Towards collaborative governance of the Digital Backbone for the SES

White Paper

Executive Summary

This paper explores the establishment of an alliance, called **SES Shared Services Alliance** (**3SA**), and formed by and open to all European ATM operational stakeholders (including Network Manager and MUAC) and with EUROCONTROL Agency support, for jointly setting up and governing the **SES Digital Backbone** (**SDB**) and its components.

Building from the NewPENS experience, this paper proposes NewPENS, Data-Link Services (DLS) and System Wide Information Management (SWIM) as the first SDB components under the remit of the 3SA.

Why this white paper?

To follow emerging operational stakeholder needs, they must increasingly rely on automated sharing, merging and presenting of information from diverse sources, i.e. "digitalise" their businesses. By nature, ATM will always use diverse data exchange technologies. However operational staff should not be disturbed by IT technology change but simply get access to better information.

To achieve this in a coordinated manner, the underpinning ATM data exchange infrastructure should be managed as a coherent „**SES Digital Backbone**". In order to involve all operational stakeholders and to accelerate the implementation of the ATM Masterplan vision, A6 Alliance and EUROCONTROL offer this white paper for wider discussion.

What is at stake?

The inter-organisational digitalisation of European ATM. In particular, in the process of setting up such shared digitalisation, important decisions have to be made, such as which stakeholders can access operations-grade information by what means; as well as which technologies are introduced and when. These decisions will define the digital ATM service market in Europe.

It is essential to recognise that this discussion must address all technical components required to get information into the right places, from wire to ATM system component. Therefore the community should further build on the good experiences of NewPENS as well as on the work that is being developed in the frame of the ongoing Datalink and SWIM Governance Implementation Projects. . The present whitepaper refers to this overall set of components as the "**SES Digital Backbone**" (**SDB**) of operational ATM.

Why will the European ATM stakeholders end up having a single SES Digital Backbone?

Similar to other industries, European ATM stakeholders are becoming more information-dependant on each other. The ATM Masterplan shows a clear vision of digitalisation, automation and virtualisation. Remote Towers, ATM virtual centre and drones are all clear examples of the digital

transformation already happening today. Therefore, there is a need to have a common efficient and reliable environment within which ATM stakeholders organise "information hubs" for managing increasingly complex interconnections.

A single SES Digital Backbone will deliver key benefits of platform economics to European ATM:
1. It will provide a common safe and cyber secured context for all data access infrastructure;
2. A common trustworthy backbone will encourage more actors to start sharing and using information; and,
3. Interoperability between stakeholders will also be eased as design choices are made in a common environment.

To this end, all stakeholders must trust the technology platform as well as its governance. Because shared digital components or "information hubs", through which business partners interact, are the mainstay of the economics of digitisation. There is typically one platform dominating the market. This is because the availability of information is what attracts customers, who themselves provide more information to the platform, and so further boosting its relevance. For example, Google, Amazon and Facebook dominate their respective information market (i.e. searches, e-commerce, social networks) such that few digital agents can afford not to use these platforms.

What are the requirements for the Governance of the SDB?

In view of the inherent monopolistic nature of the SDB explained above, it is of critical importance to organise its governance such that all European operational ATM stakeholders have access to the same information resources and so can compete in the digital environment on a level playing field (competition objective).

It is also important that changes to the SDB are agreed in an inclusive, transparent and collaborative process to ensure that the digital ATM market is not distorted by particular interests of privileged stakeholders (fair evolution objective).

Moreover, it is important that the SDB is governed such that the actual operational needs of the Single European Sky, in particular with regards to safety, cyber security and overall systemic efficiency, are duly taken into account to protect the integrity of the SES approach and its core principles (responsibility objective)[1]

Finally, there is a pressing need to accelerate the evolution of the European ATM system on technology by making sure that operational stakeholders can efficiently integrate technological solutions developed by SESAR, innovative industry solutions as well as new models for providing services into the system, after due practical consideration of the impacts. A light, non-heavy administrative approach will be essential (agility objective).

In this context, the collaborative governance of the SDB by all European operational ATM stakeholders (including NM and MUAC), and with the support of EUROCONTROL Agency, is crucial for such agents to be trustable, and in turn for the success of the SDB.

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[1] *In a recent Communication by the European Commission (COM (2016) 288), the European Commission (EC) has stressed that it will take the following principles into account in matters related to online platforms:*
- *A level playing field for comparable digital services.*
- *Responsible behaviour of online platforms to protect core values.*
- *Transparency and fairness for maintaining trust and safeguarding innovation.*
- *Open and non-discriminatory markets in a data driven economy.*

The above considerations are a transposition of these principles into the context of the Single European Sky framework.

What is the proposal?

Considering that the different technological components required for ATM digitalisation are interdependent, and hence, emerge together as the SDB, the European ATM operational stakeholders (including NM and MUAC), and supported by EUROCONTROL Agency, need to jointly address what is the best model for establishing, operating and evolving the SDB.

This paper advocates that in order to best address and manage the setup, operation, and further evolution of the SDB, European ATM operational stakeholders shall jointly define and control how, when, and under which conditions the SDB is provided to operational stakeholders. To achieve this goal, the best way in terms of feasibility, economical efficiency, flexibility, and inclusiveness for European ATM operational stakeholders is to setup a dedicated alliance: the **SES Shared Services Alliance** (**3SA**).

The mission of the 3SA should be triple:
1. Ensuring that the SDB operates in best market conditions for shared services and technological components, and for the ultimate benefit of the overall European ATM and particularly for EU passengers;
2. Establishing a collaborative governance which makes sure that the SDB meets present and future European ATM operational stakeholders' needs; and,
3. Providing a common forum, enabling European ATM operational stakeholders to sit together for fostering collaboration on shared technological components.

The focus of the 3SA will be the SDB and its components. For the time being, three SDB components are envisaged:
1. NewPENS,
2. Datalink Services (DLS), and,
3. System Wide Information Management (SWIM) including SWIM Common Components.

How can the SES Shared Services Alliance (3SA) be organised?

A plausible set up of the 3SA is formalising it by means of a Memorandum of Cooperation (MoC). Such MoC would instantiate the alliance itself, the SDB and its components, and the service provision of each component with corresponding dedicated governance structures.

The overall SDB will be composed of several different components, which even if complementary, will serve different purposes.

A practical way to reconcile the need for a common framework to address the SDB and its components, while respecting the specific needs of each components, is to modularise the 3SA MoC. To achieve this, the specificities of each SDB component should be provided in dedicated Annexes to the framework 3SA MoC. In turn, the Terms of Reference (TOR) of governance bodies tailored for each component should be described in Appendixes to each Annex, respectively. Nevertheless, the highest board of the 3SA, called Top Management Board (TMB) and formed by CEOs, should remain within the framework 3SA MoC.

Considering state-of-the-art governance structures established for NewPENS, and being discussed in the DLS and SWIM governance initiatives, the 3SA for the SDB would resemble to Figure 1.
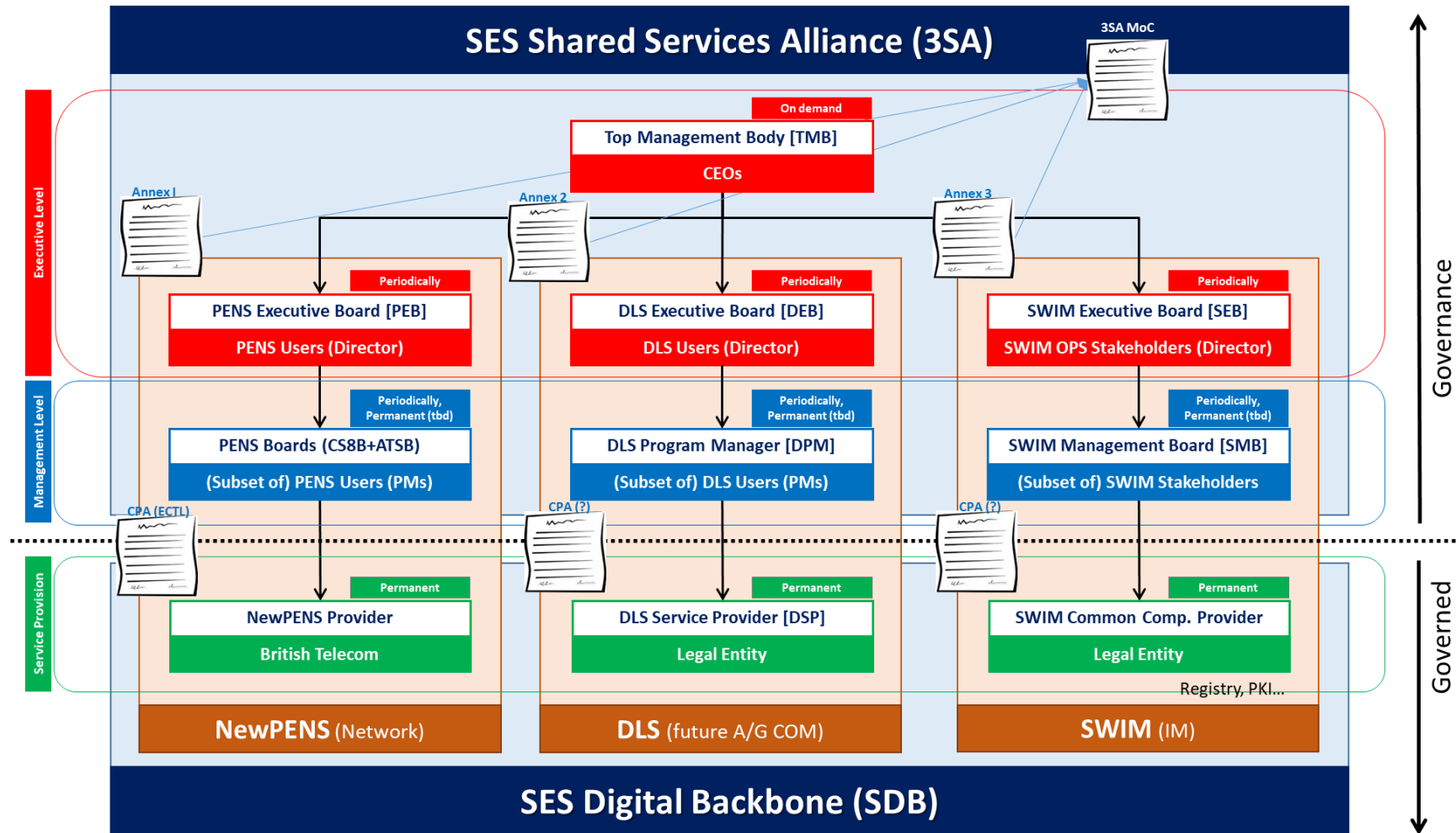
Figure 1 Overview of initial SDB and 3SA, covering NewPENS, Datalink (DLS) and SWIM[2].

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[2] *The specific bodies depicted for each SDB component are only a plausible scenario considering current status (i.e. can be subject to changes).*

How should the service provision of SDB components be arranged?

In view of the competition objective, it is crucial that the service provision of the SDB components is subject to market conditions. To safeguard this, where procurement is required, decided by the SDB governance structure, the service provision of each SDB component must be selected via public procurement processes. Therefore, in addition to the Annexes to the MoC for each component, Common Procurement Agreements (CPA) connected to the MoC Annexes must be set up to enable joint public procurement. By means of these CPAs, each component will be offered in open competition, hence remaining cost-efficient.

Why do we propose a modular structure of the 3SA MoC?

Modularising the 3SA MoC has the advantage that it allows to profile each underlying governance structure to the specific needs of each SDB component, while enabling flexible mechanisms for adding and withdrawing SDB components. Therefore, it provides a stable framework to evolve the SDB according to ATM operational stakeholder needs.

Even if the SDB as a whole will become a key part of the European ATM system, not all operational stakeholders will necessarily use all of its components. This implies that stakeholder groups will want to restrict their engagement in component-level governance to the SDB components they actually require for their operations (e.g. Airport Operators have no operational interest in DLS). To accommodate this need without fragmenting the SDB into isolated structures, each operational stakeholder needs to be positioned to sign up only for the governance of selected SDB components.

How does the proposal fit into the current and future SES context?

Europe´s next ATM generation was triggered at policy level and strongly encouraged by the EC, by setting up and strongly funding the SESAR programme, while in parallel the SES I Package was being adopted. For steering the R&D phase of SESAR, the EC and EUROCONTROL founded the SESAR Joint Undertaking (SJU), which had to execute the SESAR R&D phase drawing on ATM industry input and contribution as required.

Meanwhile, the EC accelerated the deployment of the first batch from SESAR with the introduction of the Common Projects (CPs) and Pilot Common Project (PCP) IRs[3]. These regulations are streamlining SESAR deployment phase and led to the setup of the SESAR Deployment Manager (SDM) for steering, coordinating and monitoring deployment activities. For executing the SDM financially aided with EU funds, the EC selected the SESAR Deployment Alliance (SDA), which started as an alliance of European ATM operational stakeholders, i.e. the ATM industry itself stepped up to take responsibility for ensuring that deployment is well synchronised with operational needs at all levels.

In this context, as reflected in Figure 2, the set-up of the 3SA emerges as a natural consequence from closing the loop of the SESAR programme for the operation of shared components.
In practice, the 3SA will deliver SDB joint operations in Europe "**from industry for industry**", with the support of EUROCONTROL Agency, and indeed, a stable and flexible mechanism for European ATM operational stakeholders to manage shared resources in an economically efficient manner.

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[3] *Common Projects (CPs) and Governance Implementing Regulation (EU 409/2013)*
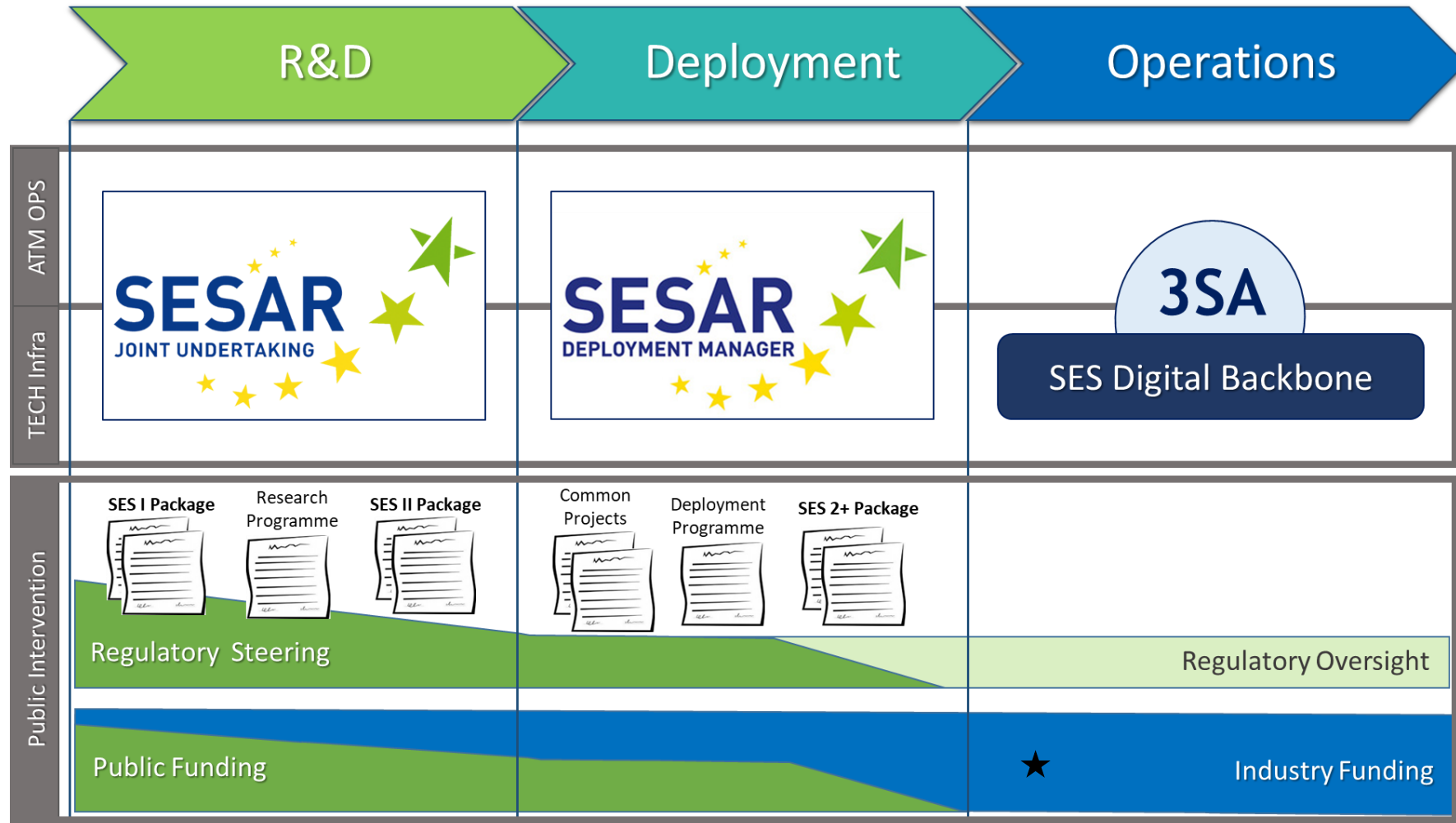*Pilot Common Project (PCP) Implementing Regulation (EU No. 716/2014)*

Figure 2 3SA and SDB in the current and future context

★ Public funding for establishment

The establishment of the 3SA could also be considered an effective response to the recent ECA's special report[4] on SES and SESAR. Amongst other considerations, this report concludes that deployment of SESAR must lead to a more unified, de-fragmented and cost-performant ATM in Europe, for which EU financial support is to be limited to R&D and deployment activities.

In terms of regulations, with the adoption of the next SES regulatory package, European ATM will have a stable and comprehensive framework also setting the environment for the SDB and the 3SA, which in turn will naturally shift the focus from extending the legal framework to effectively enforcing and overseeing operations in accordance with applicable regulations.

Overall, the 3SA will be key for the new era of European ATM besides the a.m. SES regulatory package. It does not require any specific regulatory framework mandating its implementation. Rather, it is born from joint needs and the determination of the European ATM community to work together towards higher levels of convergence and collaboration.

How will the proposal satisfy the objectives?

The competition objective will be achieved by means of joint public procurement of each SDB component and "Pay per Use" charging schemes. Public tenders will ensure that the service provision of each SDB component remains in best price-quality conditions. The "Pay per Use" charging schemes will ensure that the financial impact for each European ATM operational stakeholder correlates to the actual use of each SDB component. This in turn will ensure that the ATM agents remain in equal conditions, hence preventing market distortions and promoting competition.

The fair evolution objective will be achieved by means of collaborative decision-making governance structures controlling each SDB component. These governance structures will ensure representation of all the users and will drive the evolution of each component. In addition, the processes of these governance structures will be agreed upon by the users, which in turn will provide transparency on the collaborative decision-making.

The responsibility objective will be achieved thanks to the governance structures entailing collaborative joint procurement of SDB components. The SES regulatory framework lays down a comprehensive set of legal requirements placed to certified European ATM operational stakeholders. Building on the NewPENS best practice and by putting operational stakeholders in charge of the SDB governance, applicable legal requirements stemming from SES will be passed to the SDB component providers. This will ensure that the responsibility chain is respected and that the SDB is operated within the appropriate safety, performance, and cost-efficiency levels.

The agility objective will be achieved by means of the modular 3SA MoC structure and the direct control from European ATM operational stakeholders. This modular structure will ease the introduction of more SDB components stemming from SESAR and other innovation activities, which in turn will accelerate the evolution of the European ATM system and will positively influence the overall system efficiency. The direct user control of the SDB will ensure that required decisions are made in timely manner.

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[4] *ECA Special report No 18/2017: Single European Sky: a changed culture but not a single sky*

What is the evidence that it will work?

Joint initiatives for setting up shared digital backbones exist already in a number of sectors.

The best-in-class example is the "Society for Worldwide Interbank Financial Telecommunications" (SWIFT). SWIFT is a cooperative society set up, owned and governed by banks, for providing an equivalent digital backbone for worldwide banking. At its start in 1973, it established common standards, shared data processing systems and a worldwide network for financial transactions. Today, SWIFT provides the digital backbone for worldwide banking with a wide-ranging service portfolio. The governance of SWIFT is arranged collaboratively and uses representation mechanisms in a "Pay per Use" fashion.

Therefore, the SWIFT-case sets a very successful analogy to the SDB that can be used as a solid basis for the European ATM context.

On top of such an example stemming from outside of the ATM business, we have already established the first building block of a possible 3SA – the NewPENS governance. A common procurement agreement, agreed roles and responsibilities of the governance bodies are up and running.

Why are NewPENS, DLS and SWIM the initial SDB components?

European-wide elements that contribute to interconnect different components of the ATM system are candidates for becoming SDB components. The necessary orchestration of such components by operational stakeholders for their business processes underpins their status as SDB components.

Currently, a number of initiatives setting up European-wide components satisfy these conditions:

- **NewPENS**, successor of PENS, aims at providing a highly reliable network dedicated for European ATM.
- **DLS** initiatives envisage seamless and joint provision of datalink communication services in Europe.
- **SWIM** aims at upgrading the way information is shared amongst operational stakeholders, entailing collaborative Information Management and facilitated by using common components such as the SWIM Registry and a Public Key Infrastructure (PKI).

In this sense, the scope for these three initiatives target the European area and foresee strong collaboration amongst operational stakeholders.

Furthermore, using these components will not be possible in isolation, but in orchestration.
For example, for exchanging Flight Object information as mandated by the PCP IR, ANSPs will use information services that will exchange data using NewPENS as the underlying network. Similarly, DLS data will require a highly reliable network, such as NewPENS; for connecting ground systems from ANSPs with the VHF stations used for communicating with the cockpit. It should be noticed that in the longer term, information services will also be used to share data directly with the cockpit (Ground-Ground and Air-Ground), which in turn will require the use of NewPENS and DLS; all three combined.

Whereas, it is essential that these information services meet the relevant interoperability standards, it is also critical that this open market innovation push is not hampered by costly and heavy handed compliance processes. Therefore this vision foresees a fully automatized process for conformance testing vs. the relevant interoperability standards as a means to support an agile and inclusive governance.