

# **LEARNING FROM TECHNOLOGY INSERTION**

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## **ABSTRACT**

The Air Traffic Control (ATC) system is tasked to safely and expeditiously move aircraft from point to point. From year to year we see the increase in traffic growth. Even though traffic is growing, the capacity of the ATC system is rather constant. Currently, traffic in the ATC system is suffering from delays because of a mismatch between the demand and available capacity. The greatest limitation imposed on the airspace capacity comes from the interplay between the human operator and existing technology. In order to improve the ATC system, the Free Flight program was created by the Federal Aviation Administration (FAA), with the goal to improve the performance of the system through the deployment of advanced technologies for air traffic management.

There are two possible approaches to take when technology is inserted into the system. One is a comprehensive approach in which the whole system is automated and changed at the same time. Another approach is incremental development in which the intended automation tools are incrementally developed and deployed. As an example of the comprehensive approach we have an Advanced Automation System (AAS), which was overburdened in an attempt to replace a complex system in a single giant step. Learning from that experience, the FAA adopted an incremental spiral development approach. Spiral development underlines the “build a little, test a little, deploy a little” philosophy. Following that philosophy the automation tool development involves a number of cycles, starting from laboratory development and testing and ending with the full deployment of the tool in the National Airspace System (NAS).

Even though the spiral development is generally thought as a good approach, there are several issues linked to it, which could be addressed in order to improve it. These issues are:

- Incremental decision making, in which decisions are made after each cycle of the development, often does not take into account all relevant issues, leaving them to be dealt with in the next step
- Learning from incremental deployment, where we can use the post-deployment assessment and experiences acquired in the process to improve the incremental approach from both an implementation and a decision making point of view
- Integration challenges, which arise when the envisioned tools must be integrated in the future system. Spiral development as it exists now, does not properly include the global overview of the future system where all (or some) proposed automation tools should be integrated.

Here we discuss each of the mentioned issues, using the research examples and implementation experiences. The examples are used to point out avenues for the improvement of the transformational process of the National Airspace System.