HOW DOES COLLABORATION IN SESAR ENABLE SAFETY ENHANCEMENT?

The SESAR Joint Undertaking is an example of collaboration at the highest level. In October, the European Commission published the final evaluation of the SESAR1 programme and an initial evaluation of the SESAR2020 programme. The evaluations are positive, but where is SESAR now? Where is it heading? And how does collaborative research support safety? **Conor Mullan** provides us with his thoughts.

KEY POINTS

1. **An independent evaluation of the SESAR Joint Undertaking found many positives.**
2. **The SJU has learned from SESAR1 and is applying those lessons in SESAR2020.**
3. **Collaboration across borders is expediting local development and deployment.**
4. **Greater involvement of operational staff is leading to a greater understanding of how safety needs to be incorporated throughout the development lifecycle.**

SESAR has been with us for some time now. The original definition phase, managed by EUROCONTROL, started more than a decade ago. This led to a high-intensity two-year period during which the industry analysed the state of play of ATM and proposed new performance goals, an operational concept and the underlying technology that could support modernisation. The key deliverable of the definition phase was the first ever edition of the European ATM Master Plan – a blueprint for ATM modernisation.

The SESAR Joint Undertaking was created in 2009 and charged with the maintenance of the Master Plan and management of the R&D programme required to develop the underlying operational concept and technologies – the so-called 'development phase'.

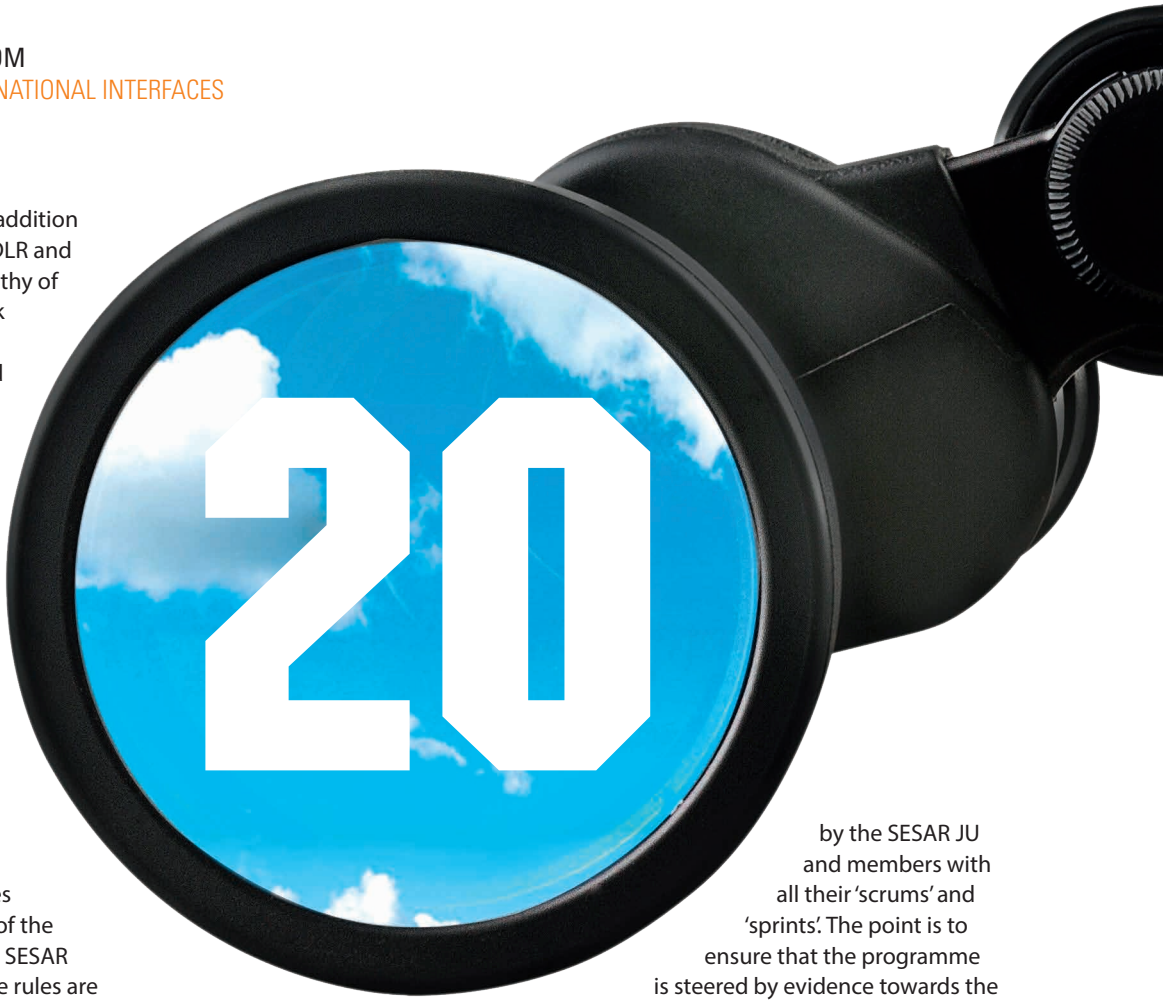
A lot has happened since 2009. The first part of the development phase is complete. SESAR1, as it is now called, ended in 2016. It included over 300 projects and 350 validation exercises leading to 63 SESAR solutions. These include the most exciting developments in ATM today, for example:

- **Time Based Separation** – this illustrates how new control paradigms (adjusting the minimum spacing according to the speed of aircraft) can lead to sustained throughput on strong winds.
- **Extended AMAN** – this illustrates how ANSPs can work together at the operational level to deliver additional benefits of airspace user through cross border coordination.
- **Remote Tower** – this offers the possibility to completely revolutionise ATC at airports by freeing controllers from the need to actually see the aircraft they control.

Beyond these solutions, the real success of SESAR1 is the partnership created through collaborative work. Partnership is important in collaborative research. SESAR projects are an improvement on their predecessors simply because the greater involvement of operational staff is leading to a greater understanding of how safety needs to be incorporated throughout the project lifecycle and properly validated at each stage.

The success of SESAR1 emboldened the Commission to make two further commitments to the SESAR project: the extension of the SESAR Development Phase (by renewing the SJU Mandate) and the launch of the Deployment Phase (by creating the SESAR Deployment Manager).

The extension of the SESAR Development Phase is known as SESAR2020. It includes a refresh of the membership – mostly the same



players but the interesting addition of research organisations (DLR and NLR) as full members is worthy of note. It includes a new work programme and a more integrated working method designed to build on the partnership approach achieved in SESAR1 and put greater focus on maturing SESAR solutions. It includes a greater emphasis on validation including the specific Very Large Demonstration projects, which will help narrow the gap between R&D and deployment.

Launching SESAR2020 was not without complication. The evaluation report makes it clear that the imposition of the new Horizon 2020[1] rules on SESAR was a retrograde step. These rules are not well adapted to managing large collaborative programmes where it is necessary for the members to steer the direction of research not only on their own results but also due to external factors – such as changes in traffic demand and new threats and opportunities such as cyber security and drones.

However, after perhaps 18 months of too much politics and not enough work, SESAR2020 is now definitely up and running and accelerating towards the speeds achieved in SESAR1.

The other positive step taken by the Commission was the creation of the SESAR Deployment Manager (SDM), in 2014, to manage the Deployment Phase and, in particular, to provide a collaborative structure for the use of Connecting Europe Facility (CEF) funds to support SESAR deployment as defined in the Pilot Common Project – an effective mandate for the widespread deployment of 27 of the SESAR solutions developed in SESAR1.

With the SJU and SDM both up and running the SESAR Project is able to reach its full potential.

Initially, the SESAR phases were seen in terms of a classic 'waterfall methodology', with the definition phase defining the 'need' in the ATM Master Plan, the development phase delivering the necessary 'solutions' (concepts and technologies) and the deployment phase 'implementing' them. The economic crisis in 2008 and subsequent fall in demand quickly highlighted that the ATM Master Plan would need to be steered by both R&D results and, perhaps even more importantly, external factors – including the emerging views of the Network Manager and Performance Review Body. This was to ensure a coherent single planning document for all bodies supporting the implementation of the Single European Sky and hence achievement of the (perhaps infamous) high level goals of halving costs, tripling capacity, a tenfold increase in safety and 10% reduction in environmental impact.

The SESAR programme, much like the validation methodology it uses, is now very much expressed as a 'continuous', iterative ATM modernisation lifecycle – very similar to the modern 'agile' development lifecycles so favoured by the SESAR JU and members with all their 'scrums' and 'sprints'. The point is to ensure that the programme is steered by evidence towards the most useful outcomes.

The recommendations in the two evaluation reports focus on actions that are designed to support the 'continuous' nature of ATM modernisation lifecycle. The SESAR1 recommendations are to:

- strengthen links with research, academia and innovative SMEs to ensure that new ideas are fed into the mix
- strengthen Master Plan maintenance to ensure new editions are relevant to all ATM stakeholders
- strengthen the use of enterprise architecture in steering the project and monitoring deployment.

It is only by working in integrated teams that operational issues can be identified and corrected

Encouragingly, the SESAR2020 report makes it clear that in evaluating lessons learnt from SESAR1 and designing SESAR2020, the SJU and Members identified and addressed similar issues. The links to academia are significantly strengthened through increased budget for and integration of 'exploratory research'. The new Master Planning Committee is specifically designed to

1- Horizon2020 (H2020) is the European Commission's biggest ever EU Research and Innovation programme and includes transport programmes such as SESAR2020, CleanSky2 and Shift2Rail.

increase stakeholder awareness and input to Master Plan update campaigns.

The SESAR2020 report makes two further recommendations. One is about streamlining H2020 collaboration and financing rules so that they support the partnership approach rather than hinder it. The other is a more interesting recommendation about evaluating additional approaches with the aim of closing the gap between R&D and deployment. This final recommendation really highlights where we are with SESAR and what more we can do.

The views of SESAR have not always been rosy. SESAR1 felt painfully slow in the early days, with success measured in projects launched and people involved rather than results. As SESAR1 matured annual SESAR releases were introduced and there was a focus on SESAR Solutions. The benefits of partnership and collaborative research, where controllers and pilots can work alongside researchers and system developers, became clearer. It is only by working in integrated teams that operational issues can be identified and corrected, ensuring that safety is a key project objective.

In simple terms, success for SESAR1 is the list of solutions deemed ready for deployment (contained in the wonderfully titled 'Solution Catalogue', reminding me of childhood days picking birthday presents from a store catalogue!) and the initial deployments themselves – time based separation at Heathrow, point merge in Dublin, extended AMAN and so on. Some will claim that we may have achieved these implementations locally or nationally anyway were it not for SESAR, but this would dismiss the nature of air traffic management development and implementation as a global issue.

We should be encouraged with where SESAR is now. We should recognise the benefits of collaborative research and of industrial partnerships

Success for SESAR2020 has to be more. It needs to close the gap between R&D and implementation. Future success should be measured in terms of reducing the time it takes to mature a solution from initial concept to actual deployment. That is really what SESAR was created to do. It was, after all, borne from the frustration of 20 to 30 year development cycles for Mode S, VDL2, MLS, GBAS – a list that goes on and on. Investment in SESAR2020 should be rewarded with improved performance for ANSPs and airports but also in new products for the industry partners that have a global market.

As the SESAR Project gathers pace, it is even more essential that all stakeholders are heard, particularly those at the coal face that will work with the new solutions

We should be encouraged with where SESAR is now. We should recognise the benefits of collaborative research and of industrial partnerships. We should work together for the betterment of our industry. But we should also be honest and critical where needed. As the SESAR Project gathers pace, it is even more essential that all stakeholders are heard, particularly those at the coal face that will work with the new solutions.

And that final recommendation on SESAR2020? What it really acknowledges is that the first implementation of an ATM solution can cost a lot more than subsequent implementations. By doing the first one correctly, by using formal validation techniques to gather evidence for the safety case and correct implementation issues and by sharing those experiences, we can support the safe rollout of new systems and procedures and at the same time reduce the cost of subsequent implementations. That is the real benefit of closing the implementation gap.

Conor Mullan is Managing Director of Think Research. Conor is co-author of the E-OCVM – the validation methodology used in SESAR1 and SESAR2020. Think Research were one of the most active SME in SESAR1, contributing to 21 projects for airports, TMA, En-Route and Network.