4-Flight-Coflight

Led by DSNA (2017 - 2022)

Introduction of a new ATM System integrating the advanced FDPS Coflight (with 4D trajectory prediction) and advanced tools in a stripless environment. 4 FLIGHT will meet the European regulations "Single sky" standards.

Sites involved

ACC/UAC: Bordeaux, Brest, Marseille, Paris, Reims

Participants

FABEC: DSNA

Project description

The objectives are to meet the expected increase in air traffic by 2020 and to contribute to the reduction of greenhouse gas emissions by optimizing trajectories. But most importantly, this system will ensure interoperability required between the Europeans air navigation service providers (ASNPs), particularly in the FABEC.

It involves Marseille ACC/UAC, Reims ACC/UAC, Paris ACC/UAC, Brest ACC/UAC and Bordeaux ACC/UAC.

Benefits

This new system is expected to lead to an increase in safety, flight efficiency and capacity through enhanced flight plan and trajectory management. Better cost efficiency is to be achieved through shared development and maintenance costs

Implementation Steps

Task	Start	End	Led by
Reims	09/2018	11/2020	DSNA
Marseille	10/2018	05/2022	DSNA
Paris	10/2019	12/2022	DSNA
Brest	tbd	tbd	DSNA
Bordeaux	tbd	tbd	DSNA

A-CDM and AMAN-DMAN tools in France

Led by DSNA (2015 - 2018)

Introduction of A-CDM at Paris Orly (LFPO), Lyon (LFLL) and Nice (LFMN) associated with deployment or upgrade of D-MAN and A-MAN tools.

Sites involved

ACC/UAC: Marseille, Paris
Airport: LFPO, LFMN

Participants

FABEC: DSNA

Point of contact

Erwan PAGE

Project description

Introduction of DMAN at Paris Orly, Lyon and Nice.

Introduction of a new AMAN system at Marseille ACC/UAC, Nice (LFMN) and Lyon (LFLL) APPs

ACDM accreditation by the Network Manager of LFPO, LFLL and LFMN.Upgrade of the existing AMAN and DMAN systems in Paris CDG is also carried on by the project

Benefits

• Optimisation of traffic flows;

• Increase in flight efficiency and capacity through an optimised departure management (better use of airport and ATFM slots).

Implementation Steps

Task	Start	End	Led by
Paris Orly	11/2011	11/2016	DSNA
Lyon	09/2011	06/2017	DSNA
Nice	01/2015	12/2018	DSNA

A-CDM@HAM Implementation

Led by DFS (2016 - 2017)

Implementation of Airport CDM processes at the sixth German airport.

Sites involved

ACC/UAC: Bremen
Airport: EDDB, other airports (see project description)

Participants

FABEC: DFS

Point of contact

Director Tower

Project description

To implement Airport CDM at Hamburg Airport. This project is a collaboration of DFS and Hamburg Airport with Eurocontrol and intends to optimize the turn-around processes for flights at Hamburg Airport as well as connect Hamburg Airport to Eurocontrol Network Management.

Benefits

• Increased efficiency of aircraft turn-round processes at Hamburg Airport

• Significant absorption of inbound delays, increased punctuality of daily aircraft rotations

• Reduced noise and pollutant emissions due to shortened runway queues

• Fewer wasted ATFM slots due to airport integration with Network Manager

Implementation Steps

Task	Start	End	Led by
Training	10/2016	03/2017	DFS
Start of operation	03/2017	08/2017	DFS
A-CDM In Hamburg		08/2017	DFS

A-SMGCS Cologne/Bonn

Led by DFS (2018 - 2020)

Implementation of an A-SMGCS, including RIM function, at Cologne/Bonn Airport.

Sites involved

Airport: other airports (see project description)

Participants

FABEC: DFS

Point of contact

Director Tower

Project description

The project comprises the implementation of an A-SMGCS, including RIM function, at Cologne/Bonn Airport to improve runway safety and throughput and to support the provision of air traffic services and apron services. The project covers the following activities:

- Replacing/exchanging the current primary sensor

- Setting up the new cooperative sensor (MLAT)

- Provision of the required infrastructure

- Implementation of a tracker and a ground situation display

- Safety assessments

Benefits

See impact on performance.

Implementation Steps

Task	Start	End	Led by
Start of operation	10/2018	03/2021	DFS

A-SMGCS Düsseldorf

Led by DFS (2014 - 2019)

Implementation of an A-SMGCS Level 2, including RIM function, at Düsseldorf Airport.

Sites involved

Airport: EDDL

Participants

FABEC: DFS

Point of contact

Director Tower

Project description

The project comprises the implementation of an A-SMGCS Level 2, including RIM function, at Düsseldorf Airport to improve runway safety and throughput and to support the provision of air traffic services and apron services. The project covers the following activities:

- Replacing/exchanging the current primary sensor

- Setting up the new cooperative sensor (MLAT)

- Provision of the required infrastructure

- Implementation of a tracker and a ground situation display

- Safety assessments

The realization of this project will be the preparatory work for the deployment of A-SMGCS Level 3 and 4

Benefits

See impact on performance

Implementation Steps

Task	Start	End	Led by
Training	10/2016	02/2018	DFS
Start of operation	07/2018	07/2019	DFS

A-SMGCS for ELLX airport

Led by ANA Lux (2013 - 2019)

Implementation of A-SMGCS at ELLX airport.

Sites involved

Airport: ELLX

Participants

FABEC: ANA Lux

Point of contact

Head ATC-TWR
ary@airport.etat.lu

Project description

Implementation of full advanced SMGCS up to level 2 safety net functionality including a wider area MLAT coverage around Luxembourg airport.

Benefits

Improved safety and capacity for the 20% operations in low visibility. Trigger for CDM procedures.

Implementation Steps

Task	Start	End	Led by
System implementation	01/2013	Q4 2016	ANA
Operational trial	Q1 2017	Q2 2017	ANA
Level 1 implementation		12/2017	ANA
Level 2 implementation	01/2018	12/2020	ANA

A-SMGCS Stuttgart

Led by DFS (2017 - 2022)

Implementation of an A-SMGCS, including RIM function, at Stuttgart Airport.

Sites involved

Airport: other airports (see project description)

Participants

FABEC: DFS

Point of contact

Director Tower

Project description

The project comprises the implementation of an A-SMGCS, including RIM function, at Stuttgart Airport to improve runway safety and throughput and to support the provision of air traffic services and apron services. The project covers the following activities:

- Replacing/exchanging the current primary sensor

- Optional: Setting up the new cooperative sensor (MLAT)

- Provision of the required infrastructure

- Implementation of a tracker and a ground situation display

- Safety assessments

Benefits

See impact on performance

Implementation Steps

Task	Start	End	Led by
Start of operation	11/2018	12/2022	DFS

AAPF

Led by MUAC (2020 - 2021)

Advanced ATFCM/ASM Planning Function

Sites involved

ACC/UAC: Maastricht

Participants

FABEC: MUAC

Point of contact

Igor Jakimov
Igor.jakimov@eurocontrol.int

Project description

Based on the closed cluster detection study, this MUAC initiative aims to identify and mitigate traffic capacity issues on a 10-30 minute planning horizon through the introduction of a new Advanced ATFCM/ASM Planning Function (concept of operations, process and role) and the necessary system support.

Benefits

Increased capacity due to:

- better pre-tactical traffic demand balancing

- better controllers' workload balancing by traffic simplification (manual traffic dispersion with the support of clustering detection algorithm, complexity prediction algorithms, other functions available in CWP and iFMP)

• Improving safety levels by reducing possibility of ATCOs overload situations

• Enabling ATC2ATM concept by creation of the AAPF layer between Central Supervisory Suite and ATCOs

Implementation Steps

Task	Start	End	Led by
Concept development and validation	06/2016	10/2016	MUAC
AAPF Ops Trial in DECO sector group	05/2017	10/2017	MUAC
Concept refinement and	11/2017	03/2018	MUAC

operational / technical developments			
AAPF Ops Trial in BRUS, DECO and HANN sector groups	04/2018	06/2018	MUAC
Coordination with the enhanced Central Supervisor Suite	07/2018	12/2018	MUAC

Note

Project was revived in 2020.

ADSC

Led by MUAC (2017 - 2022)

Sites involved

ACC/UAC: Maastricht

Participants

FABEC: MUAC

Point of contact

Noud DE LANG
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Project description

As part of the SESAR2020 projects linked to the new ADS-C (i.e. PJ18 for validations and PJ31 for live demonstrations) industry will provide a prototype compliant with latest ATN-Baseline 2 Data Link standard of March 2016. This includes the downlink of e.g. the on-board planned trajectory (known as the Extended Projected Profile - EPP). This prototype development will be provided as in-kind contribution by industry to PJ18 & PJ31 in support of further validations in the period 2017-2019.

Under PJ31 MUAC strives for providing the downlinked EPP to a sub-set of controllers in pre-operational fashion. These ATCOs will then have the option to display the EPP and get a discrepancy indication when the downlinked airborne trajectory is not equal to the FDPS flight plan.

Benefits

Lead the worldwide implementation of ATN ADS-C EPP.

Significant decrease of ATCO effort by moving ADS-C validations/demonstrations into the OPS room to a sub-set of ATCOs.

Immediate safety benefit by comparing the 2D ground trajectory and the received FMS prediction and warning in the presence of a discrepancy.

Implementation Steps

Task	Start	End	Led by
Implementation	04/2017	01/2019	MUAC

Air Command and Control System (ACCS)

Led by BAC (2016 - 2017)

Implementation of a new C2 system

Participants

FABEC: BAC

Project description

After implementation of new software (beginning 2017) a national verification and validation will take place in order to declare Initial operational capable.

Mid 17: Initial Ops capable (ACCS as main system and legacy system as back up)

Until IOC, Legacy C2 system will be primary system.

After IOC, legacy will become back up system in case of ACCS outage until ACCS stability and performance allows Legacy power down.TBD : Final Operational Capable

Implementation Steps

Task	Start	End	Led by
Trainining	01/2016	09/2016	BAC
Implementation	10/2016	06/2017	BAC
Start of operation	07/2017	09/2017	BAC

Airspace redesign

Led by LVNL (2018 - 2023)

Led by Dutch ministry of Infrastructure and Water Management

Sites involved

ACC/UAC: Amsterdam
Airport: EHAM

Participants

FABEC: LVNL, MUAC

Benefits

• Future growth of both Schiphol airport and other Dutch airports like Eindhoven, Rotterdam and the new airport under development Lelystad;

• Suitable trainings area for the Dutch Air Force.

Implementation Steps

Task	Start	End	Led by
Implementation	01/2018	12/2023	LVNL

ARSI

Led by skyguide (2017 - 2018)

Advanced Runway Safety Improvement (ARSI)

Sites involved

Airport: LSGG, LSZH

Participants

FABEC: skyguide

Project description

The ARSI project aims at changing the working methods and procedures to systemically trace controller actions to record the clearances and instructions to get knowledge of the controller's intentions. Moreover this requires a more and deeper coupled e-strip and A-SMGCS systems as it is the case today in order to improve the situational awareness within the TWR and APRON rooms as well as to provide alerts/warnings in case of safety critical / contradictory ATC clearances. A special focus has to be paid to the crossing runways in terms of take-offs and landings in their different configurations.

This new capability to alert of potentially critical situations is to be realized through the integration between the existing skyguide TWR A-SMGCS (SAMAX), TWR/APP e-strip and coordination tool (TRACE), FZAG airport e-strip and DMAN (DARTS) and SMAN (to come).

This should contribute to a first step towards the complete integration of the automation support tools provided by the ANSP for TWR control and those managing the airport situation.

Implementation Steps

Task	Start	End	Led by
Implementation	01/2017	12/2018	skyguide

ASM 365 + in EBTRA SB

Led by MUAC (2016 - 2021)

ASM 365 + in EBTRA SB and LF CBA 16

Sites involved

ACC/UAC: Brussels, Maastricht, Reims

Participants

FABEC: BAC, DSNA, MUAC, skeyes

Point of contact

Vincent Taverniers
Vincent.taverniers@eurocontrol.int

Project description

Improve the ASM L2 for the EBTRA SB and LF CBA 16 B

Benefits

Increase capacity

Increase HFE

No Impact on Safety is expected

Impact on MME needs to be assessed during the trial – TBD

Implementation Steps

Task	Start	End	Led by
Coordination BAC-MUAC-BE AMC	07/2016		BAC
Coordination BAC-MUAC-RUAC-BE AMC	08/2016	10/2016	BAC
Route opening in BE & FR concerned airspace	12/2016	31/12/2021	MUAC

ATM Portal

Led by MUAC (2016 - 2021)

Sites involved

ACC/UAC: Geneva, Karlsruhe, Maastricht, Reims

Participants

FABEC: DFS, DSNA, MUAC, skyguide

Point of contact

Eric CARPENTIER
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Project description

The ATM Portal project (ATMP) intends to deliver an infrastructure for de-centralized sharing of information and for enhanced collaboration with external stakeholders (ANSPs, Airlines…). Four initial use cases are currently planned:

1. Access to NM B2B services - using Publish/Subscribe mechanism where suitable/available - through public internet and PENS

2. Provide Flight Plan trajectories to other ATFCM/ASM systems as well as to external partners (e.g. NATS).

3. Provide a data server and web based portal for collaboration between MUAC and external partners (airlines)

4. Provide a data server and – if concept sufficiently mature – a web based portal supporting the XMAN concept.

Benefits

Alignment with new Publish/subscribe services from NM will allow future migration to Flight Data services for subsystem currently consuming EFDs in view of future EFD decommissioning, which will a/o bring significant bandwidth consumption reduction for subsystems now retrieving these data through polling mechanism (e.g. iFMP for regulations)

Sharing of the same ‘traffic view’ for flights transferred from MUAC to partners should allow better targeted AMA requests from partners who today only rely on EFDs (e.g. Heathrow and Schiphol)

Closer relationship with airlines during pre-tactical (Day-1) and tactical (few hours prior take-off) phases

Enable future XMAN server deployment and support related FABEC/SESAR2020 projects.

Implementation Steps

Task	Start	End	Led by
Implementation	10/2016	12/2019	MUAC

BKTX New Beek Transmitter Stations

Led by MUAC (2016 - 2020)

Sites involved

ACC/UAC: Maastricht

Participants

FABEC: LVNL, MUAC

Project description

Deployment of new Beek transmitter stations incl. radio towers

Benefits

Improved safety (at least two physically separated radio stations for each operational frequency); improved capacity (allows maintenance on transmitter antennas without switching to Backup VCS); lift height restrictions on airport area.

Implementation Steps

Task	Start	End	Led by
Implementation	01/2016	10/2018	MUAC

Business Continuity at EBLG, EBCI, EBOS, EBBR

Led by skeyes (2016 - 2021)

Implement procedures to provide Business Continuity for EBLG, EBCI, EBOS, EBBR, EBAW during system outage.

Sites involved

ACC/UAC: Amsterdam, Brussels, Langen
Airport: EBAW, EBBR, EBCI, EBLG, EBOS

Participants

FABEC: skeyes

Project description

This initiative aims at implementing procedures to provide Business Continuity for Belgian regional airports during system outage at Brussels APP. In particular, the following collaborations will support this business continuity project:

- For EBLG: EBLG APP and DFS Langen ACC;

- For EBCI: EBCI APP and DSNA LFQQ;

- For EBOS: EBOS APP and NATS London LTC/LAC.

- For EBBR: EBBR/EBAW APP and Amsterdam ACC

Benefits

Ensure the Business Continuity.

Implementation Steps

Task	Start	End	Led by
Implementation EBCI, EBLG		Q4 2016	skeyes
Implementation EBOS		Q1 2017	skeyes
Implementation EBBR-EBAW		Q1 2021	skeyes

Capacity management

Led by LVNL (2018)

Sites involved

ACC/UAC: Amsterdam
Airport: EHAM

Participants

FABEC: LVNL

Project description

There are different ways to improve capacity and to reduce delay. The usual approach is to redesign airspace and/or increase the volume of the airspace. Another way is capacity management. Capacity management can be applied on different flight domains from strategical to post-flight. In 2017 LVNL performed a study to define the scope of the needed improvements on the capacity management process. The study showed that improvements are possible in all four domains: strategic, pre-tactical, tactical and post-operational domain.

The roadmap of the implementation steps is pending, however, LVNL expects the most benefits within the pre-tactical domain. The further development of the D-1 process will be the first step.

Benefits

Implementation and development of the capacity management process supports the cooperative network management. It improves network performance, decreases delay and increases capacity.

Implementation Steps

Task	Start	End	Led by
Implementation	01/2018	tbd	LVNL

CDO Belgian Airports

Led by skeyes (2017 - 2022)

Continuous Descent Operations (CDO) at Belgian Airports Charleroi and Liege

Sites involved

ACC/UAC: Brussels
Airport: EBCI, EBLG

Participants

FABEC: skeyes

Project description

The implementation of continuous descent approach techniques is a goal in the 'European Single Sky ImPlementation' Plan (ESSIP). Since June 2014, CDO on EBBR has been published and is operational on the PRS runways. The implementation of CDO at the regional airports of Brussels-South (EBCI) and Liège (EBLG) is has started in 2017 and will be done in steps until 2022.

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Benefits

- To support the airspace users fly better profiles
- To reduce emissions and fuel use, in support of the environment.
- To reduce noise at low altitudes

Implementation Steps

Task	Start	End	Led by
Implementation at EBCI	Q4 2017	Q1 2022	skeyes
Implementation at EBLG	Q4 2017	Q1 2022	skeyes

Centralized DFS “Yellow Profile” SWIM Node

Led by DFS (2020)

This DFS initiative intends to deploy the Family 5.2.2 as laid down by the SESAR Deployment Manager within the Deployment Programme 2015 on the basis of implementing the Pilot-Common-Project Regulation EU No. 716/2014.

Sites involved

ACC/UAC: Bremen, Karlsruhe, Langen, Munich

Participants

FABEC: DFS

Project description

Therewith, deploying stakeholder SWIM infrastructure components for information exchange in a timely, coordinated and synchronized effort to raise capacity, improve safety and cutting costs while minimizing aviation's environmental footprint.

Specifically, the present project will achieve the following objective: ensure that the operational benefits of SWIM are realized by enabling DFS systems to provide and consume SWIM services deployed on the "Yellow profile" SWIM infrastructure.

It will ensure cost efficiency of SWIM deployment by

a) providing a single DFS implementation of SWIM ""Yellow Profile"" technology that

i. integrates into the DFS systems operations infrastructure and

ii. minimizes integration cost by providing an open standard integration platform to the DFS ATM systems.

b) coordinating the DFS internal SWIM deployment activities to realize synergies

c) ensuring efficient and effective communications with DFS in ""Yellow Profile"" matters by establishing a clear DFS unique point of access (gateway) to external SWIM Stakeholders."

Furthermore, it will minimize risk and contribute to timeliness of the European SWIM implementation effort by continuous coordination of deployment activities with all external implementation initiative stakeholders

a) SWIM service partners (NM, ANSPs, MET providers, ...)

b) SWIM Governance

c) SWIM "Common Components" providers

Benefits

See impact on performance

Implementation Steps

Task	Start	End	Led by
Training	01/2023	06/2023	DFS
Start of operation	12/2023		DFS

CoFlight Cloud Services

Led by DSNA (2017 - 2020)

Implementation phase of Flight Data Processing System offered remotely "as a service", to interconnect with in an innovative Service Oriented Architecture.

Sites involved

ACC/UAC: Paris, Geneva, Zurich

Participants

FABEC: DSNA, skyguide

Project description

The aim of the project is to implement a Flight data processing service and all related support services for testing, training, operational and contingency purpose. This advanced technology and architectural interface is implemented jointly with DSNA, ENAV and MATS.

Coflight cloud services (CCS) fosters interoperability required between the Europeans ANSPs, particularly in the FABEC while enabling consolidation of ATM systems in FABEC in an open architecture framework.

Benefits

It will lead to an increase in safety, flight efficiency and capacity. Better costs efficiency through shared development and maintenance costs and increase interoperability between systems.

Implementation Steps

Task	Start	End	Led by
Implementation	01/2017	12/2020	DSNA

Common Civ-Mil VCS

Led by LVNL (2019 - 2020)

This project implements a common Voice Communication System (VCS) for the provision of air navigation services in lower airspace in the Netherlands by the Civil and Military Air Traffic Control organisations, at the end of 2017, co-located at Schiphol.

Sites involved

ACC/UAC: Amsterdam
Airport: EHAM

Participants

FABEC: LVNL

Point of contact

Bob Korthagen
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Project description

A common VCS system eases the coordination between civil-military air traffic controllers and will contribute to civil-military cooperation and promotes integration of air navigation services. The common VCS add an extra system layer that provides a higher level of sustainability.

The main objectives of the project are to:

• provide a common VCS to the Civil and Military Air Traffic controllers located at Schiphol

• add an extra system layer, a back-up system for the main Voice Communication System (VCS), to increase sustainability

• have a VCS ready for Voice over IP (VoIP) technology and connect adjacent centers where possible

• support the development of Lelystad Airport, civil tower controllers will operate at Lelystad Airport, while Military controllers will perform the approach functionality.

The project is part of a Global Project, seeking close civil-military cooperation with the ultimate aim of one Dutch single sky and one Dutch air traffic control organisation. In 2010, Air Traffic Control the Netherlands and Royal Netherlands Air Force Command signed a memorandum of understanding. Both the Ministry of Environment and Water Management and the Ministry of Defence support this ambition. Centre consolidation, more cooperation and, in the long term, integration of civil and military air traffic services in the Dutch airspace will contribute to an optimal use of airspace and will increase the performance and cost efficiency of Air Traffic Services.

Benefits

The proposed project has a positive effect on Air Traffic Management, optimization of existing capacity, interoperability and safety. A common VCS system eases the coordination between air traffic controllers this improves Air Traffic Management. The integrated voice communication system creates interoperability between the civil and military ANSP's.

A common VCS contributes to the implementation of changes for the optimisation of the Dutch airspace design. The provision of air traffic services in the lower airspace (below FL 245) can be simplified and harmonized for both civil and military air traffic to fulfil the necessity to optimize the use of the sparse airspace available and to increase the flexible use of that airspace within the national and European context. The integration of the voice communication functionality into one system improves the time to market of future changes in airspace, flexible use of airspace and sectorisation. This contributes to an optimum use of airspace and to increase the performance of Air Traffic Management.

The extended system will be VoIP ready, this enables future international inter-operability in the voice communication domain.

Implementation Steps

Task	Start	End	Led by
Implementation	01/2019	06/2020	LVNL

Complete ANA CNS infrastructure renewal program

Led by ANA Lux (2017 - 2027)

Renewal of all main COM, NAV and SUR infrastructure for Luxembourg ANA

Sites involved

Airport: ELLX

Participants

FABEC: ANA Lux

Point of contact

Head ATC-APP and ATC-CNS
cst@airport.etat.lu and ary@airport.etat.lu

Project description

The complete portfolio of CNS infrastructure operated by ANA will be renewed over a 10 year program. Starting with the 8,33khz conversion, new VCS, new ATM data network, via new ILS, NDB, VOR and concluding in an ATM system renewal with new radar infrastructure, new ATM system including FDPS, CWP and processing. Centralized monitoring and remote maintenance services.

Benefits

Complete overhaul of currently outdated ATM infrastructure with the benefits of centralized and more efficient services.

Implementation Steps

Task	Start	End	Led by
Project	01/2017	12/2027	ANA

Contingency of APP and TWR services

Led by ANA Lux (2019 - 2021)

Local contingency of APP and TWR services

Sites involved

Airport: ELLX

Participants

FABEC: ANA Lux

Point of contact

Head ATC-APP, ATC-TWR and CNS
cst@airport.etat.lu and ary@airport.etat.lu
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Project description

Improvement of local contingency plan in case of service disruption of APP and/or TWR services

Benefits

Improved service continuity and reduction of delays

Implementation Steps

Task	Start	End	Led by
Phase 1		Q2-2020	ANA
Phase 2	Q1-2020	Q1-2021	ANA

CssIP

Led by DSNA (2017)

Sites involved

ACC/UAC: Bordeaux, Brest, Marseille, Paris, Reims
Airport: LFPG, LFPO, LFMN

Participants

FABEC: DSNA

Project description

This initiative aims at ensuring safety and continuity of service for operational communications for the purposes of ATC beyond the stop of Transfix leased connections.

Achieving this objective is based on the implementation of a national new generation telecommunications network (RENAR-IP) and the gradual migration of voice and data communications from the current network to the new network. This will ensure data exchange with various international networks and simplify the interoperability of systems and applications between adjacent control centers.

Implementation Steps

Task	Start	End	Led by
Implementation	01/2017	12/2017	DSNA

Deploy Full FRA in German airspace

Led by DFS (2018 - 2021)

Deploy Free Route Airspace (Full FRA) in German Airspace controlled by DFS

Sites involved

ACC/UAC: Bremen, Karlsruhe, Munich

Participants

FABEC: DFS

Point of contact

DFS FRA Project Manager

Project description

Stepwise implementation of Free Route Airspace in accordance with Pilot-Common-Project (EU No. 716/2014), AF#3.

Stepwise implementation of Free Route Airspace in accordance with Pilot-Common-Project (EU No. 716/2014), AF#3.

Solution 1 (01 MAR 2018):

- 1A - FRA FL245+ during night DFS-wide
- 1B - FRA FL245+ H24 in FRA Cells EDUU North and EDUU East (in EDWW East and EDMM East based on H24 RAD App 4 DCTs)

Solution 2 (DFS FRA H24 by 31 DEC 2021):

- 2a (Winter 2018/19): H24 RAD APP 4 DCTs FRA Cells EDUU West and EDUU South, ATS Route Changes
- 2b (Winter 2019/20): H24 RAD APP 4 DCTs FRA Cells EDUU West and EDUU South, ATS Route Changes
- 2c (JUN 2020 - DEC 2021): Gradual Move towards DFS FRA FL 245+ H24 (in EDWW East and EDMM East based on H24 RAD App 4 DCTs)

Benefits

- Improvement in horizontal flight efficiency (HFE)

- Improvement in Predictability

- Reduction of fuel burn

- Reduction of greenhouse gas emissions

Implementation Steps

Task	Start	End	Led by
1A - Free Route Airspace (FRA) in DFS AoR , available during night from FL245 and above.	03/2018	03/2018	DFS
1B - Free Route Airspace (FRA), available H24 from FL285 and above in NE Germany	03/2018	03/2018	DFS
2 - Free Route Airspace (FRA) in DFS AoR, available H24 from FL245/FL285 and above	10/2018	10/2021	DFS

Digital Towers

Led by skeyes (2018 - 20224)

This project aims at implementing Digital Towers for all the Belgian Airports where skeyes is providing Air Traffic Services.

Sites involved

Airport: EBAW, EBBR, EBCI, EBLG, EBOS

Participants

FABEC: skeyes

Point of contact

Mathieu Vanverkom
maw@skeyes.be

Project description

skeyes launched in 2018 the remote Digital Tower programme (DiTo). As part of an initiative to improve services and secure a long-term strategic partnership with both Charleroi and Liège airports, skeyes has taken the decision to introduce contingency services at each airport. This will offer more stability in case of operational disruptions. skeyes has furthermore decided to introduce ‘Digital Towers’, enabling further operational performance improvements by ultimately co-locating the service provision at both airports.

In 2018 and beginning of 2019, skeyes conducted two implementation studies for both the Walloon and the Flemish airports that has recommended the most appropriate deployment scenario for each region and proposed a set of high-level requirements. This laid the basis for the further development of final tender documents.

Early 2020, skeyes refined the scope of its Digital Tower programme to encompass the 6 airports where skeyes is providing Air Traffic Services (Brussels, Antwerp, Ostend, Kortrijk, Liège and Charleroi).

Benefits

- improved services
- increased efficiency

Implementation Steps

Task	Start	End	Led by
Tendering		Dec 2020	skeyes
System design and validation		Dec 2021	skeyes

Installation		Dec 2022	skeyes
Commissioning		2024	skeyes

Division of south-west sector

Led by LVNL (2017 - 2018)

The south-west sector of the Dutch FIR named sector 3, is one of the busiest sectors for Amsterdam ACC. The traffic in this sector goes to/from the sectors of Belgocontrol and to MUAC.

Sites involved

ACC/UAC: Amsterdam
Airport: EHAM

Participants

FABEC: skeyes, LVNL, MUAC, BAC

Point of contact

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Project description

The complexity of the traffic in south-west sector is high due to East-West traffic that crosses the Schiphol in- and outbound streams. The traffic for and from Brussels, Rotterdam and Eindhoven that also uses this sector makes it even more complex. Together with the explosive growth in traffic volumes for all these airports this leads to overloads and restrictions on this sector. In a stepwise approach sector 3 will be enlarged, traffic streams rerouted in collaboration with Belgocontrol and MUAC, and finally the division of sector 3 will be implemented to create in- en outbound sector, similar to the way in which western sector 2 is already dividable.

Benefits

It is foreseen that enlarging the sector together with the creation of the possibility to divide the sector to enable two independent sectors in this area, will provide sufficient capacity to prevent overloads and minimize the need for restrictions.

It is expected to have a 50% increase in sector capacity and minimization of the need for restrictions.

Implementation Steps

Task	Start	End	Led by
Implementation	01/2017	12/2018	LVNL

DME/ VOR systems replacement and modernization

Led by DFS (2016 - 2024)

Cooperation initiative between DFS and LVNL.

Sites involved

ACC/UAC: Bremen, Karlsruhe, Langen, Munich, Amsterdam

Participants

FABEC: DFS, LVNL

Project description

The main objective is to further harmonize technical specifications of air navigation systems within core Europe and to operate these systems more cost-efficiently. By increasing the number of systems to be purchased, discount rates from system manufacturers are being expected, which will result in lower annual depreciation cost after start of operation. Thus, DFS and LVNL joined for this common activity.

DFS will procure 13 VOR in Phase I of the project up to 2020, which will be installed and operated all over Germany. In Phase II (2021 to 2024), the project will focus on an infrastructure optimization by reducing the total number of VOR systems and thus, DFS will order less than 13 further VOR in Phase II.

DFS will procure 16 DME, which will be installed and operated all over Germany. Both types of DME – en-route DME and airport DME, supporting ILS installations – will be replaced.

Benefits

See impact on performance

Implementation Steps

Task	Start	End	Led by
Training	01/2016	12/2016	DFS
Start of operation	01/2017	12/2024	DFS

Drones in the ATM system

Led by LVNL (2017 - 2018)

Drones (RPAS) are considered as VFR traffic in the Dutch FIR. LVNL is looking for possibilities to allow them not only outside CTRs but also inside.

Sites involved

Airport: EHAM

Participants

FABEC: LVNL

Project description

The aim of this project is the integration of RPAS In CTR’s. LVNL completed trials and implemented the RPAS in outer ring of CTR’s (>5600 m from ARP) in regulations in 2017. For EHAM the same is expected in 2018.

At the moment LVNL is looking at the integration of RPAS in inner ring of CTR’s (

DSNA Data Link

Led by DSNA (2016 - 2018)

Sites involved

ACC/UAC: Bordeaux, Brest, Marseille, Paris, Reims

Participants

FABEC: DSNA

Project description

This initiative aims at implementing CPDLC (Controller-Pilot Datalink Communications) avoiding the cluttering of the frequency by long messages that can be misunderstood.

It involves Marseille ACC/UAC, Reims ACC/UAC, Paris ACC/UAC, Brest ACC/UAC and Bordeaux ACC/UAC.

Implementation Steps

Task	Start	End	Led by
Implementation of initial operating capability (IOC Datalink)	01/2016	12/2016	DSNA
Implementation of full operating capability (FOC Datalink) in Bordeaux and Brest ACCs	01/2016	12/2018	DSNA

DVOR DME replacement

Led by skeyes (2016 - 2021)

Replacement of the DVOR/DME systems both on electronic level and also a thorough refurbishing of the sites regarding cooling/heating, antenna system, shelter.

Sites involved

ACC/UAC: Brussels
Airport: EBAW, EBBR, EBCI, EBLG, EBOS

Participants

FABEC: skeyes

Project description

Replacement of the DVOR/DME systems both on electronic level and also a thorough refurbishing of the sites regarding cooling/heating, antenna system, shelter.

Benefits

- increased reliability

Implementation Steps

Task	Start	End	Led by
Implementation	2017	Dec 2021	skeyes

E-Strip TWR-APP GVA

Led by skyguide (2016 - 2019)

Stripless TWR/APP GVA

Sites involved

Airport: LSGG

Participants

FABEC: skyguide

Project description

Implementation of a more efficient and safer working environment (including new ATC tools, working position layout changes and new working methods) at GVA TWR, APP and AMS, replacing paper strips SYCO TIDs by modern ATC Tools in order to reduce ATCOs workload linked to overhead tasks, increase situation awareness, harmonize working methods and maximize head-up time.

It will lead to an enhanced safety and enable future capacity increases by the introduction of new ATC tools and harmonised working methods. Additionally, this implementation is expected to improve cost-effectiveness and efficiency.

Implementation Steps

Task	Start	End	Led by
Implementation	01/2016	12/2018	skyguide

EGNOS Approach Procedures

Led by DSNA (2016 - 2017)

Sites involved

Airport: LFPG, LFPO, LFMN

Participants

FABEC: DSNA

Project description

Implementation of new satellite IFR procedures at all DSNA instrument approach runways to enhance the accessibility of the ADs, in line with ICAO PBN programme and DSNA strategy to keep the maintenance of an ILS Category 1 minimum network only on medium-size regional airfields.

Benefits

Improve safety by providing vertical guidance on every instrument runway end

Optimized ILS network

Accessibility, even when maintenance of conventional navaid scheduled

Implementation Steps

Task	Start	End	Led by
Implementation	01/2016	12/2017	DSNA

Electronic Flight Strips at Schiphol TWR

Led by LVNL (2017 - 2019)

Implementation of Electronic Flight Strips at Schiphol TWR

Sites involved

Airport: EHAM

Participants

FABEC: LVNL

Point of contact

Lonneke Smit
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Project description

LVNL tower operation has a challenging future ahead. The number of movements is growing steadily and the Schiphol infrastructure is becoming more complex each day. The tower operation is at its limits, with the current way of handling traffic, growth cannot be accommodated.

The aim of the project is the replacement of paper strips by Electronic Flight Strips at Schiphol TWR-C, TWR-W, TWR-E and TWR-SIM to increase safety and efficiency.

Benefits

EFS brings a number of qualitative benefits

• Controllers can be seated according to their area of responsibility and not according to the flow of the paper strips.

• It brings tranquility to the noisy space of the tower visual control room. Now there is a continuous clicking of strips being transferred and reordered on the strip boards.

• EFS is an enabler for future developments like improved safety nets and planning functionalities (CDM). Moreover EFS is an enabler for the Pilot Common Project Implementing Rule, which requires LVNL to implement safety nets and routing and planning functionalities.

Implementation Steps

Task	Start	End	Led by
Implementation	01/2015	03/2019	LVNL

Grand Ouest

Led by DSNA (2015 - 2017)

Re-design of the airspace to be compliant with the needs of Military users, GAT flows and airports in the French west area

Sites involved

ACC/UAC: Bordeaux, Brest, Paris

Participants

FABEC: DSNA

Project description

New design of TSA6, TSA8 et TSA9, LF-R 7, LF-R146 and route network adaptation in lower and upper airspace.

It involves Brest ACC/UAC, Bordeaux ACC/UAC, Paris ACC/UAC, SNA-O and military centres

Benefits

An increase in safety, capacity and Military Mission Effectiveness is expected.

Implementation Steps

Task	Start	End	Led by
Implementation	01/2015	03/2017	DSNA

High-Profile Transition Operation (HTO)

Led by DFS (2014 - 2020)

CDO with pre-programmed vertical guidance (e.g. STARs) into EDDF from cruising level.

Sites involved

ACC/UAC: Karlsruhe, Langen, Munich
Airport: EDDF

Participants

FABEC: DFS

Point of contact

Wolfgang Oechler

Project description

High-Profile Transition Operation (HTO) : establish Continuous Descent Operations (CDO) with pre-programmed vertical guidance (e.g. STARs) into EDDF from cruising level. First procedure EMPAX STAR was established in December 2017 with RNV-1 criteria for navigation accuracy, thereafter experience gained on how to optimize procedure. Further updates and new STARs from South-East via GIMAX & FAWUR will be added 05 NOV 2020. The implementation of vertical guided STARs is a prerequisite to implement procedural spacing between STARs for CDO and RNAV-1 SIDs for CCO. It involves the ACCs of Langen and Munich and UAC Karlsruhe.

Benefits

an improvement in terms of vertical flight efficiency is expected. Later the option to increase capacity by procedural spacing between RNAV-1 STARs & SIDs is expected.

Implementation Steps

Task	Start	End	Led by
Development	01/2014	09/2016	DFS
Implementation	06/2016	12/2016	DFS
Monitoring Period 1	10/2016	03/2017	DFS
Re-Design ASPAT STAR	10/2017	06/2018	DFS
Monitoring Period 2	10/2017	12/2018	DFS

Holland Regional TMA

Led by RNLAF (2020)

Sites involved

ACC/UAC: Amsterdam

Participants

FABEC: LVNL, RNLAF

Project description

New operational concept in the military TMA’s. New conops has to be developed.

Implementation Steps

Task	Start	End	Led by
Implementation			RNLAF

Hub Control Frankfurt

Led by DFS (2017)

Implementation of procedures and technical support for optimised traffic control for Frankfurt Airport.

Sites involved

ACC/UAC: Langen
Airport: EDDF

Participants

FABEC: DFS

Point of contact

DFS Deutsche Flugsicherung GmbH

Project description

Implementation of procedures and technical support for optimised traffic control for Frankfurt Airport.

Trial operations of the tool CAPCON in 2020, evaluation of trial operations until end of Q1 2021. Pending the findings of the trials, implementation for regular operations.

Benefits

Optimised coordination between Frankfurt Tower and Approach Control. Potential capacity gains depending on trial results.

Implementation Steps

Task	Start	End	Led by
Trial (CAPCON)	Q4 2020	Q1 2021	DFS
Implementation	tbd	tbd	DFS

iCAS II

Led by DFS (2019 - 2026)

Implementation of a new ATS system at Munich, Amsterdam, Bremen and Langen ACCs.

Sites involved

ACC/UAC: Amsterdam, Bremen, Karlsruhe, Langen, Munich

Participants

FABEC: DFS, LVNL

Point of contact

DFS Deutsche Flugsicherung GmbH

Project description

iCAS which will enable DFS, LVNL and RNLAF to deploy up to 18 so-called Families as laid down by the SESAR Deployment Manager within the Deployment Programme 2015. It is a central Pilot Common Project (EU No. 716/2014) implementation project, foreseen for implementation under the framework of the SESAR Deployment Manager. Therewith, deploying advanced operational concepts such as but not limited to Free Route, Extended Arrival Management and extended information exchange with other systems / partners in a timely, coordinated and synchronized effort to raise capacity, improve safety and cutting costs and thus enabling a significant performance increase at DFS and LVNL. Furthermore, iCAS enables improved flight efficiencies in fuel and in time for the airspace users.

Furthermore, the iCAS System deployed at Karlsruhe UAC by project iCAS I will be upgraded.

It is a central Pilot Common Project (EU No. 716/2014) implementation project, foreseen for implementation under the framework of the SESAR Deployment Manager.

iCAS II belongs to the joint DFS/LVNL iCAS Programme which foresees the joint and common implementation of a new ATS system for all DFS and LVNL control centres. See also iCAS I.

Implementation Steps

Task	Start	End	Led by
Munich	Q1 2022	Q3 2022	DFS
Amsterdam	Q4 2020	Q1 2023	LVNL
Bremen	Q4 2023	Q1 2024	DFS
Karlsruhe	Q4 2024	Q1 2025	DFS
Langen	Q4 2025	Q1 2026	DFS

ILS systems replacement and modernization

Led by DFS (2017 - 2028)

Cooperation initiative between DFS and LVNL.

Sites involved

ACC/UAC: Amsterdam, Bremen, Langen, Munich

Participants

FABEC: DFS, LVNL

Project description

The main objective is to further harmonize technical specifications of air navigation systems within core Europe and to operate these systems more cost-efficiently. By increasing the number of systems to be purchased, discount rates from system manufacturers are being expected, which will result in lower annual depreciation cost after start of operation. Thus, DFS and LVNL joined for this common activity.

DFS has procured 24 ILS fix (including 1 training system and 1 test system) and 5 ILS optional up to 2030, which will be installed and operated at various international airports in Germany.

LVNL has procured 11 ILS fix (including 1 test system) and 1 ILS optional, which will be installed and operated at various airports in the Netherlands.

Benefits

Cost-efficiency due to expected discount rates out of this common procurement (reduced depreciations)

Implementation Steps

Task	Start	End	Led by
Training	07/2017	12/2017	DFS
Start of operation	01/2018	12/2030	DFS

ISMS

Led by LVNL (2017 - 2018)

Since the early days of aviation, much attention has been paid to safety. As the industry progressed in the reduction of risk, regulation formalized best practices and pushed the application of standards further. Since 2013 Annex 19 of the International Civil Aviation Organization (ICAO) provides a generic design for a safety management system which is applicable to all aviation organizations. At present, the majority of the organizations in the Dutch aviation sector have or are working towards an ICAO/EASA prescribed safety management system.

Sites involved

ACC/UAC: Amsterdam

Participants

FABEC: LVNL

Project description

To improve safety even further the organizations in the Dutch aviation sector, present at Schiphol, have decided to formalize this cooperation using standardised and common ways of working. An integral Safety Management System (ISMS) is seen as a valuable tool for this purpose. With this formalization the participating organizations also implement an important recommendation from the Dutch researchboard for safety (in dutch: onderzoeksraad voor de veiligheid, OVV) form their report on flight safety at Schiphol.

Benefits

By establishing an integral Safety Management System, the following added value is expected to be achieved:

• Increased focus: because of the integral approach, increased proactive and demonstrable action is taken on the safety of interfaces between organisations;

• Improved decision-making: because all perspectives are taken into account, the quality of decision making is higher, decisions are better, motivated and have better commitment of the organisations involved. This will result in a more efficient use of resources.

• Better insight: Knowledge of overarching risks increases. Organisations involved can appreciate each other’s barriers when managing risk. Furthermore, joint investigations, analyses and classification of risk improves the insight in safety at Schiphol;

• Integral external reporting

Organisations are able to report integrally to external parties on the management of shared risks.

Implementation Steps

Task	Start	End	Led by
Implementation	01/2017	03/2018	LVNL

Just Culture

Led by LVNL (2015 - 2018)

Sites involved

ACC/UAC: Amsterdam
Airport: EHAM

Participants

FABEC: LVNL

Point of contact

Job Brüggen
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Project description

One key to the successful implementation of safety regulation is to attain a “just culture” reporting environment within aviation organisations, regulators and investigation authorities. This effective reporting culture depends on how those organisations handle blame and punishment.

Only a very small proportion of human actions that are unsafe are deliberate (e.g. criminal activity, substance abuse, use of controlled substances, reckless noncompliance, sabotage, etc.) and as such deserve sanctions of appropriate severity. A blanket amnesty on all unsafe acts would lack credibility in the eyes of employees and could be seen to oppose natural justice. A “no-blame” culture per se is therefore neither feasible nor desirable.

What is needed is a “just culture”, an atmosphere of trust in which people are encouraged, even rewarded, for providing essential safety-related information - but in which they are also clear about where the line must be drawn between acceptable and unacceptable behaviour.

How to actually achieve that is not a trivial task. In support for this, LVNL will implement an ‘Event Review Team’ for internally advising line managers about the interpretation of human actions / behaviour, to support a consistent Just Culture throughout the organisation.

Benefits

1. Maintains the responsibility of the line manager

2. More consistent judgment on human actions or behaviours.

3. Avoid unnecessary punitive measures.

4. Fear of unjust treatment of personnel is reduced

5. Provides more trust in the management of dealing with inevitable human performance variation

6. Better reporting culture.

Implementation Steps

Task	Start	End	Led by
Development	01/2015	01/2017	LVNL
Implementation	01/2017	12/2018	LVNL

Langen 2.0

Led by DFS (2017 - 2021)

The project Langen 2.0 is a project to improve the FIR Langen in work organisation and operational structure.

Sites involved

ACC/UAC: Langen

Participants

FABEC: DFS

Point of contact

Frank Wetzel (DFS)
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Project description

Based upon current sector structure a major redesign was analysed over the past years. The main goal was to optimize sectors and to minimize ATCO workload.

Based on the past szenarios with high workload and limited ressources, only on out of five originally planned steps will be implemented: the redesign of sector Group 1 in the Northwest of Langen FIR including EDDL APP. In this area the highest benefits were seen and the necessity to optimize the structure prior implementation of a new ATS system.

Benefits

The expected benefits are to:

- increase work efficiency

- balance the workload

- get more flexibility in staff allocation

- reduce complexity of airspace and procedures

Implementation Steps

Task	Start	End	Led by
First Package (\"DLDS small\")	06/2016	06/2017	DFS
Second Package (\"Sector Group 02	06/2016	12/2017	DFS

internal\")			
Third Package (“Sector Group 06 internal”)	06/2016	03/2017	DFS
Fourth Packages (“Sector Group 10 Flight level 135”)	10/2017	12/2018	DFS
Fifth Packages (“Sector Group 05 internal”)	10/2017	12/2018	DFS

Note

The otherideas from Langen 2.0 were skipped completely, some identified features are implemented as quick wins in other ongoing AIRAC changes.

Lelystad Airport

Led by LVNL (2018 - 2019)

The goal of the Programma Lelystad is to provide the ATC at Lelystad Airport for the IFR and VFR traffic. The Programma is the collaboration between LVNL and Dutch Mil. Lelystad Airport should be opened on April 1st, 2019 growing to a maximum of 10,000 flights/year in 2023. Tower ATC at Lelystad Airport will be done by LVNL, Approach control will be provided by Dutch Mil and ACC by LVNL.

Sites involved

ACC/UAC: Amsterdam
Airport: EHAM

Participants

FABEC: LVNL, RNLAF

Point of contact

Richard Versteegh (program manager)
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Project description

Schiphol Airport has almost reached 500,000 movements/year, which is the maximum amount of movements that can be handled at Schiphol. To accommodate more traffic in the vicinity of Amsterdam, the Ministry of Infrastructure and Water Management the Netherlands has decided to open Lelystad Airport for commercial IFR traffic.

LVNL is committed to the development of Lelystad Airport, in which the focus is on a safe and efficient operational concept, especially when it concerns possible interference with traffic flows from and towards Schiphol Airport.

The start of the air traffic service provision at this airport and the opening of Lelystad for commercial traffic is now scheduled for April 1, 2019. As of this date LVNL aims to provide tower control services which are aligned with market demand within the conditions set by the ministry of Infrastructure and Water Management. The Ministry of Defence/Royal Netherlands Airforce (RNLAF) will provide approach control services from the co-located position at Schiphol-East.

Benefits

Lelystad Airport will be opened on April 1st, 2019 growing to a maximum of 10,000 flights/year in 2023. The expectation is that a part of not hub network related traffic will move from Schiphol to the Lelystad airport to enable growth at Schiphol for the hub network related traffic.

In order to support 45,000 flights/year in the future, a redesign of the Dutch airspace is necessary. A review is being done to investigate how the air traffic management system should improve after the

year 2020 in order to allow growth at Schiphol beyond 500,000 movements and Lelystad beyond 10,000 movements. Dependent on the results of the review, new projects might arise or older projects might be reopened. This decision will be made in Q1-Q2 2018.

Implementation Steps

Task	Start	End	Led by
Start of operation	01/2016	04/2019	LVNL

LUMAS Phase 2

Led by DSNA (2014 - 2020)

Improvement of the interface Marseille ACC/UAC (F sector) / Barcelona ACC (LUMAS project phase 2b)

Sites involved

ACC/UAC: Marseille

Participants

FABEC: DSNA

Project description

Inter-FAB initiative to increase entry/exit points in the oceanic area, thus complying with an ICAO request. It includes a modification of the route network and the limits of the involved sectors.

The initiative involves Brest ACC/UAC, Swanwick and CCMAR Atlantique (French military centre).

Benefits

This initiative is expected to increase safety and capacity

Implementation Steps

Task	Start	End	Led by
Implementation	01/2014	TBD	DSNA

MaRS: Modernization of Radar and surveillance Sensor systems

Led by DFS (2020 - 2034)

Sites involved

ACC/UAC: Bremen, Karlsruhe, Langen, Munich
Airport: EDDB, EDDF, EDDL, EDDM, EDDT

Participants

FABEC: DFS

Project description

The project lifecycle is from 2015 to 2034, in which the project will

1. Rationalize the surveillance infrastructure by fully decommissioning spectral inefficient and functionally inferior Mode A/C radars.

2. Deploy a full network of Mode S radars as required.

3. Deploy new surveillance sensors and sensor mix as developed in the EU's SESAR Joint Undertaking program such as Multilateration and ADS-B complemented by a new network of Mode S radars. In addition, implement Multi-Static-Primary-Surveillance-Radars, as this technology becomes mature in the EU's SESAR Joint Undertaking's SESAR 2020 Program by the mid 2020's.

4. Deploy new radar data processing systems in an effort to integrate new surveillance sensors into a modular system.

5. Deploy civil/military use of radars in an effort to reduce cost by utilizing infrastructure synergies.

Benefits

By means of this project the following benefits are achieved:

1. Increased reduction of separation minima from 5 to 3 miles (whre possible) increasing airspace capacity.

2. Cost-efficient operation of the new surveillance infrastructure through standardized units as well as civil/military radar sharing.

3. Usage of enhanced surveillance data increasing surveillance quality and accuracy; thus, increasing safety.

4. Implementation of new surveillance sensors with extended range resulting in a lower number of systems.

5. Reduction of high frequency radio fields increasing spectrum efficiency.

6. Deploy new and more robust systems against signal disturbing sources and enabling a reduction in protection zones also making attractive sites available for wind farm development.

Implementation Steps

Task	Start	End	Led by
Start of deployment	08/2024	12/2034	DFS
Training	Q4/2023	01/2034	DFS
Start of operation	12/2024	12/2034	DFS

Marseille – Geneva Interface

Led by DSNA (2017)

Marseille ACC/UAC – Geneva ACC /APP Interface

Sites involved

ACC/UAC: Marseille, Geneva

Participants

FABEC: DSNA, skyguide

Project description

This initiative envisages an

- Adjustment of the ATS limits between Marseille ACC/UAC and Geneva ACC/APP below FL 195 to allow a better understanding of these limits;

- Improvement of connection to the routes network.

Benefits

Safety increase

Implementation Steps

Task	Start	End	Led by
Implementation	01/2017	12/2017	DSNA

Mode S airspace

Led by ANA Lux (2019 - 2020)

Use of mode S in ELLX TMA

Sites involved

Airport: ELLX

Participants

FABEC: ANA Lux

Point of contact

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Project description

Mode S implementation

Benefits

Use of conspicuity code A1000 instead of dedicated ORCAM codes

Implementation Steps

Task	Start	End	Led by
Implementation		Q2-2020	ANA

N-CONECT

Led by LVNL (2016 - 2019)

This is an Eurocontrol project were all European ANSPs are involved.

Sites involved

ACC/UAC: Amsterdam
Airport: EHAM

Participants

FABEC: LVNL

Point of contact

Eurocontrol
ELBERT Laszlo, Laszlo.ELBERT@eurocontrol.int

Project description

The n-CONECT (network-COmmoN Enhanced Collaborative ATM) project is linked to the “NM Ops Service Platform” Strategic Project, as described in the NSP. It provides a global vision for future NM service interfaces. The initial focus of n-CONECT is planned convergence to single, redesigned HMI for all users, fit for purpose and flexible enough to meet the needs of the different user roles (both internal and external)

Benefits

The project will develop services and tools to:

• Ensure that all stakeholders (included LVNL) involved in developing NM functions and future ATM systems have access to the Network view;

• Make Network information and decision flows available via the new Network Common Enhanced Collaborative ATM Platform, to support operational CDM by different stakeholders in the Network and across the ATFCM phases;

• Take advantage of new technologies (such as HTML5, COTS products for building the HMI).

Implementation Steps

Task	Start	End	Led by
Development			LVNL
1st Implementation step – connection to Network Manager	01/2016	06/2019	LVNL
Further steps	tbd		LVNL

N-VCS (DSNA)

Led by DSNA (2016 - 2020)

Introduction of a new voice communication system with capability for transfer of the voice by Internet Protocol.

Sites involved

ACC/UAC: Bordeaux, Brest, Marseille, Paris
Airport: LFPG

Participants

FABEC: DSNA

Project description

Taking benefits of Common FABEC VCS specifications MUAC and DSNA formed a partnership for a new VCS procurement. Project N-VCS (New-VCS) has been created in 2010 and DSNA/MUAC commonly selected a provider via a CFT procedure. Through N-VCS project, MUAC and DSNA joined forces for the whole system lifecycle to develop, operate and maintain a common large VCS system.

N-VCS will replace in a near future (from 2016 to 2025) large VCS currently operated by MUAC and DSNA in its 5 French ACCs and Paris/Charge de Gaulle Airport backup VCS.

Benefits

Increase in safety through improved back-up,

Increased cost-effectiveness of the ANSP’s investments as a result of scale effects in the acquisition process as well as during the maintenance phase.

Implementation Steps

Task	Start	End	Led by
Paris Roissy-CDG	10/2016	12/2018	DSNA
Brest ACC/UAC	10/2018	12/2019	DSNA
Bordeaux ACC/UAC	10/2019	12/2020	DSNA
Paris ACC/UAC			DSNA
Reims ACC/UAC			DSNA

Network 2.0

Led by LVNL (2017 - 2019)

The Project concerns the deployment of Family 5.2.1 – Stakeholders Internet Protocol Compliance as laid down by the SESAR Deployment Manager within the Deployment Programme 2016 based on implementing the Pilot- Common-Project Regulation EU No. 716/2014 at Amsterdam ACC and Amsterdam Schiphol TMA. This project will consolidate all common network functions (now mostly embedded in the legacy ATM solution itself) into a central service. This network is reliable and safe, redundancy techniques support all network layers and it supports a geo-redundant or segmented data centre.

Sites involved

ACC/UAC: Amsterdam
Airport: EHAM

Participants

FABEC: LVNL

Project description

This Project aims to:

• Deploy Family 5.2.1 – Stakeholders Internet Protocol Compliance as laid down by the SESAR Deployment Manager within the Deployment Programme 2016 based on implementing the Pilot-Common-Project Regulation EU No. 716/2014; implement Internet Protocol Network connectivity for the Amsterdam ACC and Amsterdam Schiphol TMA (Terminal Maneuvering Area) to be able to exchange ATM information. The IP supports future SWIM information exchanges through SWIM Yellow and Blue profiles based on Internet Protocol.

• Deploy Network infrastructure for iCAS.

• Integrate the military network (NAFIN) in the Network 2.0 Amsterdam infrastructure.

Benefits

The following results are expected:

• Part of the Pilot-Common-Project (PCP) regulation EU No. 716/2014 is implemented and that enables to increase performance at regional and European network level and thereby improves quality of transport.

• The interoperability and security for exchange of ATM information is improved by the IP. Internet Protocol compliance is necessary for civil and military stakeholders to be able to support future SWIM information exchanges through SWIM Yellow and Blue profiles based on Internet Protocol.

Performance Benefits:

• Less than 2% technology cost reduction is expected for Amsterdam Schiphol Airport.

• For security costs estimated at 1% improvement (cost of downtime is not included in this estimate), interoperability is not quantifiable.

Implementation Steps

Task	Start	End	Led by
Implementation	10/2017	09/2019	LVNL

New ATCO Consoles

Led by MUAC (2016 - 2020)

To provide the Next Generation Consoles for the ATCOs in the OPS- and Test & Training Room.

Sites involved

ACC/UAC: Maastricht

Participants

FABEC: MUAC

Point of contact

Nick Miller
nick.miller@eurocontrol.int

Project description

Human Factor and Ergonomic study shall provide a major contribution in design of the new ACTO Consoles and the future lay-out of the outer ring in the OPS-room. For Test and Contingency reasons, the ATCO consoles in the Test & Training Room are included.

Benefits

Capacity: future growth in the number of consoles available, improved flexibility of the sector layouts and enabler for integration of future operational concepts.

Sustainability of MUAC services: avoid obsolescence and identified flaws (modularity, cooling, acoustics..)

Implementation Steps

Task	Start	End	Led by
Development	01/2016	12/2020	MUAC
Implementation	01/2020	12/2020	MUAC

New Interface Marseille ACC-UA

Led by DSNA (2015 - 2018)

Sites involved

ACC/UAC: Marseille

Participants

FABEC: DSNA

Project description

Implementation of the DSNA airspace strategy in lower airspace (SIV MTL).

Finalisation of the Provence project by increase in LFML capacity and creation of a flow orientation not dependent on the runway in use (new sectorisation).

It involves SNA/SSE (Provence APP), Marseille ACC/UAC, SNA/CE (Lyon APP) and French Military APP.

Benefits

This initiative will lead to an increase in safety and capacity.

Implementation Steps

Task	Start	End	Led by
Implementation	01/2015	01/2018	DSNA

New Shared ATM system

Led by skeyes (2019 - 2024)

Implementation of a new Shared Air Traffic Management System/ SAS3 providing Air Navigation Services in Belgian airspace.

Sites involved

ACC/UAC: Brussels, Maastricht

Participants

FABEC: BAC, MUAC, skeyes

Point of contact

Thomas Joosten
tjo@ext.skeyes.be

Project description

To implement the new **Shared Air Traffic Management System/ SAS3** providing Air Navigation Services in Belgian airspace, in collaboration with Belgian Defense and Maastricht Upper Area Control Centre.

Benefits

Modernise the ATS and further improve cost efficiency and capacity within Brussels ACC and Maastricht UAC.

Implementation Steps

Task	Start	End	Led by
Step 1		2019	BAC
Step 2	2019	2024	skeyes

New VCS BAC

Led by BAC (2016 - 2017)

Introduction of a new voice communication system with capability for transfer of the voice by Internet Protocol

Participants

FABEC: BAC

Project description

Kleine-Brogel AD

Beauvechain AD

Florennes AD

Koksijde AD

ATCC Semmerzake

CRC Glons

Implementation Steps

Task	Start	End	Led by
Florennes AD		03/2016	BAC
Beauvechain AD		06/2016	BAC
Kleine-Brogel AD		09/2016	BAC
Koksijde AD		12/2016	BAC
ATCC Semmerzake		06/2017	BAC
CRC Glons		06/2017	BAC

New VCS NL

Led by RNLAF (2018)

Sites involved

ACC/UAC: Amsterdam

Participants

FABEC: LVNL, RNLAF

Project description

Replacement comms system

Implementation Steps

Task	Start	End	Led by
Implementation	03/2017	06/2017	RNLAF

New Voice Communication System

Led by MUAC (2016 - 2021)

Sites involved

ACC/UAC: Maastricht

Participants

FABEC: DFS, DSNA, MUAC

Point of contact

Tom Goossenaerts
tom.goossenaerts@eurocontrol.int

Project description

Introduction of a new primary voice communication system for obsolescence avoidance, technology uplift (in particular VoIP) and increased interaction with the ATCO HMI (VCS alarms / warnings / selected frequencies on CWP, call from label…)

Introduction of a new secondary voice communication system for obsolescence avoidance.

Benefits

Increase in safety through improved reliability and radio coverage; cost efficiency through common procurement and maintenance; restored extendibility.

Implementation Steps

Task	Start	End	Led by
Primary VCS	03/2016	10/2017	MUAC
IP migration of DFS radio sites	01/2018	12/2018	MUAC
New Backup VCS	01/2019	12/2021	MUAC

Next generation and VoIP capable VCS

Led by DFS (2016 - 2018)

DFS initiative involving the centres of Karlsruhe, Munich, Bremen to deploy a new state-of-the-art Voice-over-IP capable Voice Communication System as a technical prerequisite in line with the Interoperability IR (EU No. 552/2004 incl. its amendment by EU No. 1070/2009) for the implementation of dynamic airspace configurations as well as implementing EUROCAE Standard ED-137.

Sites involved

ACC/UAC: Bremen, Karlsruhe, Munich

Participants

FABEC: DFS

Project description

It will equally enable the introduction of advanced operational concepts of the PCP (EU No. 716/2014) for flexible airspace management and dynamic airspace management to enable a higher cost effectives of the air navigation service provision for airspace users and to increase operational performance. The deployment project will contribute (enabler project) to closing the Gap for Family 3.1.4 identified by the SESAR Deployment Manager within the Deployment Programme 2015 and is planned for implementation under the framework of the SESAR Deployment Manager.

The dedicated deployment objectives of the technical prerequisites are:

- Deployment of Primary Voice-Communication System (VCS) for ACC Bremen

- Deployment of a last-resort VCS for ACC Munich and renewing of related radio sites

- Deployment of a last-resort VCS for ACC Bremen and renewing of related radio sites

- Deployment of a last-resort VCS for UAC Karlsruhe and renewing of related radio sites

Benefits

Increase in safety through improved reliability; cost efficiency through state of the art technology; restored extendibility.

Implementation Steps

Task	Start	End	Led by
Bremen Main VCS		10/2017	DFS
Bremen last resort VCS		03/2017	DFS
Munich last resort VCS		12/2016	DFS
Karlsruhe last resort		03/2018	DFS

VCS			

Paperless Strip System (PSS)

Led by DFS (2014 - 2021)

DFS introduction of paperless environment within the OPS room (CWPs)

Sites involved

ACC/UAC: Langen, Munich

Participants

FABEC: DFS

Point of contact

DFS Deutsche Flugsicherung GmbH

Benefits

SAF +: The documentation of given clearances is improved with PSS. Even in ambitious traffic situations all details of a clearance are recorded. An accurate analysis of safety relevant incidents is possible which leads to an improvement of the safety level.

CEF +: Positive impact on unit costs and productivity by:

• Optimized staff deployment (runner and FCB) for the execution of air traffic control in ACC of lower airspace because of the shortfall of manual distribution of paper strips an certain system inputs

• Increase of capacity (= increase in sales) by system support

The benefit of the project exceed the costs but it will take place after some years of project term.

(The discounting of future surplus revenue leads to a negative cash value).

CAP ++: Reduction of coordination workload by automation of coordination task respectively the forwarding of information. Thereby a reduction of manual coordination takes place. More movements and less delay in critical sectors at peak periods.

Assumption: the work of input in the coordination triggering sector is not more elaborative than the actual coordination without PSS.

Implementation Steps

Task	Start	End	Led by
Munich	10/2014	06/2015	DFS
Langen SG7	02/2016	05/2016	DFS
Langen SG10	10/2016	01/2017	DFS
Langen SG 1	01/2019	03/2021	DFS

PBN approaches roadmap for ELLX airport

Led by ANA Lux (2017 - 2020)

PBN roadmap for development of RNP approaches and RNAV STAR and transitions at ELLX airport.

Sites involved

Airport: ELLX

Participants

FABEC: ANA Lux, skeyes

Point of contact

Head ATC-APP
cst@airport.etat.lu
+352 621 615689

Project description

The ANA PBN roadmap is a long term planning on implementation of performance based navigation flight procedures of different levels, in search of the most adequate navigation procedures for ELLX.

Benefits

Improved flight efficiency, back up for ground based navigation.

Implementation Steps

Task	Start	End	Led by
Specification definition	Q1 2017	Q4 2017	ANA
RNP approaches, RNAV package definition		Q4 2018	ANA
RNAV STAR, transitions and RNP approaches (LPV200)	Q1 2019	Q1 2020	ANA

PBN Transition and Implementation within the Belgian Part of Brussels FIR

Led by skeyes (2020 - 2030)

Implementation of a full-PBN environment according to the PBN & PCP IR within the Belgian part of Brussels FIR.

Sites involved

ACC/UAC: Brussels
Airport: EBAW, EBBR, EBCI, EBLG, EBOS

Participants

FABEC: skeyes

Point of contact

Saranne Verhellen
sve@skeyes.be

Project description

*The project purpose is to establish a full-PBN environment in the Belgian part of Brussels FIR not later than 06 JUN 2030, this in order to be compliant with national requirements, European regulatory obligations [*PBN IR: EU Regulation 2018/1048, PCP IR: EU Regulation 716/2014] *and international commitments [*ICAO Assembly Resolution 37/11, ICAO Doc 9750]. To achieve such purpose, the project is broken down into three main phases:

1. *03 DEC 2020: ATS routes & instrument flight procedures compliant with the PBN IR;*
2. *25 JAN 2024: PBN-compliant environment;*
3. *06 JUN 2030: Full-PBN environment.*

All steps to be carried out, as well as a high-level planning estimate of the activities, are to be documented in a PBN implementation and transition plan covering all aspects dictated by the European regulatory obligations.

Benefits

- *Number of incidents;*
- *Sector capacity;*
- *Fuel consumption;*

- *Pollutant emissions;*
- *Investment and maintenance cost;*
- *Number of noise complaints;*

Implementation Steps

Task	Start	End	Led by
ATS routes & instrument flight procedures compliant with the PBN IR;		03/12/2020	skeyes
PBN-compliant environment	03/12/2020	25/01/2024	skeyes
Full-PBN environment	25/01/2024	06/06/2030	skeyes

Point Merge North-East Paris A

Led by DSNA (2013 - 2017)

Sites involved

ACC/UAC: Brussels, Paris, Maastricht
Airport: LFPG

Participants

FABEC: skeyes, DSNA, MUAC

Project description

This initiative involving the centres of Paris, Belgocontrol, MUAC, BAC envisages to improve the flight management arrival to Paris CDG through:

- an easier management of sectors labelled “AP” and “TE”;

- an extended coordination between Paris ACC/UAC and Paris CDG APP;

- a better trajectory predictability for users;

- the improvement of vertical profile.

Benefits

centers invovled SNA/RP (Paris ACC/UAC and CDG APP), Belgocontrol, MUAC, BAC

Implementation Steps

Task	Start	End	Led by
Implementation	01/2013		DSNA

Post-OPS Analysis & Business Intelligence

Led by MUAC (2017 - 2022)

Sites involved

ACC/UAC: Maastricht

Participants

FABEC: MUAC

Point of contact

Sebastian Wagnick
sebastian.wagnick@eurocontrol.int

Project description

PA: To enhance the Post-OPS Analysis process and tooling at MUAC, including improvement of the traffic predictions, in order to further optimise the planning of daily operations, and

BI: To develop Business Intelligence facilities that not only allows the efficient creation of KPI monitoring and reporting workflows and dashboards, but also allows users to perform data mining in a self-service manner.

Benefits

The additional insights gained from consolidated MUAC performance data will improve the cost-efficiency not only of the ATM operations directly, but also of the ATM system and operational concepts development strategies.

Implementation Steps

Task	Start	End	Led by
Implementation	01/2017	06/2021	MUAC

Pre-Flight Check

Led by MUAC (2020)

Proposal of an improved FPL to the airline operators based on RAD and ASM information at H-6 hours

Sites involved

ACC/UAC: Maastricht

Participants

FABEC: MUAC

Point of contact

Theo Hendriks
Theo.Hendriks@eurocontrol.int

Project description

Depending on the traffic situation, flights will be able to flightplan routes normally restricted by RAD or routes going through military areas or .

Implementation Steps

Task	Start	End	Led by
Initial implementation and fine tuning	1 Mar 2020	31 Dec 2020	

RAPNET NG

Led by DFS (2016 - 2018)

to deploy up to four so-called Families as laid down by the SESAR Deployment Manager within the Deployment Programme 2015 based on implementing the Pilot-Common-Project Regulation EU No. 716/2014

Sites involved

ACC/UAC: Bremen, Karlsruhe, Langen, Munich

Participants

FABEC: DFS

Project description

Deploy up to four so-called Families as laid down by the SESAR Deployment Manager within the Deployment Programme 2015 based on implementing the Pilot-Common-Project Regulation EU No. 716/2014. By this, deploying internet protocol compliant infrastructure for exchange of information as an interoperable baseline / prerequisite for the future deployment of SWIM functionalities and ATM system information exchange all the while ensuring further conformity to EU No. 633/2007.

RAPNET NG will provide a common WAN infrastructure for all DFS sites to ensure future IP communications compliance with external stakeholders. This fulfils the provision of stakeholder SWIM Infrastructure components as required in AF 5.2.1. DFS external partners like Airlines, Airports, Military and MET will be connected to RAPNET NG utilizing gateways to the RAPNET NG infrastructure (PENS or bilateral connections).

RAPNET NG will ensure cost efficiency of SWIM deployment by replacement of the current Ericsson PPX based Multiservice WAN Infrastructure at all DFS sites by an MPLS based WAN infrastructure.

Benefits

See performance benefits

Implementation Steps

Task	Start	End	Led by
training	02/2016	12/2017	DFS
Start of operation		12/2018	DFS

RASUM

Led by DFS (2014 - 2020)

The main objective is to comply with the European Implementing Rule1079/2012, which requires an 8,33 kHz radio capability below FL 195 as of Dec. 31st, 2018

Sites involved

ACC/UAC: Bremen, Karlsruhe, Langen, Maastricht, Munich

Participants

FABEC: DFS, MUAC

Point of contact

DFS Deutsche Flugsicherung GmbH

Project description

. In order to achieve this goal, all respective radio ground stations in Germany are going to be replaced to ensure this 8,33 kHz channel spacing, accordingly.

DFS will procure, install and operate the new 8,33 kHz capable radio receivers and transmitters all over Germany.

Benefits

Increase in frequency availability through

Implementation Steps

Task	Start	End	Led by
Training	01/2014	12/2014	DFS
Start of operation	01/2014	12/2018	DFS

RDFS Radio Direction Finder System

Led by MUAC (2016 - 2021)

Sites involved

ACC/UAC: Maastricht

Participants

FABEC: MUAC

Point of contact

Patrick Bardet
Patrick.bardet@eurocontrol.int

Project description

Implementation of a system to display the position of a transmitting aircraft on the ATCO HMI, using state-of-the-art RDF receivers and a newly developed RDFS subsystem to calculate the location of the aircraft during its transmission.

Benefits

Increase in safety (in line with European Action Plan for Air Ground Communications Safety); improved capacity and cost efficiency; aid to usage of Conspicuity Codes in Free Route Airspace

Implementation Steps

Task	Start	End	Led by
Implementation	11/2016	01/2017	MUAC

Renewal Ground Radio Infrastructure

Led by BAC (2016 - 2017)

Renewal of the radio infrastructure and VHF channel spacing conversion from 25 to 8.33 KHz

Participants

FABEC: BAC

Project description

Kleine-Brogel AD

Beauvechain AD

Florennes AD

Koksijde AD

ATCC Semmerzake

CRC Glons

Implementation Steps

Task	Start	End	Led by
Florennes AD		03/2016	BAC
Beauvechain AD		06/2016	BAC
Kleine-Brogel AD		09/2016	BAC
Koksijde AD		12/2016	BAC
ATCC Semmerzake		06/2017	BAC
CRC Glons		06/2017	BAC

Replacement AAA ATC System by iCAS system

Led by LVNL (2017 - 2021)

In 2011, after an analysis of the alternatives for replacement, LVNL initially chose to co-operate with the German air traffic control organisation Deutsche Flugsicherung-DFS. The system under development is known under the name of iCAS: iTEC based Centre Automation System. The iTEC-development, together with the Spanish supplier Indra, was started by the air traffic control organisations of Germany, Great Britain and Spain. LVNL was the fourth organization to join this partnership. In the meantime also Avinor from Norway and PANSA (Poland) and Oro Navigacija (Lithuania) have joined.

Sites involved

ACC/UAC: Amsterdam
Airport: EHAM

Participants

FABEC: LVNL, RNLAF

Point of contact

André van den Wildenberg
A.A.vandenWildenberg@lvnl.nl

Project description

The LVNL AAA air traffic control system is by far the most important and largest operational information system of LVNL. Replacement of this system is necessary because it is out of date and cannot implement the European SESAR requirements cost-efficiently.

End 2020 iCAS must be operational in Munich, followed by Bremen and Amsterdam at the end of 2021. For a controlled transition, including training of air traffic controllers who start using the system, the systems must be available about two years before these dates.

Benefits

iCAS system is an enabler for the further developments (SESAR PCP regulation). iCAS features a 4D-trajectory and is designed to provide ATC services within the entire airspace of Germany and the Netherlands including all lower and upper

The initial implementation of iCAS is an important enabler in the realization of the following families from the SESAR Deployment Programme above and below FL310:

1) 3.2.1 Upgrade of ATM systems (NM, ANSPs, AUs) to support Direct Routings (DCTs) and

Free Route Airspace;

2) 3.1.2 ASM Management of Real Time Airspace Data;

3) 3.1.4 Management of Dynamic Airspace Configuration;

4) 3.2.3 Implement Published Direct Routings;

5) 3.2.4 Implement Free Route;

6) 1.1.2 AMAN Upgrade to include Extended Horizon function;

7) 1.2.3 RNP1 Operations in high density TMAs (ground capabilities);

7) 1.2.5 RNP routes connecting Free Route Airspace (FRA) with TMA;

9) 4.2.3 Interface ATM Systems to NM Systems;

10) 4.4.2 Traffic Complexity Tools.

A future iCAS version (full operational capability) will in addition deploy or enable the following Families of the SESAR Deployment Programme at the benefit of the

airspace user:

1) 2.3.1 Time Based Separation;

2) 5.1.2 Future PENS;

3) 5.3.1 Upgrade/Implement Aeronautical Information Exchange System / Service;

4) 5.4.1 Upgrade/Implement Meteorological Information Exchange System / Service;

5) 5.5.1 Upgrade/Implement Cooperative Network Information Exchange System / Service;

6) 5.6.1 Upgrade/Implement Flights Information Exchange System/Service supported by Yellow Profile;

7) 6.1.1 ATN B1 based services in ATSP domain.

Implementation Steps

Task	Start	End	Led by
development	01/2017	12/2020	LVNL
Implementation	01/2020	12/2021	LVNL

RNAV1 and RNP APCH approaches Amsterdam Schiphol

Led by LVNL (2015 - 2021)

First phase of RNAV1 and RNP-APCH approaches Amsterdam Schiphol

Sites involved

ACC/UAC: Amsterdam
Airport: EHAM

Participants

FABEC: LVNL

Point of contact

Bart Banning b.f.t.banning@lvnl.nl

Project description

Implementation of RNAV arrival routes from ARTIP IAF to Schiphol runways 36R and 18C, and RNP APCH procedures to 10 runway ends at Schiphol.

The RNAV arrival route from ARTIP IAF to Schiphol runway 36R has been implemented and is in use in the low season. RNAV arrival from ARTIP IAF to Schiphol runway 18C is on hold.

RNP APCH to Schiphol runway 22 is currently being implemented. A following project has been started to implement next three runways which will render the existing NDB approach procedures obsolete. The final RNP APCH project is in the planning stages. This will also realize instrument approaches to runway ends that are seldom used and are not currently equipped with (near) precision approach procedures.

A review is being done to investigate how the air traffic management system should improve after the year 2020 in order to allow growth at Schiphol beyond 500,000 movements. Dependent on the results of the review, new projects might arise or older projects might be reopened. This decision will be made in Q1-Q2 2018.

Benefits

This is in support of the implementation of the Pilot-Common-Project (PCP), for RNAV arrivals a positive environmental effect (Increased number of continues descent approaches) and for RNP APCH an increased sustainability in case of ILS outages is expected.

Implementation Steps

Task	Start	End	Led by
RBAV arrival routes from ARTIP IAF to	Implemented		LVNL

Schiphol rwy 36R			
RNAV arrival routes from ARTIP IAF to Schiphol rwy 18C	tbd		LVNL
Implementation RNP APCH rwy 22	01/2015	06/2018	LVNL
Implementation RNP APCH rwy 06, 18C, 36R	01/2018	12/2019	LVNL
Implementation RNP APCH rwy 04, 09, 18R, 24, 27, 36C	01/2020	09/2022	LVNL

RNP Based Departure Operations in High Density TMAs in FRA, DUS, BER, MUC

Led by DFS (2017 - 2024)

Implementation of RNP Based Departure Operations in High Density TMAs in FRA, DUS, BER, MUC

Sites involved

ACC/UAC: Bremen, Karlsruhe, Langen, Munich
Airport: EDDF, EDDL, EDDM, EDDT

Participants

FABEC: DFS

Project description

The overall objective is to deploy the so-called Family “1.2.3 RNP 1 Operations in high density TMAs (ground capabilities)” as laid down by the SESAR Deployment Manager within the Deployment Programme 2015 based on implementing the Pilot-Common-Project Regulation EU No. 716/2014. In that context the Implementation of RNP Based Departure Operations in the High Density and PCP-related TMAs FRA, DUS, BER and MUC in a timely, coordinated and synchronized effort will have a significant impact on the raise of capacity, the improvement of safety and the further reduction of costs while minimizing aviation's environmental footprint.

Deployment of RNP-based routes including Radius to Fix-functionality for departure procedures (Standard Instrument Departure: SIDs) and transitions.

Reduction in spread of flight tracks during turns, and thereby reducing the noise footprint in the highly populated areas surrounding the major airports in Germany as well as reduction in CO2 emissions and an increase in flight efficiency.

Implementation of flexible and environmentally friendly procedures for departure using PBN/RNP in high density TMAs, as specified in RNP1 specifications.

Implementation of the requirements set out in the SESAR ATM Master Plan moving towards the goal of the Single European Sky Implement PBN Implementation Plan.

Benefits

In that context the Implementation of RNP Based Departure Operations in the High Density will have a significant impact on the raise of capacity, the improvement of safety and the further reduction of costs while minimizing aviation's environmental footprint.

Reduction in spread of flight tracks during turns, and thereby reducing the noise footprint in the highly populated areas surrounding the major airports in Germany as well as reduction in CO2 emissions and an increase in flight efficiency.

Implementation Steps

Task	Start	End	Led by
FRANKFORT	04/2017	03/2018	DFS
DUSSELDORF	02/2019	04/2019	DFS
BERLIN	09/2019	12/2019	DFS
MUNICH	09/2020	12/2020	DFS

Note

At EDDB Berlin and EDDF Frankfurt first set of RNP procedures are implemented, Full transition to RNP only is expected End of 2024. EDDM partially PBN procedures implementend, too. Full transition also planned end of 2024. EDDL Düsseldorf implementation was delayed due to environmental protests, new date subject to confirmation.

Robusto: Sectorless ATM (S-ATM) Karlsruhe (Phase I)

Led by DFS (2021)

This initiative aims at the implementation of sectorless air traffic control Phase I.

Sites involved

ACC/UAC: Karlsruhe

Participants

FABEC: DFS

Point of contact

Holger Stöckmann (holger.stoeckmann@dfs.de); Rüdiger Steyer (ruediger.steyer@dfs.de)

Project description

With S-ATM Level 1 (Robusto), the first stage of sectorless air traffic management will be implemented at Karlsruhe UAC in the airspace at and above FL 375. S-ATM represents a paradigm shift: from the spatial responsibility of air traffic controllers to aircraft-centred responsibility.

The actual implementation will largely be achieved by adapting or changing current procedures and processes. Changes to the existing system technology and the wide-area communication infrastructure should be kept to a minimum, if possible.

Implementation of S-ATM Robusto:

• S-ATM Robusto will be implemented in two steps.

? Step I: Implementation of S-ATM in sector family East (OST-EBG, a minimum of two working positions) at and above FL 385. Implementation will be completed by the end of 2020 at the latest.

? Step II: Implementation of S-ATM in the airspace of Karlsruhe UAC (a minimum of six working positions) at and above FL 375. Implementation will be completed by the end of 2024 at the latest.

• Adaptation and implementation of new working procedures for air traffic controllers, as few changes as possible to the technical infrastructure.

• Increased productivity of air traffic controllers because aircraft remain in one sector for a longer time and their workload is more balanced.

• Development of a fallback and recovery strategy

• Adjustment of authorisation structures

• More flexible deployment of personnel due to uniform authorisation

The development of a fallback and recovery strategy is also important.

It will be necessary to make changes to iCAS (new DFS ATM-System) Robusto Step I. Reciprocal effects with the iCAS II project are to be examined until the preparation of project application (PA) 2 for Robusto Step I and II.

As part of the implementation of S-ATM Robusto, the voice communication system must be upgrated to ISIS-XM/G5 by October 2020.

Benefits

S-ATM is expected to improve SAF, CEF, CAP and ENV: By allocating aircraft entering the sectorless airspace to air traffic controllers with unused capacity, overload situation are prevented, productivity is increased, and delay is reduced – while flight efficiency is improved by optimised coordination.

Implementation Steps

Task	Start	End	Led by
Training	TBD	TBd	DFS
Start of operation Step I	12/2020	12/2020	DFS
Start of operation Step II	06/2024	12/2024	DFS

RTC - Remote Tower Control

Led by DFS (2018)

Implementation of Remote Tower Services in Leipzig for the airports of Saarbrucken, Erfurt and Dresden.

Sites involved

ACC/UAC: Langen, Munich

Participants

FABEC: DFS

Point of contact

Director Tower

Project description

Many small airports face discontinuation of air transport service due low traffic volumes making the provision of service at these airports financially nonviable. Partly, this is due to high cost of the air traffic services provision. In order to retain air transport service at these smaller airports, solutions need to be deployed in order to ensure sustainable service provision.

With its Remote Tower Control (RTC) project, DFS aims to cut costs in the long term by using new technologies and procedures and by optimizing staff scheduling and making it more efficient.

Remote Tower Control (RTC) provides cost efficient air traffic services for airports from a remote i.e. third location. RTC achieves this through visual reproduction (based on high-definition video cameras, infrared cameras and panoramic high resolution screens) replacing the on-site out of-the-window-view by an air traffic controller and allows remote air traffic service provision. Bundling air traffic services at a RTC Center in Leipzig for the airports of Saarbrucken, Erfurt and Dresden allows for efficient staff resource deployment, which is enabled through a uniform concept of operations and qualifications. Furthermore, staff resources may be deployed optimized across the actual traffic demand at all three airports combined.

This project aims at enhancing ATM by implementing SESAR, as defined in the European ATM Master Plan (2015) in the Key Feature “High performing Airports”, there referring to “Remote Tower”.

The timeline looks as follows:

- Beginning of operation of Saarbrucken air traffic services at RTC center Leipzig: December 2018

- Beginning of operation of Erfurt air traffic services at RTC center Leipzig: tbd

- Beginning of operation of Dresden air traffic services at RTC center Leipzig: tbd

Benefits

In terms of performance, a positive impact on Cost Efficiency is expected

Implementation Steps

Task	Start	End	Led by
operation of Saarbrucken air traffic services at RTC center Leipzig	09/2018	12/2018	DFS
operation of Erfurt air traffic services at RTC center Leipzig	03/2019	tbd	DFS
operation of Dresden air traffic services at RTC center Leipzig	12/2020	tbd	DFS

Rx/Tx renewal Belgian GS

Led by skeyes (2016 - 2023)

Phased renewal of Rx/TX in Belgium and construction of new sites to ensure full coverage of Brussels FIR/UIR.

Sites involved

ACC/UAC: Brussels
Airport: EBAW, EBBR, EBCI, EBLG, EBOS

Participants

FABEC: skeyes

Point of contact

Hans Dirckx
dih@skeyes.be

Project description

The project consist of the renewal of all radio sites (Rx/TX) across Belgium under the responsibility of skeyes and it is planned to be rolled-out between January 2021 – March 2023 (A, B and C-chain).

Benefits

The implementation of the project will increase the quality of service and the reliability of air traffic control communications throughout Brussels FIR/UIR.

Implementation Steps

Task	Start	End	Led by
RX EBBR A&B chains	2018	2019	skeyes
Phased implementation of 18 new sites (A,B,C chains)	January 2021	March 2023	skeyes

Schipol AMAN

Led by LVNL (2017 - 2020)

A user friendly arrival manager is deployed at Amsterdam Schiphol Airport, which supports controllers to optimize traffic flows to Schiphol airport

Sites involved

ACC/UAC: Amsterdam
Airport: EHAM

Participants

FABEC: LVNL

Project description

The first step is a replacement of the current system by a modern AMAN that can be further developed to generate benefits. The new AMAN will be operational in Q2 2018. LVNL expects that the extra training ATCOs will receive by the introduction of the new system will slightly improve operation even without new functionalities.

The second step, to start in 2018, aims at improving meteorological information for trajectory prediction, speed advisories and Flexible TP. It will be executed in cooperation between LVNL and DFS. The deployment will improve sequence stability by extending the AMAN horizon in the future.

Benefits

AMAN development will lead to improved predictability and improved flight efficiency due to improved TP functionality Leading to more efficient flight profiles as a result of less need for vectoring and stack holdings. As well as it will supports the implementation of the PCP regulation.

AMAN will allow for earlier detection and mitigation of traffic overload situations. This will lower the number of times ATCOs are exposed to high workload situation which carry the potential for safety incidents.

Improved situational awareness for all actors (pilots, controllers, and other airspace users) will lower the number of unexpected occurrences and surprises for all. Leading to fewer safety incidents

Implementation Steps

Task	Start	End	Led by
Amsterdam Schiphol AMAN 1.0	01/2014	06/2018	LVNL
Amsterdam Schiphol AMAN 2.0	01/2018	12/2020	LVNL

SID-STAR revalidation for ELLX airport

Led by ANA Lux (2017 - 2020)

Review and revalidation of all conventional SID/STAR for ELLX airport.

Sites involved

Airport: ELLX

Participants

FABEC: ANA Lux, skeyes

Point of contact

Head ATC-APP
cst@airport.etat.lu
+352 621 615689

Project description

Based on new constraints like evolved obstacle data (ETOD), all SID/STAR procedures have to be reviewed and revalidated.

Benefits

Compliance and Safety management.

Implementation Steps

Task	Start	End	Led by
Package definition	Q1 2017	Q4 2017	ANA
Publication		Q1 2020	ANA

STANLY_ACOS iSWIM for Free-Route and NM

Led by DFS (2017 - 2020)

Sites involved

ACC/UAC: Bremen, Karlsruhe, Langen, Munich

Participants

FABEC: DFS

Project description

The main objective of this project is to deploy services for exchange of aeronautical information in a timely, coordinated and synchronized effort in order to raise capacity, improve safety and cutting costs while minimizing aviation's environmental footprint by providing an integrated airspace management tool within the iCAS system environment and connecting to Network Manager systems as well as neighbouring ANSPs systems.

It will ensure that DFS is able to satisfy the legal provisions of EU No. 716/2014 by

? - providing the DFS contribution to the SWIM service infrastructure subject to the requirements and standards in the PCP Implementing Rule,

? - subjecting all development and operations to pertinent requirements of the Interoperability Implementing Rule EU No. 552/2004.

? - implementing aeronautical information services using the "Yellow SWIM TI Profile".

It will also ensure cost efficiency of SWIM deployment by

? - providing a single DFS implementation of SWIM ""Yellow Profile"" technology that

- integrates into the DFS systems operations infrastructure and

- minimizes integration cost by providing an open standard integration platform to the DFS ATM systems.

? - coordinating the DFS internal SWIM deployment activities to realise synergies

? - ensuring efficient and effective communications with DFS in "Yellow Profile" matters by establishing a clear DFS unique point of access (gateway) to external SWIM Stakeholders.

It will minimize risk and contribute to timeliness of the European SWIM implementation effort by continuous coordination of deployment activities with all external implementation initiative stakeholders

- SWIM service partners (NM, ANSPs, Airspace Users, ...)

- SWIM Governance

- SWIM "Common Components" providers

It will contribute to deployment of AF 5.3.1 by connection of DFS-Systems (Airspace management, Flight Data Processing systems, Airspace Management Tools) via temporal SWIM-Node to Network Manager.

Implementation Steps

Task	Start	End	Led by
Training	07/2017	07/2020	DFS
Start of operation		12/2020	DFS

Start-up of Berlin International Airport

Led by DFS (2017 - 2020)

Prepare the operational crews of TXL and SXF tower and ACC Bremen for the new airport operation. The technical equipment in the tower is availbale since 2012 and has to be adapted to fit to the changed conditions (e.g. airport layout) in 2020. P1 / ATCAS, AMAN and PSS Bremen and the ATS system have to be adapted to new routes and the controller have to be trained with regard to the new procedures. An additional sector will be introduced to support operations at the airport and the connection of the SIDs to the ENR Network as well of the STARs inbound to the airport will be adjusted accordingly.

Sites involved

ACC/UAC: Bremen
Airport: EDDB

Participants

FABEC: DFS

Point of contact

Hans Niebergall

Project description

Start of operation of new airport in Berlin; adaptation of flight procedures and potential increase of sector capacities. Avoid potential bottlenecks and create re-routing scenarios.

Benefits

Potential increase of sector capacities due to improved structure.

Implementation Steps

Task	Start	End	Led by
Training	01/2019	10/2019	CC BRE - TWR BER
Start of operation	10/2019		DFS

Sufficient air traffic controllers

Led by LVNL (2017 - 2022)

The program ‘Sufficient air traffic controllers’ aims to solve the impending shortage of air traffic controllers

Sites involved

ACC/UAC: Amsterdam
Airport: EHAM

Participants

FABEC: LVNL

Project description

More air traffic controllers is required because now and in the future air traffic controllers play a crucial role in enabling the ambitions of the Dutch aviation sector. Several processes within LVNL determine the demand for air traffic controllers. In addition to the primary process of delivering air traffic service provision these are: the training of new air traffic controllers, change projects for which air traffic controllers expertise is needed, team meetings, etcetera. A deficit occurs when the demand for air traffic controllers is greater than their availability.

Benefits

The program goal is achieved if there is:

• A robust supply of air traffic controllers that is sufficient to enable the ambitions of the Dutch aviation sector;

• A healthy working pressure for the individual air traffic controller, in which ' healthy ' stands for a workload that is not too high.

Implementation Steps

Task	Start	End	Led by
Implementation	01/2017	12/2022	LVNL

Surveillance chain upgrade Luxembourg ATM system

Led by ANA Lux (2016 - 2019)

Upgrade of ATM system architecture and functionalities.

Sites involved

Airport: ELLX

Participants

FABEC: ANA Lux

Point of contact

Head ATC-APP
cst@airport.etat.lu
+352 621 615689

Project description

Upgrading of existing ATM system to standard hardware, virtual architecture and new operating system. Interoperability set to current and future standards.

Change and upgrade of controller HMI

Benefits

Extending ATM system life cycle and sustainability.

Implementation Steps

Task	Start	End	Led by
Project definition	Q1 2016	Q1 2017	ANA
Implementation		Q2 2019	ANA

SWIM PKI

Led by skeyes (2018 - 2021)

To develop and deploy a common framework for both integrating local PKI deployments in an interoperable manner as well as providing interoperable digital certificates to the users of SWIM. SDM multi-stakeholders project managed by Eurocontrol, and co-founded by INEA

Sites involved

ACC/UAC: Brussels

Participants

FABEC: skeyes

Project description

To develop and deploy a common framework for both integrating local PKI deployments in an interoperable manner as well as providing interoperable digital certificates to the users of SWIM. SDM multi-stakeholders project managed by Eurocontrol, and co-founded by INEA.

Implementation Steps

Task	Start	End	Led by
Development and implementation	13/11/2018	31/12/2021	skeyes

SYSAT

Led by DSNA (2017 - 2023)

Sites involved

Airport: LFPG, LFPO, LFMN

Participants

FABEC: DSNA

Project description

The SYSAT program objective is to replace, modernize, and improve efficiency and homogeneity at national level of the ATM tower and approach systems which are under DSNA’s responsibility.

It involves all continental DSNA APPs/TWRs (about 70 big, medium and small sites), excluding oversea facilities.

Benefits

It will increase safety through improved back-up, capacity and ground management (contribution to the CDM process). Cost efficiency will be improved as (Reduction of costs induced by delays, reduction of operating costs as a result of reduced heterogeneity, capacity improvements due to better automated assistance).

Implementation Steps

Task	Start	End	Led by
LFPG TWRs + APP	10/2017	10/2019	DSNA
LFPO TWR + APP	10/2019	06/2020	DSNA
LFPB TWR	03/2020	06/2020	DSNA
Other APP/TWRs	06/2019	12/2022	DSNA

TAVO

Led by DFS (2018 - 2023)

Tower Advanced Voice Operations

Sites involved

Airport: EDDB, EDDF, EDDL, EDDT

Participants

FABEC: DFS

Point of contact

Hansjörg Seipp
hansjoerg.seipp@dfs.de

Project description

Deploy new Voice-over-IP capable Tower Voice communication systems (VCS) and Voice recording systems (VRS) at the following DFS Tower-sites:, Hannover, Berlin Tegel, Düsseldorf, Nürnberg, Stuttgart, Hamburg, Köln-Bonn, Frankfurt, Berlin and Leipzig

Benefits

Enabler for phone- and radio communications via Voice-over-IP (VoIP) networks

Implementation Steps

Task	Start	End	Led by
Tower Nürnberg		11/2020	DFS
Tower Hannover		11/2019	DFS
Tower Düsseldorf		07/2020	DFS
Tower Stuttgart		12/2020	DFS
Tower Hamburg		06/2021	DFS
Tower Köln-Bonn		11/2021	DFS
Tower Frankfurt		06/2022	DFS
Tower Berlin		11/2022	DFS
Tower Leipzig		06/2023	DFS
Tower Berlin Tegel		11/2019	DFS

TMA redesign project to the south

Led by ANA Lux (2019 - 2021)

Redesign of boundary between ELLX TMA and French airspace by delegation of services from SNA Nord-Est and CRNA Est to Luxembourg Approach in order to improve flight profile and efficiency.

Sites involved

ACC/UAC: CRNA/E-SNA/NE, Reims
Airport: ELLX

Participants

FABEC: ANA Lux, DSNA
Other participants (see project description)

Point of contact

Head ATC-APP
cst@airport.etat.lu
+352 621 615689

Project description

Delegation of services between France and Luxembourg

Benefits

Improvement of flight profile and efficiency for arriving and departing traffic from ELLX to the south (GTQ)

Implementation Steps

Task	Start	End	Led by
Kick-off		Q1-2019	ANA/DSNA
Follow-up		Q1 2020	ANA/DSNA
Design proposal by DSNA		Q3 2020	DSNA
Implementation		Q2-2021	ANA/DSNA

TWR System at Amsterdam Schiphol

Led by LVNL (2018 - 2020)

In this project LVNL organizes the replacement of the current tower system.

Sites involved

Airport: EHAM

Participants

FABEC: LVNL

Point of contact

Raymond Deleu r.deleu@lvnl.nl

Project description

An important rationale for the replacement of the tower system is upgrading the technology, increasing the options to introduce innovations and lowering costs by using a commercial product for which costs can be shared. The innovations that are required by the Pilot Common Project are an important driver, but Schiphol specific needs will also be addressed. Due to the recent traffic growth at Schiphol innovations in the tower system are more important than ever.

Benefits

• Lowering the workload of the tower controllers by providing improved departure planning

• Implementation of the ATM Functionalities as defined in the Pilot Common Project:

o Departure Management Synchronised with Pre-departure sequencing

o Departure Management integrating Surface Management Constraints

o Automated Assistance to Controller for Surface Movement Planning and Routing

o Airport Safety Nets

Implementation Steps

Task	Start	End	Led by
iCAS interface	01/2018	11/2019	LVNL
Message broker infrastructure	01/2018	11/2020	LVNL
DMAN sequencer	04/2018	11/2020	LVNL
A-SMGCS 1 & 2	tbd	tbd	LVNL
Automated Assistance	tbd	tbd	LVNL

to Controller for Surface Movement Planning and Routing			

UHO (Upper Airspace Harmonization & Optimization)

Led by skyguide (2016 - 2017)

Evolution towards Virtual Centre CH with an optimization of sectorisation in ZRH and GVA

Sites involved

ACC/UAC: Geneva, Zurich

Participants

FABEC: skyguide

Project description

Evolution towards Virtual Centre CH with an optimization of sectorisation in ZRH and GVA, with:

• Safety improvement through optimized sectorisation that suits better to the actual traffic flow

• Ensure that deficiencies and weaknesses in respect to the current upper sectorisation are removed before the transition phase of COPFLEX

• Remove the bottleneck-effect of the M4 sector and ensure a more balanced traffic distribution amongst the upper sectors before the transition phase of COPFLEX.

• To achieve a more flexible and dynamic sector opening scheme

• Swiss wide sector configuration and harmonization for the benefit of efficiency and compatibility of the upper airspace operations

• Enabler for the future inter Centre coordination (Step V) and a prerequisite for copflex1 (by creating the sectors L7 and M7 on a technically basis) and a successful Virtual Centre

• Focus on operational issues having 6 UPPER Sectors in GVA & ZRH

Implementation Steps

Task	Start	End	Led by
Implementation	01/2016	12/2017	skyguide

Virtual Center - Tranche2 - CO

Led by skyguide (2017 - 2021)

Implementation of the first step towards virtual centre CH

Sites involved

ACC/UAC: Geneva, Zurich

Participants

FABEC: skyguide

Project description

Evolution from harmonised stripless operation to operational flexibility.

The main objectives of the programme are

• Harmonised UPPER/LOWER practices in a combined Swiss airspace

• Flexible operation of combined Swiss sectors above FL375, location independent

• Combined Swiss IT-system based on service oriented architecture integrating new services and legacy components

• Data centre location independence

Implementation Steps

Task	Start	End	Led by
Implementation	01/2017	12/2021	skyguide

VoIP capable network BAC

Led by BAC (2017)

Network enabled for VoIP usage

Participants

FABEC: BAC

Project description

Kleine-Brogel AD

Beauvechain AD

Florennes AD

Koksijde AD

ATCC Semmerzake

CRC Glons

VoIP Implementation

Led by skeyes (2018 - 2022)

Implementation of VoIP links between VCS and GRS.

Sites involved

ACC/UAC: Brussels
Airport: EBAW, EBBR, EBCI, EBLG, EBOS

Participants

FABEC: skeyes

Project description

Implementation of a IP gateways or new VCS. Validation of the VoIP-implementation through the implementation of one G/G link between the Brussels VCS and a partner VCS.

Implementation Steps

Task	Start	End	Led by
Deployment		31 Dec 2022	skeyes

Workload model for Amsterdam Area

Led by LVNL (2016 - 2021)

Development and implementation of Workload Model (WLM) for Amsterdam Area Control, Approach Control operations and Tower operation

Sites involved

ACC/UAC: Amsterdam
Airport: EHAM

Participants

FABEC: LVNL

Project description

Amsterdam Area Control (ACC)

In March 2015 LVNL implemented the Workload model (WLM) for ACC operations. This tool uses ETFMS Flight Data (EFD) and in house developed complexity/workload indicators to predict controller workload for Amsterdam ACC. ACC supervisors can use this controller workload information to improve operational decision making regarding staffing and sector management; e.g. activate or de-activate ACC sectors. Workload information can also benefit capacity management. With the availability of workload information ACC supervisors and Flow Management Position Controller (FMPC) can further optimize regulations.

WLM also enables the future use of Short Term ATFC Measures (STAM) and advanced flexible use of airspace (FUA). Development of a near real time simulation feature in the workload model is the next step for LVNL in the development of the WLM for ACC. This development will assist the ACC supervisor and FMPC to assess the impact of a regulation or STAM on traffic flows and airspace before taking it into actual affect.

Schiphol Approach (APP)

It is expected that controller workload can also be used in a Terminal Maneuvering Area (TMA). Managing controller workload can optimize runway throughput. Therefore a workload support tool for APP supervisors for assessing controller workload in daily operations will be developed and implemented.

As a first step the distribution of traffic inbound Schiphol via the three initial approach fixes will be presented to the APP supervisor. The APP supervisor can use this information to activate or de-activate (the second) landing runway(s). This development is called TDP, the Traffic Distribution Page and was introduced in spring 2016.

A second development will be the integration of the TDP with CDM. With outbound planning information available outbound traffic flows at Schiphol Airport can be presented with better predictability. The combination of both inbound and outbound traffic flows in TDP give the APP

supervisor better understanding of the upcoming traffic and therefore better support in decision-making.

Schiphol Tower (TWR)

It is expected that controller workload can also be used for TWR operations, specifically the complex and demanding Ground Operations (GND) at Schiphol Airport. Managing controller workload can optimize runway, taxiway and apron

As a first step the previous mentioned Traffic Distribution Page (TDP) will also be introduced for TWR operations. With TDP (including CDM information) TWR supervisor can have a better understanding of the upcoming traffic and therefore better support in decision-making.

In a future development complexity/workload indicators can be developed for TWR operations. This will provide even better information to the APP supervisors in decision making , staffing options and further optimize demand and capacity to optimize runway throughput.

Benefits

The development and implementation of WLM (and TDP) will provide better insight into the expected controller workload. This insight can be used in decision-making by Amsterdam ACC and Schiphol TWR/APP supervisors. Results are better planned operations:

• Better staffing ensuring that controller workload maintains acceptable at all times;

• More efficient traffic flows by further optimizing runway operations, resulting in less holding or outbound delay;

• More efficient activation of sectors;

• More effective ATFC Measures by incorporating workload insight in managing sector capacities, resulting is less ATFM-delay.

Furthermore this initiative supports the implementation of the PCP regulation.

Implementation Steps

Task	Start	End	Led by
Implementation ACC	01/2016	12/0209	LVNL
Implementation APP	01/2016	12/2020	LVNL
Implementation TWR	01/2016	12/2021	LVNL

XMAN (Cross-centre arrival management)

Led by DFS (2012 - 2023)

The XMAN (Cross-centre arrival management) project is a multi-stakeholder project, conducted by FABEC and FAB UK/IRL (DFS, DSNA, MUAC, LVNL, NATS, skeyes and skyguide) to ensure a harmonized and coordinated implementation of Extended Arrival Management Operations in accordance with PCP Implementing Rule 716/2014 and the "European Single Sky Implementation Plan - ESSIP", resulting from the Deployment Programme 2015 (DP2015) of the SESAR Deployment Manager.

Sites involved

ACC/UAC: Amsterdam, Bordeaux, Bremen, Brest, Brussels, Geneva, Karlsruhe, Langen, Maastricht, Marseille, Munich, Paris, Reims, Zurich, other ACC/UACs (see project description)
Airport: EBBR, EDDB, EDDF, EDDL, EDDM, EHAM, LFMN, LFPG, LFPO, LSZH, other airports (see project description)

Participants

FABEC: DFS, DSNA, LVNL, MUAC, skeyes, skyguide
Other participants (see project description)

Point of contact

Dr. Frank Zetsche (DFS)
frank.zetsche@dfs.de

Project description

The overall objective of the XMAN/AMAN Project is to develop, to validate and to implement cross centre and cross border arrival management procedures and techniques which enable an optimised traffic flow into the major airports within and close to the FABEC airspace and which generate a considerable improvement in various performance categories such as environment (CO2 and fuel-burn reduction), safety (reduction in stack holding) and capacity (reduction in traffic bunching/workload).

Started in 2012, it focused initially on the optimization of traffic flow inbound the five major hubs London, Paris, Amsterdam, Frankfurt and Munich. After publication of PCP IR 716/2014, the scope has been expanded to cover all PCP-related airports in the European Core Area (Area of Responsibility of the contributing ANSPs).

A common operational concept (CONOPS) and a standardised set of system requirements have been developed to produce harmonized procedures for concrete implementations down to system level and operations level.

As described in the PCP IR and DP2015 (family 1.1.2.), the XMAN project aims for the extension of the planning horizon of arrival management systems (AMAN) from the local TMA into the airspace of adjacent en-route control centers up to about 180 NM including economical Top of Descent (ToD)

around the PCP-airports – or even beyond – depending on the operational environment and the needs of the stakeholders.

The XMAN project foresees a stepwise implementation, where the first (Basic) Step encompasses the upgrade of currently available systems and technologies in order to establish Extended Arrival management in large parts of FABEC, e.g. through exchange of arrival management information via OLDI (AMA message) or SWIM-ready web services (XML format)). Arrival traffic flows into the major hubs in the FABEC and UK/IRL area are optimized by extending the planning horizon of supporting AMAN tools up to 180 NM – or even beyond, consequently involving various adjacent ATC units.
The second (Advanced) Step will take on board first validated SESAR results in order to improve the en-route part of cross centre arrival management. Numerous additional advanced and optimised features will be covered (implementation of the XMAN Portal to improve the situational awareness, application of delay sharing strategies, feedback on XMAN actions, COP optimiser etc.).

Airspace design is not affected by the XMAN project. Input data for the AMAN systems are FPL data (via IFPS), surveillance data (via RADNET - where available) and/or EFD data (via ETFMS).

The final objective of the FABEC XMAN Project is to provide XMAN implementations for the airports Amsterdam, Berlin, Brussels, Dublin, Düsseldorf, Frankfurt, London (LHR, LGW, STN), Manchester, Munich, Nice, Paris (CDG, ORY) and Zurich.

The implementation of extended arrival management at PCP-related airports outside the FABEC and FAB UK/IRL area might require the provision of the necessary functionalities at individual FABEC ACCs. It is expected that these implementation initiatives will be initiated by the respective external partner and that content and timing will be bilaterally agreed.

These are XMAN Barcelona (connection with Bordeaux and Marseille), XMAN Copenhagen (connection with Bremen, Karlsruhe, Maastricht), XMAN Milan (connection with Geneva, Karlsruhe, Marseille, Munich, Zurich), XMAN Palma de Mallorca (connection with Marseille), XMAN Rome (connection with Marseille) and XMAN Vienna (connection with Karlsruhe, Munich).

Benefits

In general, it can be stated that extended arrival management absorbs delay in the en-route phase of a flight, when aircraft are cruising at higher altitudes. Hence, it is more efficient and saves fuel and CO2 compared to stack holding or long transitions in the TMA. This procedure also reduces noise for the communities living beneath the holding stacks.
All this leads to economic benefits to the airspace users and environmental improvements to all concerned.

Implementation Steps

Task	Start	End	Led by
Frankfurt connection to Maastricht, Karlsruhe, Munich, Bremenand Brussels	already started	12/2022	DFS
Munich connection to Vienna, Karlsruhe, Zurich, Langen, Prague	already started	03/2019	DFS

and Padua			
Berlin connection to Munich, Karlsruhe, Maastricht, Prague, Warsaw, Malmö and Copenhagen	11/2020	12/2023	DFS
Düsseldorf connection to Maastricht, Karlsruhe, Bremen, Brussels and Amsterdam	12/2018	12/2023	DFS
Paris CDG connection to Brest, Reims, Bordeaux, Marseille and Maastricht	already started	12/2021	DSNA
Nice connection to Geneva and Milan	tbd	12/2023	DSNA
Amsterdam Schiphol connection to Maastricht, London and Brussels	already started	12/2021	LVNL
Amsterdam Schiphol connection to Reims, Karlsruhe and Copenhagen (indirect connection)	tbd	tbd	LVNL
London Heathrow connection to Maastricht, Shannon, Reims, Prestwick, Brest and Copenhagen	already started	12/2022	NATS
London Heathrow connection to Bordeaux, Marseille and Karlsruhe (indirect connection)	2022	12/2022	NATS
London Gatwick connection to Reims, Brest, Prestwick, Maastricht, Copenhagen and Shannon	2020	12/2020	NATS
London Gatwick connection to Karlsruhe, Bordeaux and Marseille (indirect connection)	2022	12/20222	NATS
London Stansted connection to Maastricht, Brest,	tbd	12/2021	NATS

Prestwick, Reims, Copenhagen and Shannon			
London Stansted connection to Karlsruhe and Bordeaux (indirect connection)	2021	2021	NATS
Brussels connection to Amsterdam, Langen, London, Maastricht and Paris	2025	12/2025	skeyes
Brussels connection to Brest, Reims and Karlsruhe (indirect connection)	tbd	12/2025	skeyes
Dublin connection to London, Prestwick and Shannon (NATS)	2023	12/2023	IAA
Frankfurt connection to Reimms (indirect connection)	2021	12/2021	DFS
Paris CDG connection to London, Karlsruhe, Zurich, Geneva and Milan (indirect connection)	tbd	12/2023	DSNA
Paris Orly connection to Brest, Bordeaux and Marseille	already started	12/2020	DSNA
Manchester connection to Prestwick andShannon	tbd	2022	NATS
Manchester connection to Maastricht, Reims and Brest (indirect connection)	tbd	2022	NATS
Zurich connection to Reims, Langen, Munich, Geneva and Milan	already started	12/2022	skyguide
Zurich connection to Marseille, Maastricht and Karlsruhe	tbd	tbd	skyguide

Note

Possible impacts due to the current corona situation are currently investigated.

xStream

Led by DSNA (2017 - 2019)

The xStream (Cross-border SESAR Trials for enhanced arrival management) project is a SESAR 2020 Very Large Scale Demonstration (VLD). It aims at extending arrival management horizon up to at least 200 nautical miles from destination airport and at evaluating its impacts and benefits. The project will also demonstrate how arrival constraints can be computed and provided to upstream Area Control Centres (ACC).

Sites involved

ACC/UAC: Paris, Zurich
Airport: LFPG, LFPO, LSZH

Participants

FABEC: DFS, DSNA, MUAC, skyguide

Point of contact

Nicolas Marcou
nicolas.marcou@aviation-civile.gouv.fr

Project description

The objective of xStream project is to demonstrate, at a very large scale, new extended arrival management tools and techniques that improve flight efficiency and flight predictability at airports, in TMA and in upstream ACC.

The main target is to extend arrival management horizon up to at least 200 NM in order to enable delay absorption earlier in the flight and at higher altitude that is more fuel efficient.

This delay absorption strategy is expected to smooth arrival peaks of traffic and to induce a reduction of workload for ATCO in the TMA, thus increasing safety and enabling smoother descent profiles.

To meet this objective, the project will define concept and tools for:

• Computing an extended arrival sequence with an horizon of at least 200 NM;

• Defining a delay sharing strategy between TMA, extended TMA and en-route sectors taking into account the overall network capacity and airspace user’s preferences;

• Providing the calculated arrival constraints to upstream Area Control Centres (ACC) and relevant aircraft: AMAN Allocated Time (AAT), Target Time of Arrival (TTA), Time to Lose (TTL), Miles in Trails, Speed advisory, etc.

• Executing the delay sharing strategy.

For a global picture, the project will also assess the compatibility of these concepts with the handling of inbound flows to multiple airports in the sectors of upstream ACCs. The objective is to avoid cumulative effects that could reduce some sectors capacity or flight efficiency.

The project will also associate Airspace Users in order to implement collaborative processes for the management of arrival sequence (A-Flex).

The demonstrations will be a step beyond “industrial research” and will prepare operational use, resolving potential operational issues raised by previous projects. It will serve as proof of concept for AF#1 in Pilot Common Project (PCP). The findings of these exercises may be reused into XMAN project to implement – where possible – permanent and/or improved XMAN operations.

Benefits

An increase in fuel efficiency, flight predictability and a reduction of workload in TMA.

Implementation Steps

Task	Start	End	Led by
Gatwick XMAN extended to 350 NM	11/2017	09/2019	NATS
Elements of partners TP sharing with AMAN	09/2017	09/2019	NATS
Heathrow XMAN extended to 500 NM	09/2018	09/2019	NATS
Collaborative extended arrival sequence in Paris Orly and Paris CDG	07/2017	09/2018	DSNA
COP Sequencer for hostpot resolution in Paris ACC terminal sectors	04/2018	12/2018	DSNA
Improved arrival planning management and airspace user’s preferences	06/2018	10/2018	DSNA
Extended AMAN in Zurich airport	01/2019	02/2019	skyguide
Collaborative tool between Airspace Users, ATC and Network Manager (UDPP) in Zurich	09/2018	12/2018	skyguide
Improved Arrival Management and NM integration in Zurich	05/2018	08/2018	skyguide