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DIGITALISATION 2.0

At the time of writing this foreword I am preparing myself to take over the Digital Transformation Office (DTO) of the Network Management Directorate of EUROCONTROL. I feel very honoured, but at the same time I feel a great challenge and responsibility. As part of my preparation, since I had my first conversation on the subject with my Director Iacopo Prissinotti, I wanted to understand what (ATM) digital transformation is. Is it a new buzzword?

Digital transformation means *"adapting an organization's strategy and structure to capture opportunities enabled by digital technology"* (Furr and Shipilov, 2019). This has been happening for decades in all industries. As part of the ATM/ANS ecosystem, we follow the same general pattern.

Computers today – whether in your pocket, in the ops room, or on the flight deck – assist our work and increasingly enable the automation of tasks traditionally done by humans. Digital technology is now inseparable from the world as a whole and how we as people work. And the change is accelerating, whether we like it or not.

Digitalisation 1.0

But for me, this is Digitalisation 2.0. In the 1990s I witnessed and was involved in Digitalisation 1.0 with my previous employer (ROMATSA – the Romanian ANSP), together with colleagues and friends, inspired by the 'ODID IV' EUROCONTROL simulations.

The ODID IV study simulation evaluated the HMI aspects of a modern (at that time) ATC system using colour, graphical displays and a mouse input device within an expanded ATC environment, including approach control, lower and upper airspace sectors. And there were no paper strips. This was back in 1993.

ODID IV included a set of conflict detection aids based on through sector aircraft profiles, updated according to the controller's plan, a dynamic interactive radar label for notation and data input, STCA, en route sequencing assistance for inbound approach traffic, system assisted coordination, colour planning states, a flight leg providing conflict information, and text windows for advance planning information.

This is what we were saying back in 1993: "*Forecast traffic …requires that powerful computers and display systems are introduced to help the controller plan and monitor a continuously evolving and complex traffic situation. Such systems can only assist the controller if they are provided with accurate information, and this requires that the controller updates the system with his/her current traffic plan.*

"The introduction of high-resolution colour raster scan displays together with powerful computers and fast graphic generators has pushed the upgrading of air traffic control systems into the high technology era. Research into the controller-system interface and its use of technology of this nature is required if we are to ensure its successful introduction into the operations room."

Does this sound familiar? Of course, there have been changes. Some of our applications were in DOS! (Some readers will not even know what this means.) We borrowed from MS Windows-type configurations of the screen, moving from the plan position indicator (PPI) radar screen technology to 2Kx2K computer screens. But even then, the controller could – via keyboard input and roller ball or touch input – amend aspects of the current flight plan information and aircraft profiles for purposes of visualisation and inter-sector data transfer. In fact, aside from the replica of the paper strips that were abandoned, the HMI in Bucharest looked the same for over 20 years.

The planned replica of paper strips in electronic form – like you see in Figure 2 – did not fly with our air traffic controllers. Despite slick algorithms for moving the electronic strips and sorting them in time or by level, the controllers just closed them and developed new ways of controlling the traffic. Work-as-imagined proved quite different to work-as-done (see *HindSight* 25), and we had to develop jointly a different way to do the planning and tactical control once we moved to Digitalisation 1.0. In the end, we used sector lists, and the radar screen became less cluttered.

Now, the days of Barco screens with dedicated air conditioning in the consoles are over for many centres. We have more powerful computers and functionality, taking less space, with farm servers and cloud infrastructure in some cases, providing exponentially more computing power.

Figure 1. The Romanian 1997 real-time simulation operations room in Brétigny

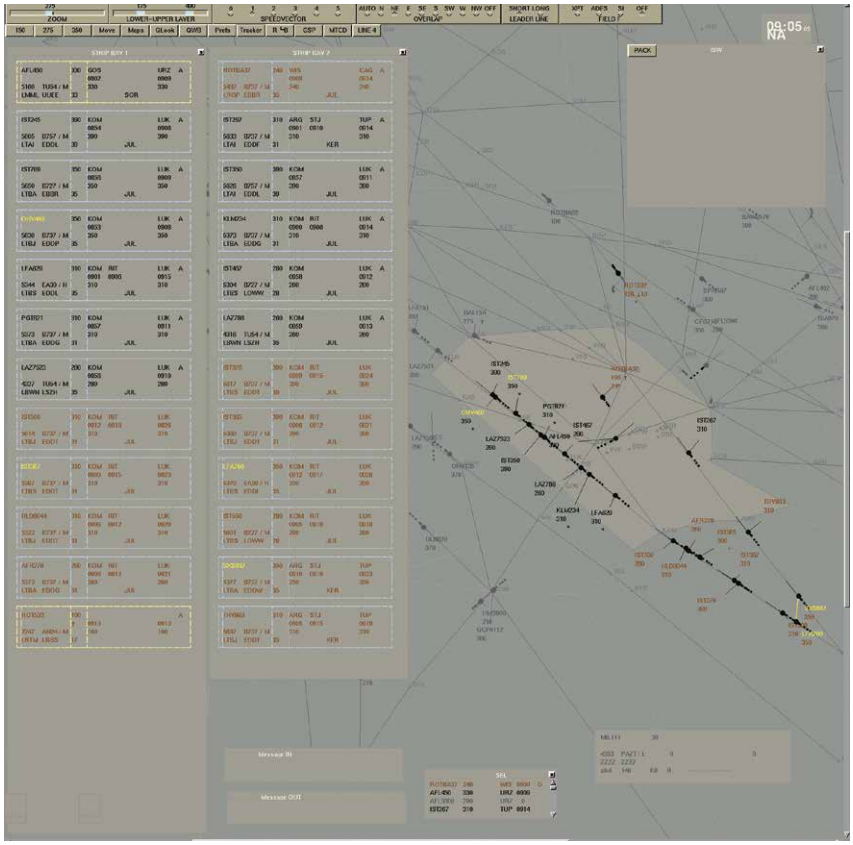

Figure 2. En-route planning display with electronic strips during Romania 1997 simulation in Brétigny

So what is different?

In the 1990s the technology was expensive and inflexible. Change was relatively slow and did little to disrupt how ATCOs, flow controllers, AIS specialists, ATSEPs, and others worked. Partly for those reasons, Digitalisation 1.0 did not shake up ANSPs too much.

Now, as noted by Wessel et al (2016), cheaper and more flexible IT infrastructure have aided newcomers to the market. Not only has technology changed, business models and the whole sector is unrecognisable from the 20th century (e.g., unmanned aircraft system traffic management or UTM providers). These innovators, they argue, *"often seek to displace rather than support legacy organisations, making it critical that older businesses pay close attention to what's changing and adapt when necessary"*. The ATM world needs to embark quickly on Digitalisation 2.0, if not already, or else risk being disrupted and losing the market.

Can we adapt?

But can we adapt? *"Many executives have little faith in their employees' ability to survive the twists and turns of a rapidly evolving economy"*, wrote Fuller et al (2019). The head of strategy at a top German bank told them, *"The majority of people in disappearing jobs do not realize what is coming … My call center workers are neither able nor willing to change"*.

This kind of thinking is sad but common. There is a perception of the ATM world is that it is conservative, overprotective, and does not want to change and adapt. My experience from the inside is different, but we have a long way to go to prove to external parties that we too are adaptable and resilient.

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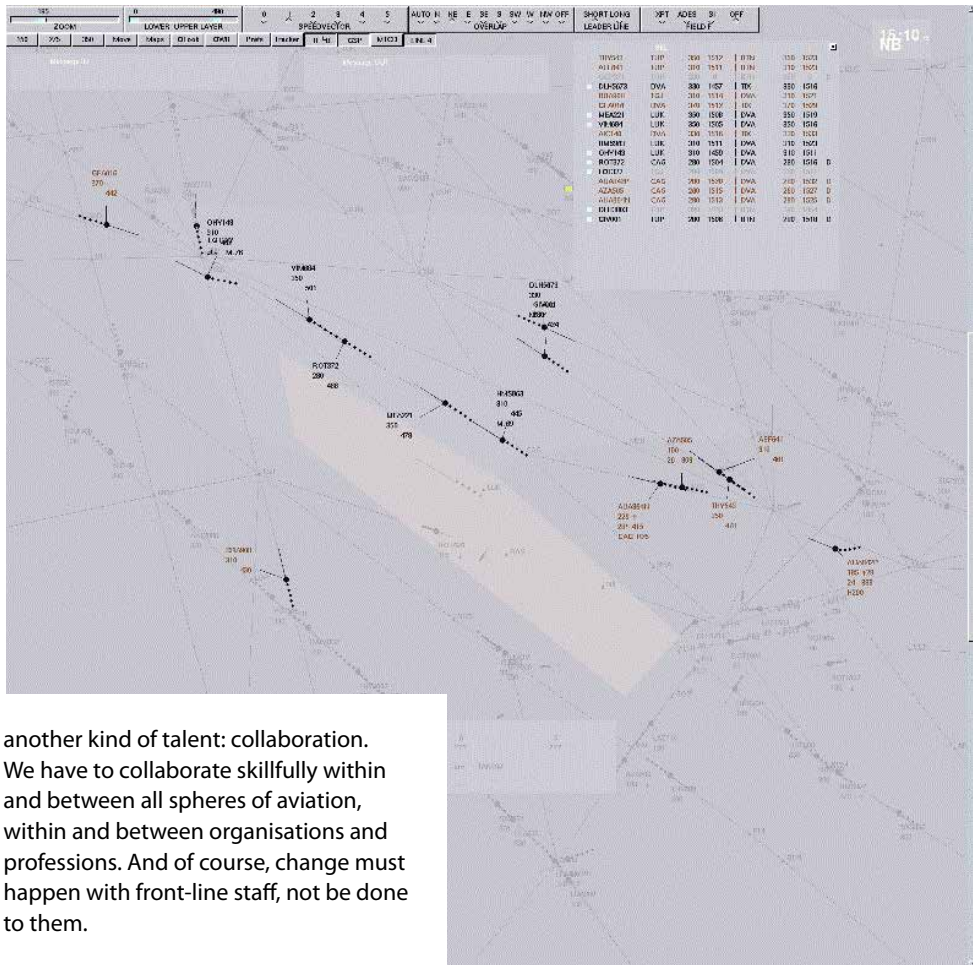

Figure 3. The final radar display after the simulation validation without electronic replica of paper strips

Digital transformation: Talent in four key areas

According to Davenport and Redman (2020), success in 'digital transformation' requires bringing together and coordinating talent in four interrelated domains – technology, data, process, or organizational change capability. To put it in aviation terms, they wrote that *"Technology is the engine of digital transformation, data is the fuel, process is the guidance system, and organizational change capability is the landing gear. You need them all, and they must function well together."* And for that, I would add another kind of talent: collaboration. We have to collaborate skillfully within and between all spheres of aviation, within and between organisations and professions. And of course, change must happen with front-line staff, not be done to them.

This issue of *HindSight* is dedicated to *Digitalisation and Human Performance*. As you read the contents, I invite you to reflect on the changes that have occurred, pay attention to the changes that are occurring now, and get involved in the changes that are coming.

References

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