Invitation to AICHAIN solution exchange November 8th, 14th and 24th.

Dear colleague,

To achieve the global goal of seamless information exchange and collaborative data value exploitation in the ATM community, and to be part of an intermodal transport network, the AICHAIN project has designed a novel solution where private data can be used effectively, in a cyber-secured way, to improve the ATM and air transport operations with no need for data sharing. **The AICHAIN solution is a technology that enables privacy-preserving machine learning collaboration on private data sets to enable operational improvements in ATM.** The solution consists of a combination of several **privacy-enhancing technologies**, such as **federated machine learning** and **blockchain**.

As a recognised operational expert, we would like to invite you to an online workshop where we could altogether discuss this important topic and to identify use cases of your interest that could be enabled with the AICHAIN solution.

The AICHAIN team is at your disposal in three online sessions scheduled in November. Please note that these three sessions will be the same in terms of contents, but they are organised in different dates to increase the likelihood of fitting with your calendar. Feel free to attend more than one if you would like.

- **Session 1: Tuesday 8th Nov, 10:00**
- **Session 2: Wed 16th Nov, 15:00**
- **Session 3: Thursday 24th Nov, 10:00**

Each session will have a duration of 2h, with the following agenda:

Workshop title: "Improving Air Traffic Management operations with machine learning collaboration on private data sets: discussion of use cases of interest for the ATM stakeholders (the SESAR AICHAIN Solution)":

- **Point 1 (10'): Participants introduction & initial Q&A**
- **Point 2 (30'): AICHAIN Solution overview**
- **Point 3 (20'): Open Q&A**
- **Point 4 (60'): Use cases discussion**

Please, if you would like to attend to any of these sessions, **contact the AICHAIN team to receive the Teams session invitation**:

- Javier Busto: javier.busto@sita.aero
- Sergio Ruiz: sergio.ruiz@eurocontrol.int
- Andre Rungger: andre.rungger@swiss.com

You may have any question or comment, please use any of these emails.

WHY THIS WORKSHOP IS IMPORTANT FOR YOU?

Data is the new Gold.

Comment of an airliner: …"*we are almost weekly confronted with data request from NM, Airports and ANSPs in order to increase predictability, usually we share almost all data, as we believe that only with a good cooperation we can achieve benefits. However there are data we will not, cannot share, for many reason beyond GDPR* ".

Air traffic management (ATM) operations could greatly benefit in terms of capacity, efficiency, predictability, or safety if certain operational systems were powered by machine learning models. To train them effectively, such data-driven models need access

to large high-quality datasets. However, some relevant datasets owned by different ATM actors (e.g. airspace users, airports, etc.) cannot be accessed through traditional data sharing mechanisms due to their privacy requirements.

The **AICHAIN solution** enables the privacy-preserving exploitation of large private datasets from different stakeholders to enrich operational machine learning applications. This is achieved through **privacy-preserving federated machine learning,** where the training and serving of the federated models can be done at the data owners' facilities in a cyber-secured and trustworthy manner without sharing any data. Thus, private data owners can remain in full control of their dataset's privacy. A novel **Blockchain**-based mechanism enhances the federated learning platform with two key features: i) an audit trail to support model **trustworthiness**, as required for operational AI applications in ATM; and ii) a **system of tokens** to implement direct incentives for the participants and fairness policies.

Experimental results from two ATM use cases: the operational benefits of this new solution have been explored in the SESAR ER4 project AICHAIN by means of two ATM use cases related to Demand & Capacity Balancing (DCB): use case 1: improving the prediction of the estimated take-off time (ETOT); use case 2: improving the prediction of the routes filled by the airlines in their flight plans. In recent times, the Network Manager (EUROCONTROL) have developed machine learning models to improve the predictability of operations through these two use-cases. However, the current models only use data that is available at the Network Manager or that is shared by the Airspace Users. In the context of the AICHAIN project these models have been taken as a baseline and have been augmented with relevant operational private data provided by one Airspace User (SWISS Air). The experimental results proved that **the predictions of the machine learning models can be more accurate when the models can be trained with private data.** It is expected that if more data could be exploited from additional airlines, then the results observed in the project experiments could improve significantly.

Discussion of use cases of your interest: with many lessons learned during the development of this solution, we would like to launch a workshop, inviting stakeholders with affinity, aiming to install a dialogue and to explore how the solution could bring value to all the stakeholders. We do think that the AICHAIN solution can provide benefits of common interest for the ATM and air transport community and we would like to explore together ideas for use cases in these domains where private data can bring value by means of privacy-preserving federated machine learning.

Attached you can find a teaser of the workshop slides with some technical details, which will be further explained in the proposed sessions with time for open Q&A and discussion.

The project partners are looking forward to meeting you in one of the abovementioned workshop sessions.

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