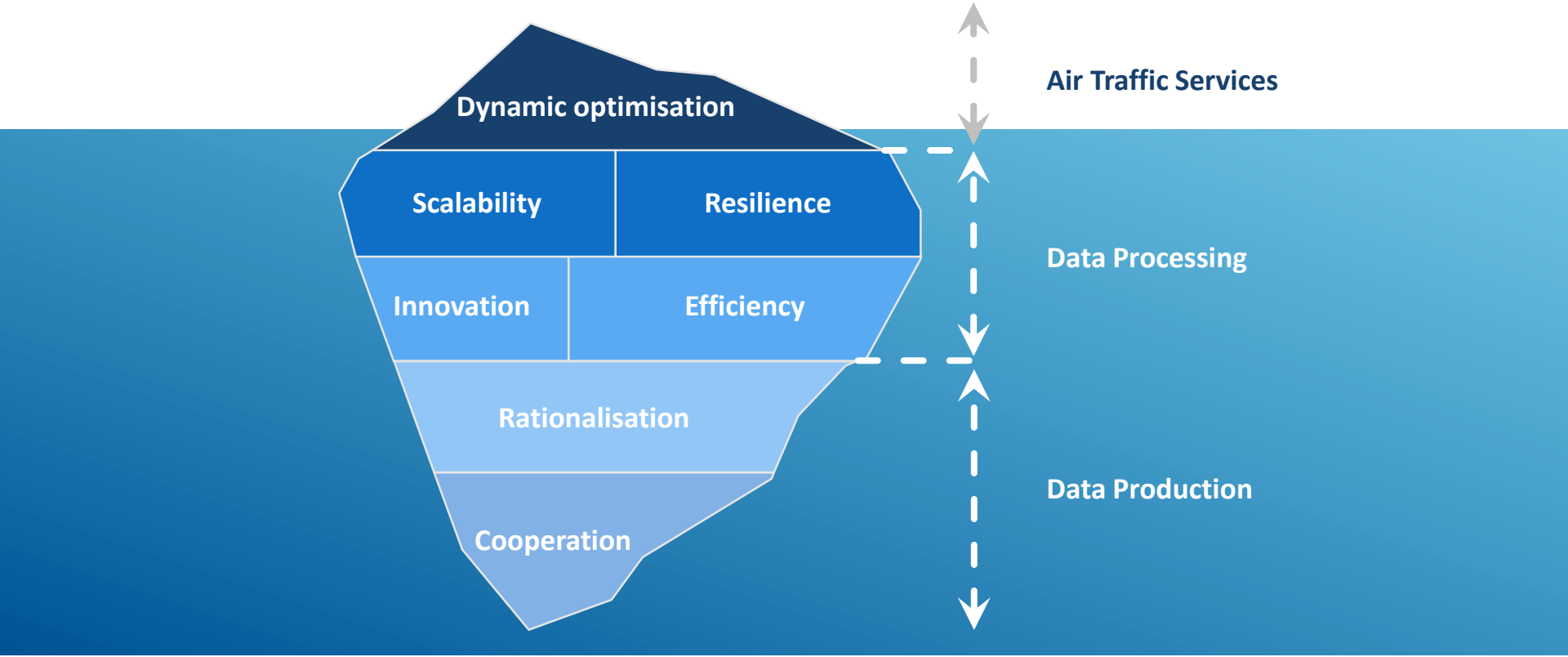
- These defined boundaries:
  - allow for a clear distinction between services (interoperability),
  - group the characteristics and competences required for ATM data services (i.e. data manipulation, non-geographically fixed)
  - fit well into the existing framework of legislation (e.g. EU Reg No. 2017/317), and
  - allow for maximum flexibility of business models (and would appear to enable an easier separation of accounts between services)



Agenda item 4.1 Implementation scenarios for ATM data services

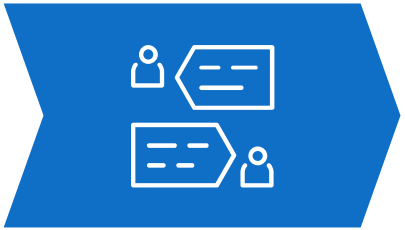
Dynamic optimisation of airspace and capacity is the main goal derived from the AAS, but there is more to it: scalability and resilience are also important, even more so under the current circumstances.

The tip of the iceberg: dynamic optimisation of airspace and capacity



Taking the definitions of ATM data services and the delivery mechanisms, we can identify several implementation scenarios bringing potential benefit

Implementation scenarios for ATM data services



Baseline scenarios

Shared development of systems and processes

Shared R&D activities

Shared training platforms

Non-tactical scenarios

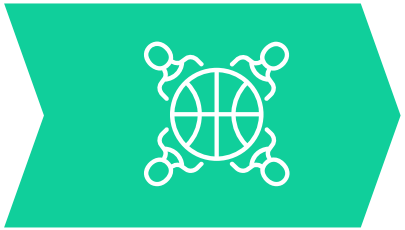
Non-time critical (planned) contingency operations

Planned delegation of service (night-time ops)

Time critical scenarios

Time critical contingency between two parties

Dynamic cross-border airspace adjusted to demand and optimising rostering between two ANSPs (/FIRs)



Virtual centre scenarios

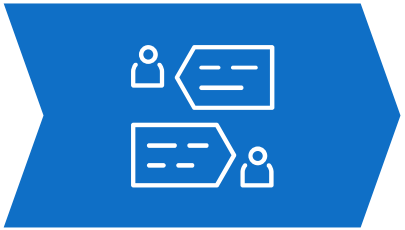
Virtual centres and non-dynamic optimisation

Capacity on demand (dynamic optimisation) at local or regional level

Capacity on demand (dynamic optimisation) at network level

Key principle: anything is possible in bilateral cooperation, and there are good examples already*, BUT: there are barriers to this, and they increase as we increase the scope and complexity

Benefits of having ATM data services (and ADSPs)



Baseline scenarios

No dramatic change from current setup

ADS can reduce setup costs for cooperation

Some smaller efficiency benefits if system development is managed by an ADSP for multiple ANSPs

Non-tactical scenarios

Benefits in resilience and capacity are minuscule

More efficiency-oriented use cases

The non-dynamic nature of these use cases require less complexity

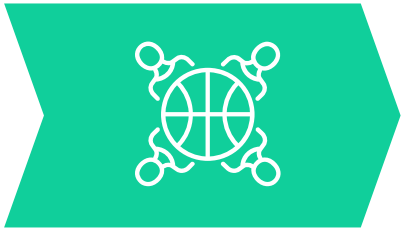
Efficiency benefits on a wider scope are unlocked, if moving towards ADS from bilateral agreements.

Time critical scenarios

Benefits require a common technical platform shared by the parties, and consistent data treatment

ADS and ADSPs can unlock these benefits, without the need for a shared platform

Capacity and resilience/scalability benefits are limited, without ADS on the network level



Virtual centre scenarios

Network level benefits build up when moving from non-dynamic optimisation through local/regional dynamic optimisation to network level dynamic optimisation

Requires a very high level of interoperability, data consistency, and flexibility in cooperation. These are unlocked with a common EU-wide approach and ADS(P).

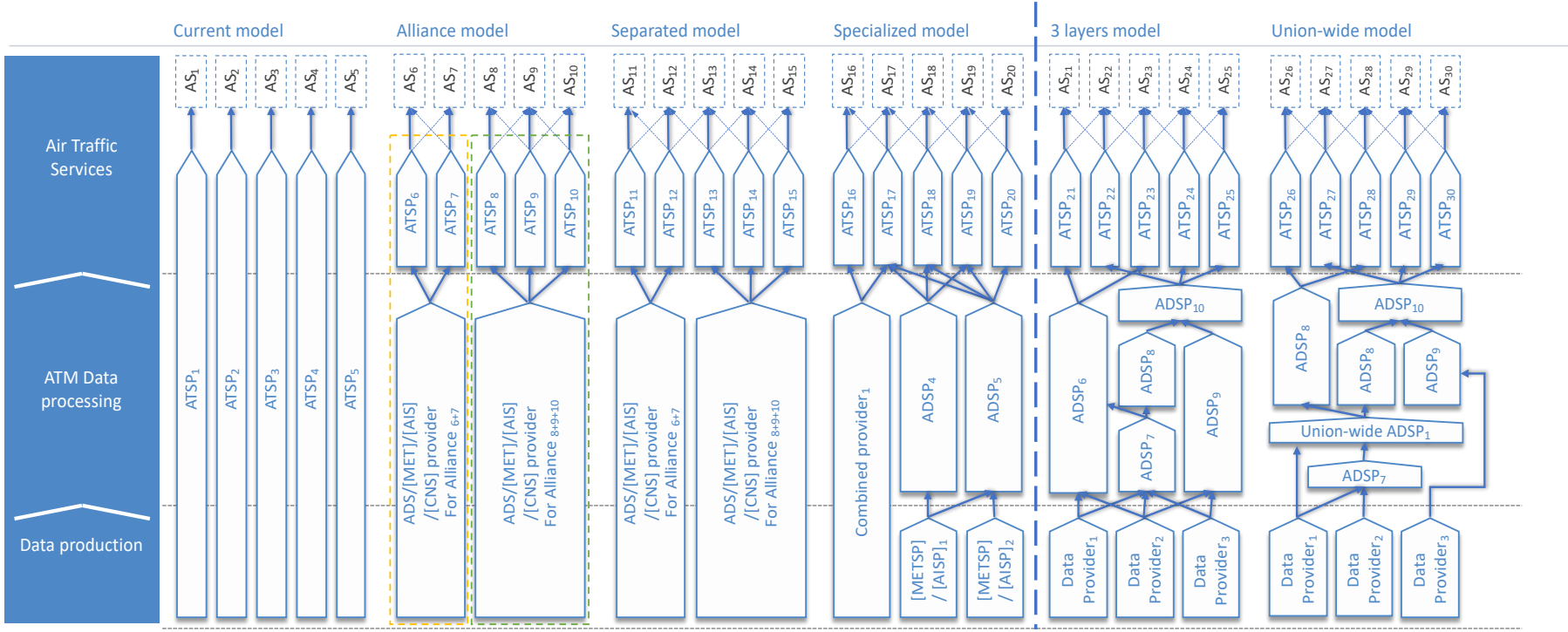
* FINEST, AIX-Geneva, MUAC-SloveniaControl-skeyes, etc.

Agenda item 4.2 Service delivery models for ATM data services

There are 5 models defined besides the status quo, each of them having a key characteristic (hence their names).

Overview of service delivery models for ADS

Possible service delivery models amended with the 3 layers model and the pan-European model for ATM Data Service provision (based on AAS Figure 26.)



Boundaries between models are not necessarily exact, but there are key aspects which make them distinct. These are driving technical solutions, competition, and the way services are delivered,

Key characteristics of service delivery models

- Alliances deliver ADS to alliance members.
- ANSPs retain full control over the value chain
- ANSPs remain vertically integrated.

- The boundary between ATS and ADS is clearly defined
- ATSPs 'purchase' data services from ADSPs
- Data related services remain vertically integrated.

- Enter specialised ADSPs, focusing only on data production or data processing
- Vertical integration of ADSPs may remain, but specialised players also emerge.

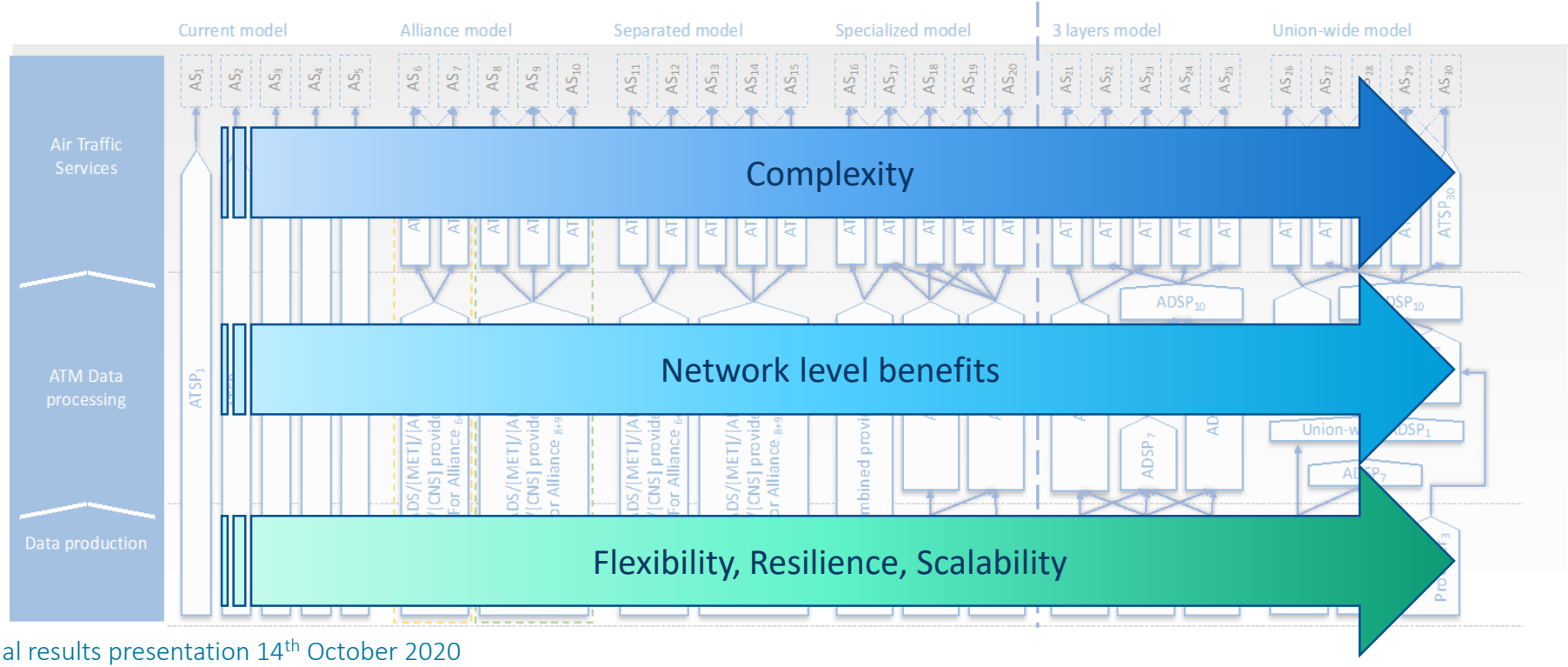
- The boundaries between the three service layers are clearly defined
- Two new 'markets' created: data production and data processing

- Same as the 3 layers model
- Certain sub-services may be - provided on a Union-wide basis.

Complexity may increase as we move from towards the more layered models, but so does the potential for network level benefits as well.

Why consider different delivery mechanisms?

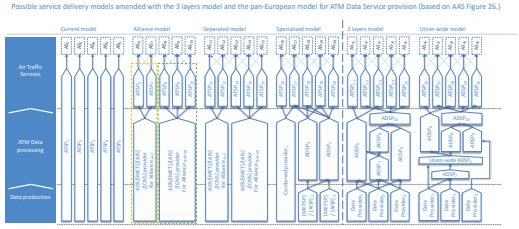
Possible service delivery models amended with the 3 layers model and the pan-European model for ATM Data Service provision (based on AAS Figure 26.)



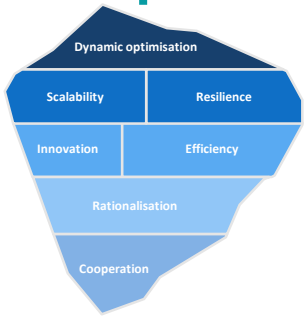
Agenda Item 5.1 Overview of the impact assessment

We use the high-level goals, service delivery models and implementation scenarios to inform the impact assessment. These aspects are iteratively affecting also each other.

Logical model of the different aspects



Impact assessment



The impact assessment focuses mainly on EU level impacts, and excludes any non-direct impacts.

Overall conclusions from the impact assessment

- The impact assessment excludes the benefits associated with resolving the capacity issues and reducing delays to an optimum level. These benefits are covered by the AAS, however, and when assessing the full potential of ATM data services, these must be considered as well.
- The impact assessment has its limitations, due to the very high level of uncertainty caused by the plethora of choices available for service providers, and also for policy makers
- The theoretical maximum economic potential associated with ATM data services is significant, and may reach even 31% in non-ATCO staff and 46% in CAPEX.
- The expected economic benefit, however, is very much dependent on which service delivery models are chosen by ANSPs. As per our calculations, the expected value of the beneftis may be around 15% in non-ATCO staff costs and 16% in CAPEX.
- Both social and safety impacts show possible positive and negative impacts or risks. Mitigation recommendations are developed for these, wherever they are applicable, ensuring that of course, that safety is not compromised

Agenda item 5.2 Economic impacts

Methodology

Objective of this task:
Analysis of the potential impacts of the new ADSP models on an EU-level

Sources

- Tool 19 of the EC Better Regulation Toolbox - Identification/Screening of Impacts developed by European Commission.
- "Methods to Assess Costs and Monetise Benefits for CBAs" developed by SESAR Joint Undertaking.

Steps

I. Identification of problem drivers and changes introduced by the new policy;
   - Market structure changes,
   - Technical changes,
   - Legal changes.

II. Identification of the impacts of the selected policy options;
   - Increase or decrease in costs

III. Single out those impacts which are likely to be significant;
   - CAPEX
   - Staff costs

IV. Assess the impacts.
   - Data envelopment analysis (DEA) tool

Results

Step I
Main problem drivers:

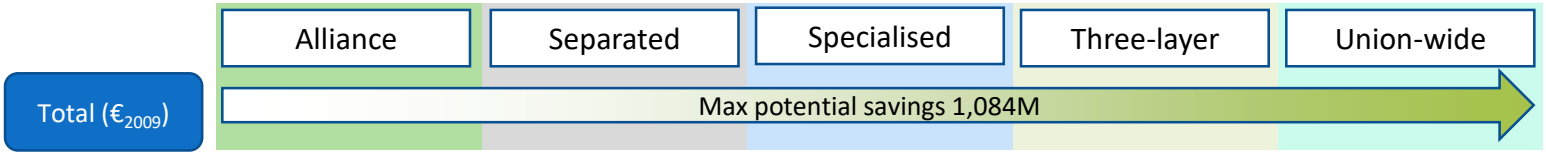
- Inefficient provision of Air ATS across Europe
- Inability to manage unexpected changes in capacity

Step II & III
Significant potential impacts:

- Reduction in the CAPEX and related costs
- Reduction in non-ATCO staff costs
- Decrease in certification costs
- Increase in insurance costs

Step IV
Impact assessment

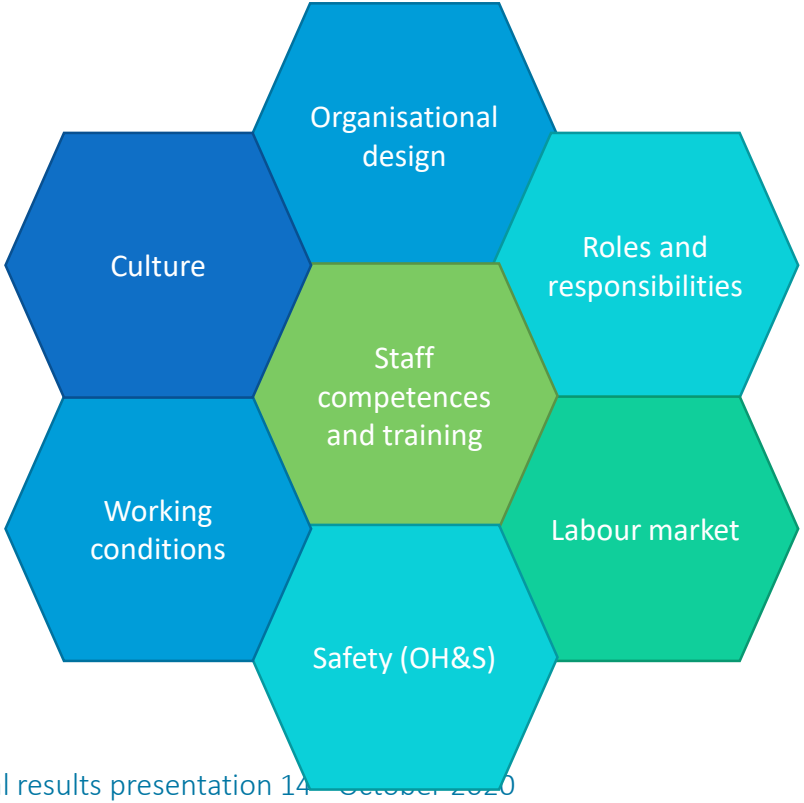
Yearly potential maximum savings per service delivery model



Agenda item 5.3 Social impact

Service delivery mechanisms assessed against criteria following EC Better Regulation guide-lines' categories as a check for areas to explore

Voluntary (optional) models under the revised SES2+ proposal, offered to those who want to engage by buying in data or becoming an ADSP. No regulatory requirement to move to ADSPs



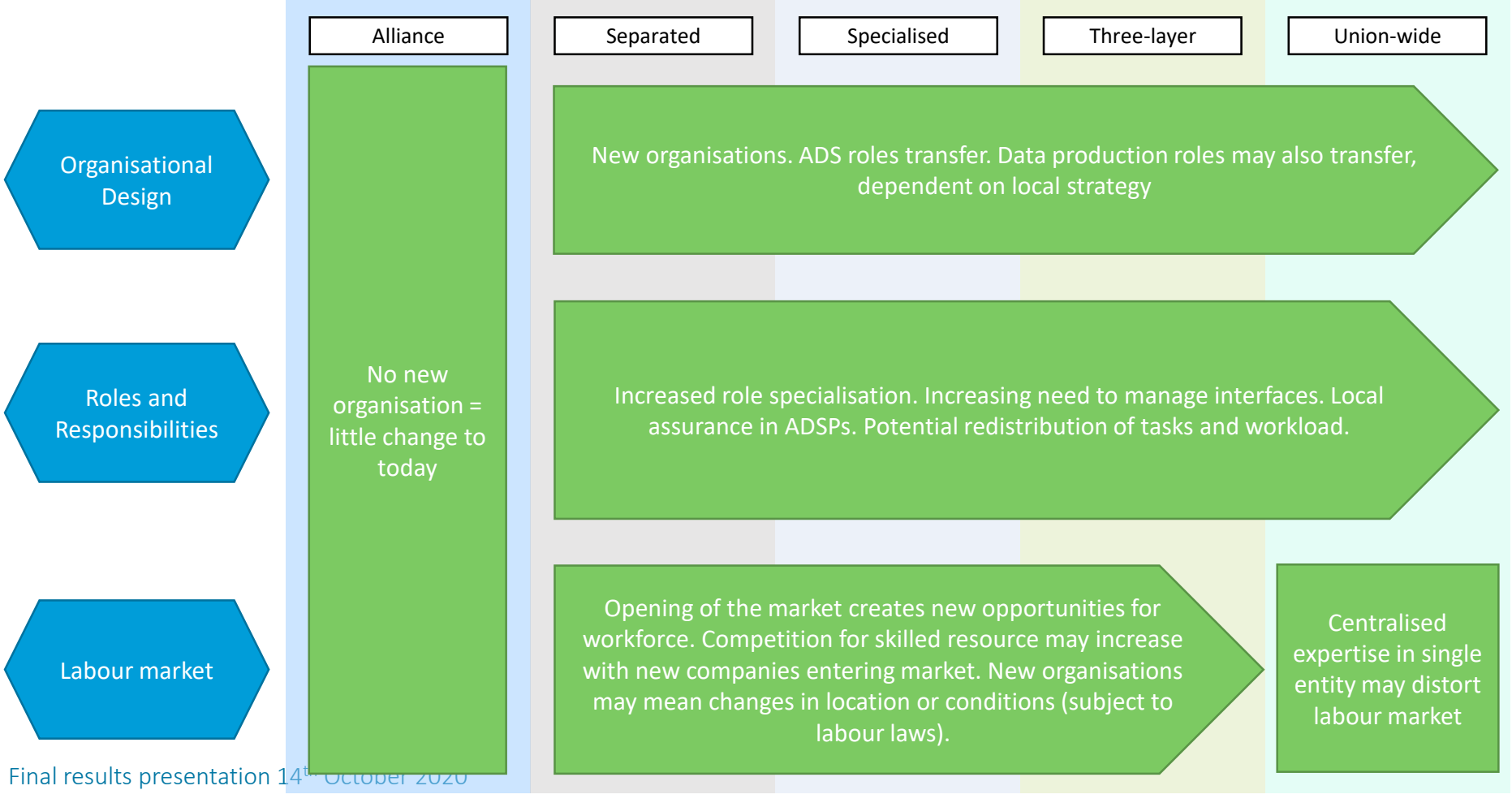
Main commonalities to today

- Functional tasks that need to be provided in the flow of operational data
- Core competences for ADS
- Assurance of organisations providing operational data in the ATM/ANS domain – i.e. certification as ANSPs

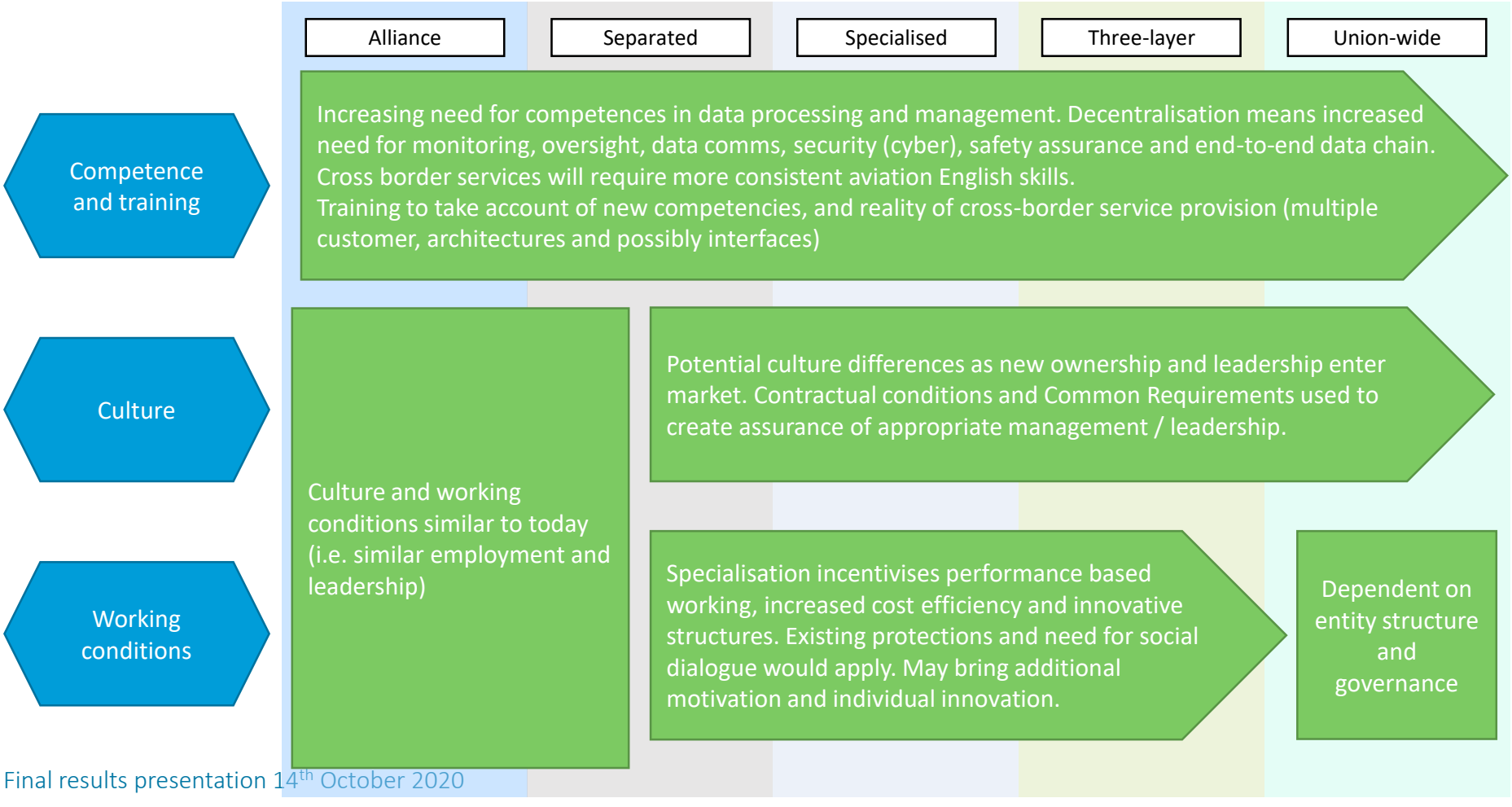
Main changes (all voluntary):

- Potential new organisations (ADSPs)
- Re-allocation of roles and responsibilities across sector
- New specialisms as ADS evolve

Summarising the results of the social impact assessment (1/2)

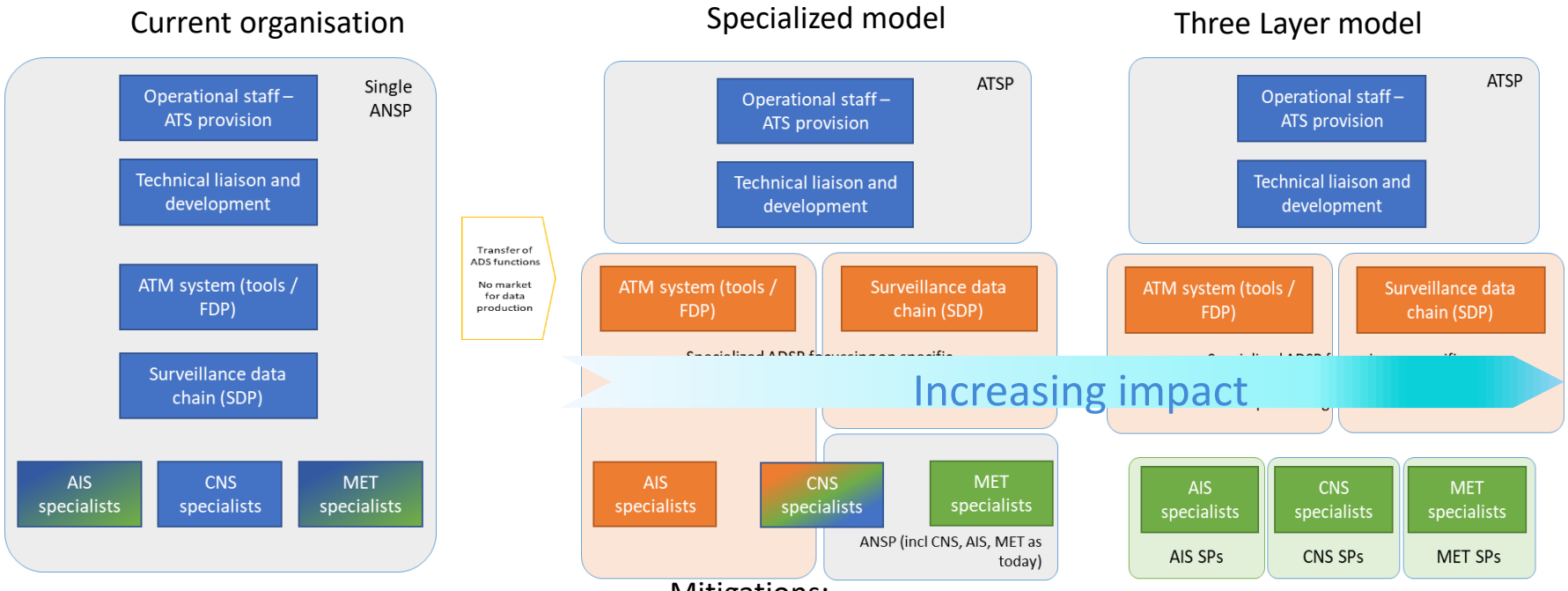


Summarising the results of the social impact assessment (2/2)



Agenda item 5.4 Safety impact

Organisational safety - Effectiveness of Safety Management



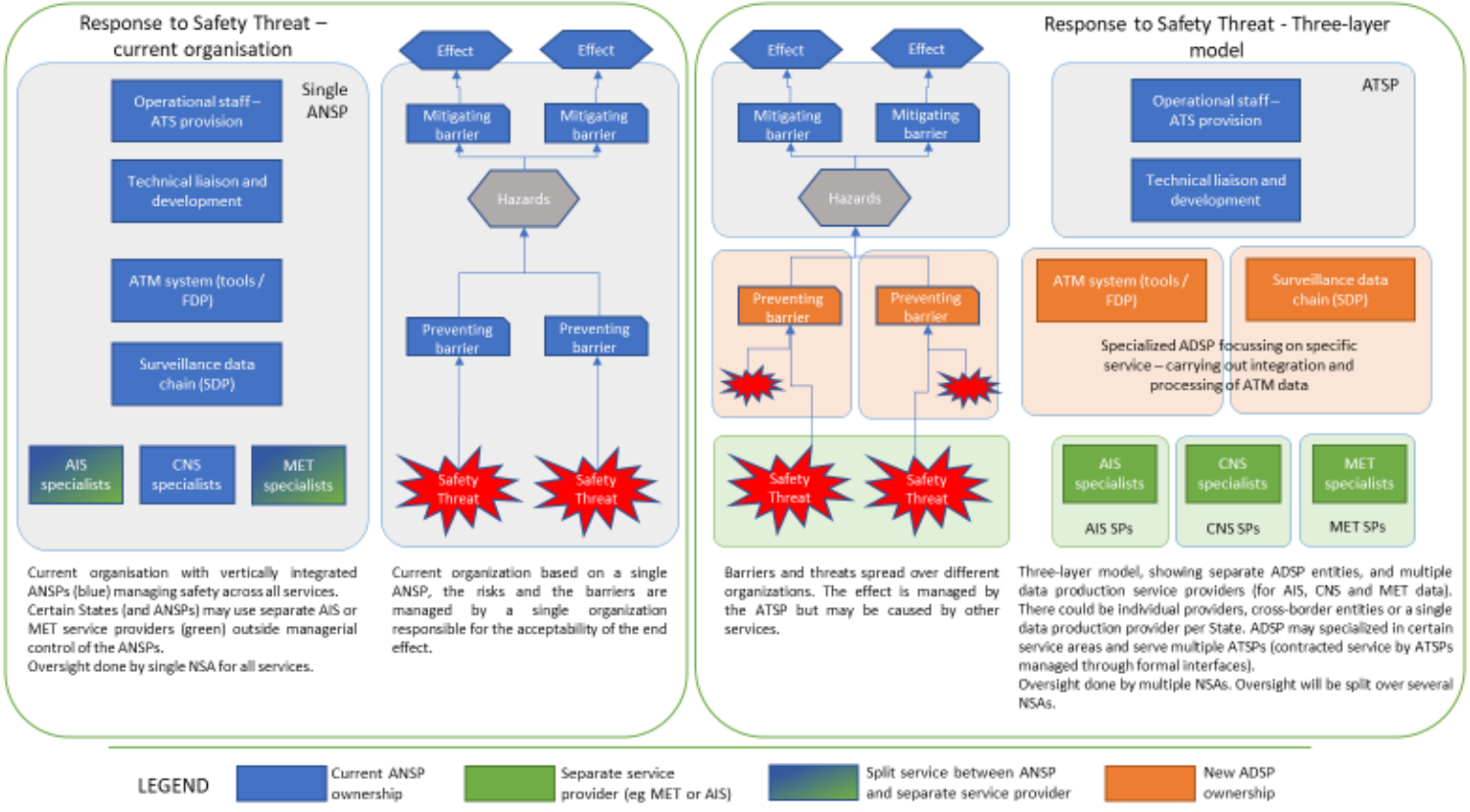
Possible negative impact

- Distributed safety accountabilities
- Lack of integrated risk picture
- Increased need to manage multi-actor and multi-layer changes

Mitigations:

- Adequate Common Requirements to ensure the compatible design of safety function among the stakeholders (assurance, promotion, culture and reporting).
- Visibility of design and system architecture provided to stakeholders
- Ensure Safety Support Assessments / Safety Support Cases achieve their objectives

Response to safety threat



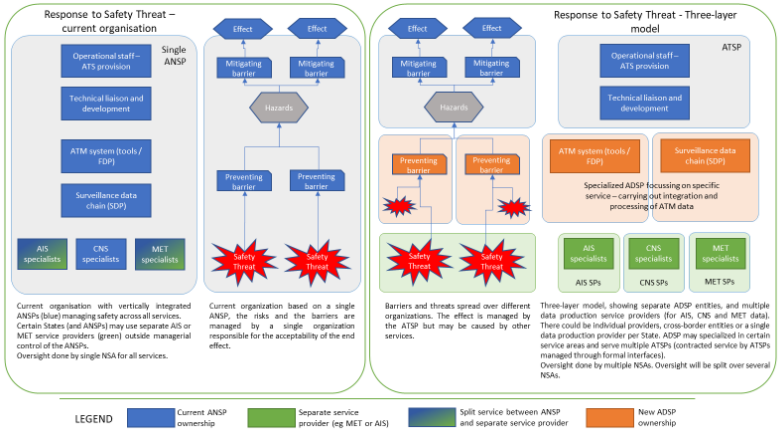
Response to safety threat

Increased complexity - introduction of new risks

Additional interfaces between actors

Lack of integrated risk management approach

Maintenance assured by different organisations



Accessibility of data from more than one source

Improved continuity of service

Increased resilience

Improved contingency

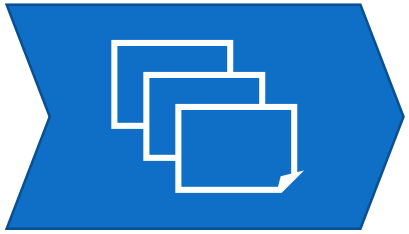
Mitigations :

- Adequate Common Requirements (awareness by the ADSP)
- Interoperability requirements

Agenda item 6.1 Interoperability and interfaces

Support for ADSP interoperability exists, but would need strenghtening

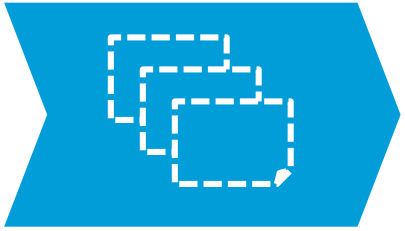
Current status and Future needs



Current Regulations

Provides the necessary vehicles to mandate implementation of IOP standards

Service Delivery Models for ADSPs does not require changes hereto



Future Regulations

Dependent on EASA Rule Making Task for certification / declaration (the Framework)

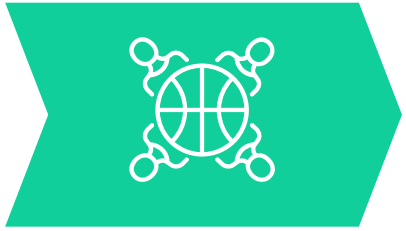
Potentially, some additional essential requirements to ATM/ANS systems and constituents

Current IOP standards may need revision to reflect split of services

Interoperability standards

Interoperability between ANSPs exists today (Asterix, OLDI, FPL, NM B2B, etc.)

More complex Service Models and Operational Concepts (dynamic / cross border management of sectors) may need more “effective” IOP standards



Future standards

Common Project One will mandate SWIM implementation (AIS, MET & FD)

Ongoing standardization work will need to be completed (e.g. ED133a)

Would need to align to SESAR industrialization timelines

Agenda item 6.2 Licensing, certification and oversight of ATM data service providers

Certification, oversight and enforcement of ADSPs subject to current principles

Basic Regulation (2018/1139) and Common Requirements (2017/373)

Regulations

Current regulation provides the necessary basis for the certification and oversight of ADSPs

Current proposed amendments address some issues (e.g. Cyber Security)

Basic Regulation

ATM Data Services need to be recognized as a separate type of service with associated essential requirements

SES2++ already includes proposal for both

Common Requirements

ATM Data Services need to be recognized as a separate type of service

New Part ADS need to be developed with specific CRs for ADSPs (data quality and quality of service)

ADSPs certified based on general requirements (e.g. ANS) and specific requirements (ADS, CNS)

Certificate

Specific ADSP certificate:

- Type of ATM Data Services
- Airspace supported
- Conditions

Mutually recognized

Roles and Responsibilities of Competent Authorities remain as today

Basic Regulation (2018/1139)

Current situation

ADSP provided in Regulatory view	One Member State	Several Member States	Most or all Member States
Responsible as per regulation	Member State	Member State(s) under agreement	EASA
Possible delegation as per regulation	Member State may request another Member State or EASA to be responsible or support the tasks		EASA may request a Member State to be responsible or support the tasks
Applicant as per regulation	May request EASA being the responsible authority		EASA
Residence outside Member States	Irrespective, EASA will be the responsible authority		

Future situation

- ADSPs wishing to operate in one or several Member States
- ADSPs wishing to operate in all or most Member States
- ADSPs may request EASA being the Authority

Reasoning / challenges

Reasoning:

- More complex Service Delivery Models tend to favor EASA
- Initially, ADSP would be established based on existing ANSPs (same Authority for ADSP and ATSP)
- Responsibilities would have to be transitioned
- ADSP can request EASA being the Authority

Challenges:

- Harmonization and equal standards among Member States
- Resources of the Authorities
- Level of cooperation needed between Authorities

Agenda item 7 Presentation on the defence and military related aspects of ATM data services

Military in EU context – common denominators

- Diverse EU context = diverse requirements
  - Technology, organisation, legal aspects
- Defence is national prerogative
  - Difficult to regulate on EU level
  - Air sovereignty tasks
- Not a direct subject to specific regulation
  - States' responsibility
- Normal and crisis operational modes
  - Different needs during crisis
- Service, not a business
  - Does not decide on financial aspect
- Receiver and provider of ATM data
  - May not be regulated same way as civilian provider

Main military requirements - I

- Availability and continual provision of ATM data
  - Continuous situational awareness
  - Enabler for safe and effective military operations
- Interoperability of data and systems
  - Legacy system may experience interoperability issues
  - Should not prevent military from using the ADSP or force into investments
- Security and confidentiality of military data
  - To maintain control over their own data
  - Classification of some military data and trusted parties
  - Resilience of ADSP to be addressed

Main military requirements - II

- No additional costs to military
  - Current arrangements to be maintained if same services (as today) are provided
  - Military does not manage national budgets
- Voluntary principle of ATM data provision by military
  - Military data is shared mainly for coordination and safety of CIV/MIL operations
  - Data is provided as is (quality) and only if agreed
- No ‘enforced’ certification
  - Regulatory requirement to ensure safety levels to civil operations supported by military services

Conclusion

- No blocking requirements identified
  - Most of issues could be solved by State via contracts and liability arrangements
- Existing SES regulatory framework may support military requirements' issues
  - Expected that the new regulation will address the ADSP similarly as ANSP
- States will play the main role in deciding the organization of ATM/NAS services incl. relation between ADSP and military
  - States responsibility and prerogative
- Local service agreements are estimated to prevail to define responsibilities and liabilities
  - Local specifics would be difficult to address by EU regulation

Agenda item 8.1 Providing ATM data services under market conditions: pricing scenarios

Competition

Competition *for* the market

Contestable market

Conditions

- No entry or exit barrier
- Access to the same technology
- Perfect information
- Price setting lags

Auction theory: tendering & bidding

Conditions

- Required inputs/technology to enter the market should be available to every potential bidder
- No incentives of collusion between bidders
- *E.g. European 3G spectrum auctions in 2000*

Competition *in* the market

Pricing options	**Marginal cost**	**Average cost**	**Price cap**
Pros (+)	• Optimal social welfare	• Almost optimal social welfare • Regulated amount of profit for regulated entities (break-even or cost-plus)	Decrease of price over time: • Reduction of costs • Invest in new technologies → More efficient market.
Cons (-)	• Potential losses for the regulated entities (MC > ATC)	• Cost recovery, no incentive to reduce costs	• Potential risk of reduction in quality and decrease in investments • Time consuming • Need for symmetric information • Expert knowledge
Examples from other industries	*Californian electricity market*	*Pricing regulations in public utilities of the US in the 19th century*	*Economic regulator (Ofwat) for the water and sewerage sector in England and Wales*

Data service on market conditions

Current situation
Hybrid price cap model

ATM data services are fully integrated into the ANSPs

ANSP economically regulated for all *en route* services*:*

- Prices set in terms of DUC;
- Over a regulated period
- ↓ following a union-wide target;
- Regulatory mechanism implemented;
- ANSPs can charge a rate of return (ROE).

→

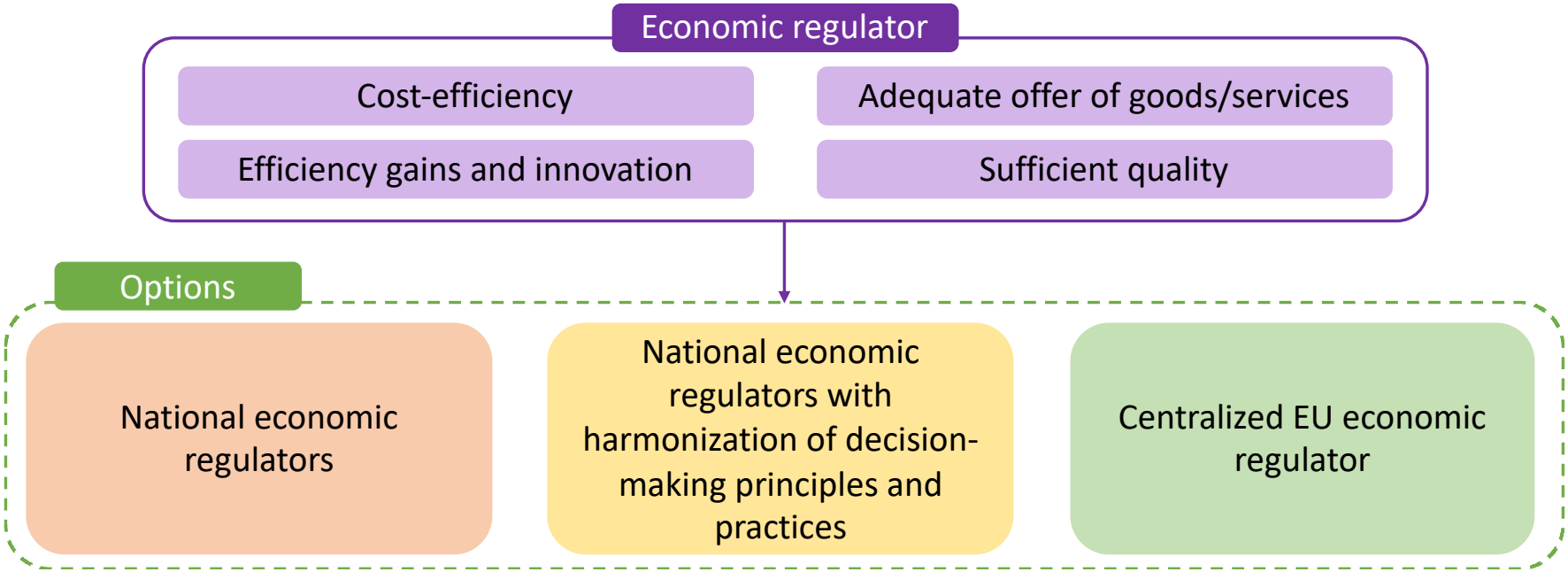
Future

Competition ***for*** the market	Competition ***in*** the market
Potential difficulties in the first period of market creation: • Contestable market • Auction theory	• Quality targets; • Investment policies. • Align and calibrate prices between upstream and downstream markets (avoid marginalisation or cost increases); → Need for coordination and a set of common rules between national economic regulators

Agenda item 8.2 Institutional background of economic regulation in relation to ATM data services

Purpose

Objective of this task:
Analyse and appraise, as required under the ToR, the institutional arrangements required for the economic regulation of ATM data service providers.



Key findings

Economic regulator	**National economic regulators**	**National economic regulators with harmonization of decision-making principles and practices**	**Centralized EU economic regulator**
Institutional requirements & legal basis	• General principles, including on independence • No mandatory harmonization, broad discretion in decision making practices	Common standards, including for: • Decision-making principles • Economic regulation methodologies • Related procedures	Sector-specific regulation with detailed responsibilities and tasks of the agency (independent body)
SES institutional framework Who (potentially)	E.g. NSA → only limited changes *Other industry: railway sector in Europe (National rail regulatory body)*	E.g. NSA → enhanced harmonisation *Other industry: gas and electricity sectors in Europe (ACER, NRA)*	E.g. PRB, EASA → new EU regulatory authority *Other industry: ECB role as bank supervisor*
Pros (+)	• Specialised local knowledge • Geographic proximity with regulated entities	• Specialised local knowledge • Geographic proximity with regulated entities • Enhanced consistency of decision making across MS	• Consistent regulatory approach • Broder sector view • Economic of scale and scope, enabling efficient use of resources
Cons (-)	• Challenges in terms of availability and use of resources and expertise • Potential risk of regulatory capture • Focus on national and local dimensions • Inconsistencies between EU MS	• Challenges in terms of availability and use of resources and expertise • Potential risk of regulatory capture	Challenges related to distance between economic regulator and the regulated entities (e.g. information collection and interaction with regulated entities)

Agenda item 9 Main Conclusions from the study

The concept of ATM data services should be pursued. There are no blocking issues, yet there are challenges, which require policy actions.

Summary of the conclusions

THANK YOU FOR YOUR ATTENTION!