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Human performance in the context of digitalisation has gained more importance as ATM undergoes major developments. Over the last decades ATM systems have developed from manual paper-based systems with no or little system support, to digitalised systems providing more advanced support. This redefines the role of the human and how the human interacts with other parts of the ATM system.

The ATM world has witnessed significant changes around every 30 years. The last big change was the implementation of radar to support the ATM system, improving safety and efficiency. Now, new concepts such as interoperability and self-separation are becoming operational reality. Technology provides benefits of improving capacity, efficiency and safety as well as bringing new challenges for human performance. The tasks of ATCOs will change, and they must rely on the system in a completely different way than before.

As part of the iTEC alliance and in collaboration with ANSPs across Europe, we are on the way to modernise our en route ATM system. With this system, the role of the ATCO will be transformed to a supervisory role in detecting conflicts, relying on sophisticated system support. However human skills will still be needed to assess and resolve conflicts that automated systems will detect. A monitoring role will for example bear the potential for out-of-the-loop performance issues, making it more difficult for the human to detect and take action to recover from unforeseen situations.

Paradigm changes in technology like i4D and self-separation concepts call for new or modified skills and competency requirements for the human in the ATM system, parallel to recent developments in cockpit automation. The aviation industry must have learned from those developments that it is critical to make

sure the user is in the centre of the design. Realistic assumptions on human behaviour, and knowledge of human capabilities and limitations need to be considered in design. It is critical to understand the extent of the change. Risk assessment methods must account for 'systems in systems' and greater interdependencies between people, technology, and all other elements.

Part of the operational staff in Avinor ANS was temporarily laid off last year due to the situation with Covid-19. As traffic increases again, most ATCOs are now back in operations. We do have experience and measures in place to train personnel returning to work, but the pandemic has shown us new challenges. There is also a need to focus on those that continued to work operationally and now need to adjust their practices to new demands. The consequences of COVID-19 represent added layers of complexity to be tackled by management and the operational environment. There are lessons to consider, now and in the future.

Avinor ANS is implementing a considerable strategic initiative with remote towers in corporation with Avinor AS (mother company). Technology and digitalisation are central strategic areas at corporate level. In ANS en route business area, the development of the future ATM system is a major ongoing programme.

Key digitalisation initiatives are also ongoing for support functions, which operations strongly depend on. One example was to deploy iPad applications that digitalise previously paper-based information for ATCOs. The goal is to optimise the resource demand for administrative tasks. Another example is the development of resource management tools in-house, to optimise management of ATCO resources in production.

The major change toward more automation in air traffic control – shifting from controlling to monitoring the traffic from a human perspective – is as much a cultural change as a change of tools and the human role. As an ANSP we need to foster such a cultural change and as top management we should be aware of the critical role we are playing in building a new culture. The more technology advances, the more important it is to focus on the human dimension in the overall system, for the sake of our employees, our customers, and safe and efficient services. **S**

As from 1 January 2022 Jan-Gunnar Pedersen will be the CEO of Avinor ANS, Norway. Since 2014, he has been the Director of the Business area Enroute. One of his main achievements has been to unify the enroute organisation, from separate ACC units to one organisation operating the ACCs as one virtual ops room. Jan-Gunnar holds an MBA in Aviation Management and has been in Avinor most of his professional career, in various management positions since 2005. Jan-Gunnar was born in the Northern part of Norway in 1969. Although he moved to the Oslo area in 1994, he enjoys spending time in the beautiful landscape above the polar circle.