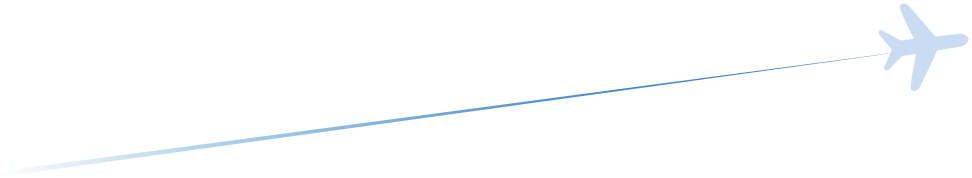

D5.15 Production of three-part introductory courses

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Copyright Statement

Engage

THE SESAR KNOWLEDGE TRANSFER NETWORK

This deliverable is part of a project that has received funding from the SESAR Joint Undertaking under grant agreement No 783287 under European Union's Horizon 2020 research and innovation programme.

Abstract

This deliverable summarises the preparation of three introductory courses that are available for use by any academic institution, free of charge, via the EngageWiki. The contents of the courses cover: (1) an introduction to air traffic management; (2) airline planning and operations; and (3) airport planning and operations.

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1 Introduction

The Engage KTN supports European air traffic management (ATM) education and training in the air transport community to develop new talent with knowledge of future ATM scientific research needs, to sustain a supply of skilled researchers and to stimulate the next generation of ATM operational and engineering staff. To support this objective, three introductory courses have been prepared, namely:

(1) Introduction to air traffic management;

(2) Airline planning and operations;

(3) Airport planning and operations.

Courses (2) and (3) provide essential contextual knowledge on air transport and thus a better understanding of course (1). Each course comprises:

- a package of PowerPoint slides for approximately 10 lectures;
- a set of supplementary briefing notes for each course that list additional sources of information.

It should be noted that this deliverable has been rescheduled to take into account a survey of universities (moved to Q1 2021 due to Covid-19) which requested feedback on the course content – however no changes were requested from the research community.

The courses are available free of charge to academic institutions via a simple registration process hosted on the EngageWiki [4].

2 Course content

The courses have been prepared by members of the Engage consortium, comprising experienced lecturers (one Professor and four Associate Professors) from the University of Belgrade – Faculty of Transport and Traffic Engineering, and senior researchers (one Professor and three Senior Research Fellows) from the University of Westminster. The content has been subject to two internal reviews. In addition, a considerable part of course (1) as well as part of course (3) were presented at the first Engage summer school, held in Belgrade in 2019 (reported in D5.12 [2]) and feedback obtained was considered in the production of the final lectures.

The design of the course content was not only based on extensive consortium expertise in the field, including decades of continuous intensive involvement in education and research in air transport, but also taking into account the Engage review of university undergraduate degrees in aviation (e.g. air transport, aeronautics, pilot/ATCo) undertaken during 2019. The review was specifically reported upon in an informal Engage deliverable (D5.4+ - A review of undergraduate education in the field of air transport [3]), prepared by University of Belgrade – Faculty of Transport and Traffic Engineering, which has been shared with the SJU as an input to the SESAR Digital Academy initiative (16 January 2020).

The slides have been prepared in PowerPoint format, displaying authorship, Engage and SESAR JU logos and referring to the grant funding from Horizon 2020 on the final slide. Figure 1 and Figure 2 show the first and last slide templates.

Figure 1: Cover slide template

Figure 2: Final slide template

Each course is accompanied by a set of supplementary briefing notes (Word document) which list additional sources of information. Where appropriate, presenter notes have also been included with the slides.

2.1 Course 1: Introduction to ATM

The content of the *Introduction to ATM* course, with authors, are summarised in the following table.

Table 1: Introduction to ATM lectures and authors

Lectures	Authors
1. Air Traffic Control as part of Air Transport System	
a) Air Traffic System	Prof Dr Fedja Netjasov (UB-FTTE)
b) Air Navigation Services	Prof Dr Fedja Netjasov (UB-FTTE)
c) SESAR programme	Dr Tatjana Bolić (UoW)
2. Airspace Management (ASM)	
a) Airspace division in the horizontal and vertical plane	Prof Dr Fedja Netjasov (UB-FTTE)
b) Airspace classes, aircraft vertical position, aircraft separation, flight conditions and rules	Prof Dr Fedja Netjasov (UB-FTTE)
c) Airspace sectorisation problem	Prof Dr Fedja Netjasov (UB-FTTE)
3. Air Traffic Service (ATS)	
a) Types of Air Traffic Control System (procedural and radar systems)	Prof Dr Fedja Netjasov (UB-FTTE)
b) Air Traffic Controller (ATCo) decision making processes	Prof Dr Fedja Netjasov (UB-FTTE)
c) Data necessary for ATCo work - flight plan, meteo data, messages	Prof Dr Fedja Netjasov (UB-FTTE)
d) ATCo activities	Prof Dr Fedja Netjasov (UB-FTTE)
e) Air Traffic Control - ATC, Flight Information Service - FIS, Alerting Service – AS	Prof Dr Fedja Netjasov (UB-FTTE)
f) Air Traffic Control Units - airport, approach, en-route	Prof Dr Fedja Netjasov (UB-FTTE)
g) ANS charges	Dr Radosav Jovanović (UB-FTTE)
4. Air Traffic Flow Management (ATFM)	
a) Introduction to flight planning and messaging	Graham Tanner (UoW)
b) ATC Capacity and Traffic Demand	Prof Dr Fedja Netjasov (UB-FTTE)
c) Strategic, pre-tactical and tactical planning	Prof Dr Fedja Netjasov (UB-FTTE)
d) Network Management	Prof Dr Fedja Netjasov (UB-FTTE)
e) Air Traffic Flow and Capacity Management (ATFCM) phases	Prof Dr Fedja Netjasov (UB-FTTE)
f) Measures for capacity and demand regulations	Dr Luis Delgado (UoW)
5. ATM Performance Measurement	Prof Andrew Cook (UoW)
6. Essential Data Sources in Aviation and ATM	Graham Tanner (UoW)
7. Future concepts in ATM	Dr Luis Delgado (UoW)

2.2 Course 2: Airline planning and operations

The content of the *Airline planning and operations* course, with authors, are summarised in the following table.

Table 2: Airline planning and operations lectures and authors

Lectures	Authors
1. Travel demand, product and market structure	Dr Danica Babić (UB-FTTE) Dr Slavica Dožić (UB-FTTE)
2. Airline cost structures	Dr Danica Babić (UB-FTTE)
3. Airline networks	
a) Network development/design	Dr Danica Babić (UB-FTTE)
b) Network structure and route evaluation	Dr Danica Babić (UB-FTTE)
4. Fleet planning	Dr Slavica Dožić (UB-FTTE)
5. Schedule planning	
a) Schedule design	Dr Danica Babić (UB-FTTE)
b) Fleet assignment	Dr Danica Babić (UB-FTTE)
c) Aircraft routing	Dr Danica Babić (UB-FTTE)
d) Crew scheduling	Dr Danica Babić (UB-FTTE)
6. Airline operational control	
a) Flight planning	Dr Slavica Dožić (UB-FTTE)
b) Decision Support Systems	Dr Slavica Dožić (UB-FTTE)
7. Airline Pricing	Dr Slavica Dožić (UB-FTTE) Dr Danica Babić (UB-FTTE)
8. Air cargo	Dr Radosav Jovanović (UB-FTTE)

2.3 Course 3: Airport planning and operations

The content of the *Airport planning and operations* course, with authors, are summarised in the following table.

Table 3: Airport planning and operations lectures and authors

Lectures	Authors
1. Airports as nodes of air transport system	
a) High level overview - number, types, size, demand concentration, etc.	Dr Bojana Mirković (UB-FTTE)
b) Basic terminology	Dr Bojana Mirković (UB-FTTE)
c) Regulatory framework and airport information	Dr Bojana Mirković (UB-FTTE)
d) Traffic characteristics	Dr Bojana Mirković (UB-FTTE)
2. Airport site selection	
a) Meteorological conditions	Dr Bojana Mirković (UB-FTTE)
b) Terrain and obstacle analysis	Dr Bojana Mirković (UB-FTTE)
c) Environmental conditions	Dr Bojana Mirković (UB-FTTE)
d) Other conditions	Dr Bojana Mirković (UB-FTTE)
3. Airport design	
a) Factors affecting runway length and calculation of runway length	Dr Bojana Mirković (UB-FTTE)
b) Manoeuvring area and associated safety areas - design parameters	Dr Bojana Mirković (UB-FTTE)
c) Manoeuvring area - basic markings and lighting	Dr Bojana Mirković (UB-FTTE)
4. Runway capacity	
a) Factors affecting runway capacity	Dr Bojana Mirković (UB-FTTE)
b) Models for calculating runway capacity	Dr Bojana Mirković (UB-FTTE)
c) Runway capacity enhancement, capacity and demand management	Dr Bojana Mirković (UB-FTTE)
5. General airport layout	
a) Runway system, taxiway system and terminal complex planning	Dr Bojana Mirković (UB-FTTE)
b) Selected examples	Dr Bojana Mirković (UB-FTTE)
6. Apron design and operations	
a) Apron area design	Dr Bojana Mirković (UB-FTTE)
b) Apron markings and signs, and basic traffic regulations	Dr Bojana Mirković (UB-FTTE)

Lectures	Authors
c) Ground handling	Dr Bojana Mirković (UB-FTTE)
d) Apron capacity and gate requirements	Dr Bojana Mirković (UB-FTTE)
7. Passenger terminal design and operations	
a) Overall terminal design - concepts and level of service	Dr Bojana Mirković (UB-FTTE)
b) Detailed terminal design - passenger and baggage processing	Dr Bojana Mirković (UB-FTTE)
8. Introduction to airport economics	Dr Radosav Jovanović (UB-FTTE)
9. Selected topics	
a) Airport certification	Dr Bojana Mirković (UB-FTTE)
b) Rescue and fire fighting	Dr Bojana Mirković (UB-FTTE)
c) Runway surface conditions	Dr Bojana Mirković (UB-FTTE)
d) Wildlife management	Dr Bojana Mirković (UB-FTTE)

2.4 Access to introductory courses

The courses are available free of charge to any academic institution wishing to use them, for non-commercial use only, acknowledging Engage as the source.

Access to the courses is via the EngageWiki: https://wikiengagektn.com/Teaching_Resources. A simple registration form requests the name of the institution, contact person and confirmation that the courses will be used for not-for-profit, educational use only.

3 References

[1] Engage project, 2017. Grant Agreement 783287, Ref. Ares(2017)6114946 - 13/12/2017.

[2] Engage project, 2019. D5.12 Engage SESAR Summer School 2019, Edition 01.02.00, March 2019.

[3] Engage project, 2020. D5.4+ A review of undergraduate education in the field of air transport, Edition 01.00.00, January 2020 (informal deliverable prepared by UB-FTTE).

[4] EngageWiki, 2021. https://wikiengagektn.com/Teaching_Resources.

4 Acronyms

AS	Alerting service
ASM	Airspace management
ATC	Air traffic control
ATCo	Air traffic controller
ATFCM	Air Traffic Flow and Capacity Management
ATFM	Air Traffic Flow Management
ATM	Air traffic management
ATS	Air traffic service
FIS	Flight information service
SESAR	Single European Sky ATM research
SJU	SESAR Joint Undertaking
UB-FTTE	University of Belgrade - Faculty of Transport and Traffic Engineering
UoW	University of Westminster

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