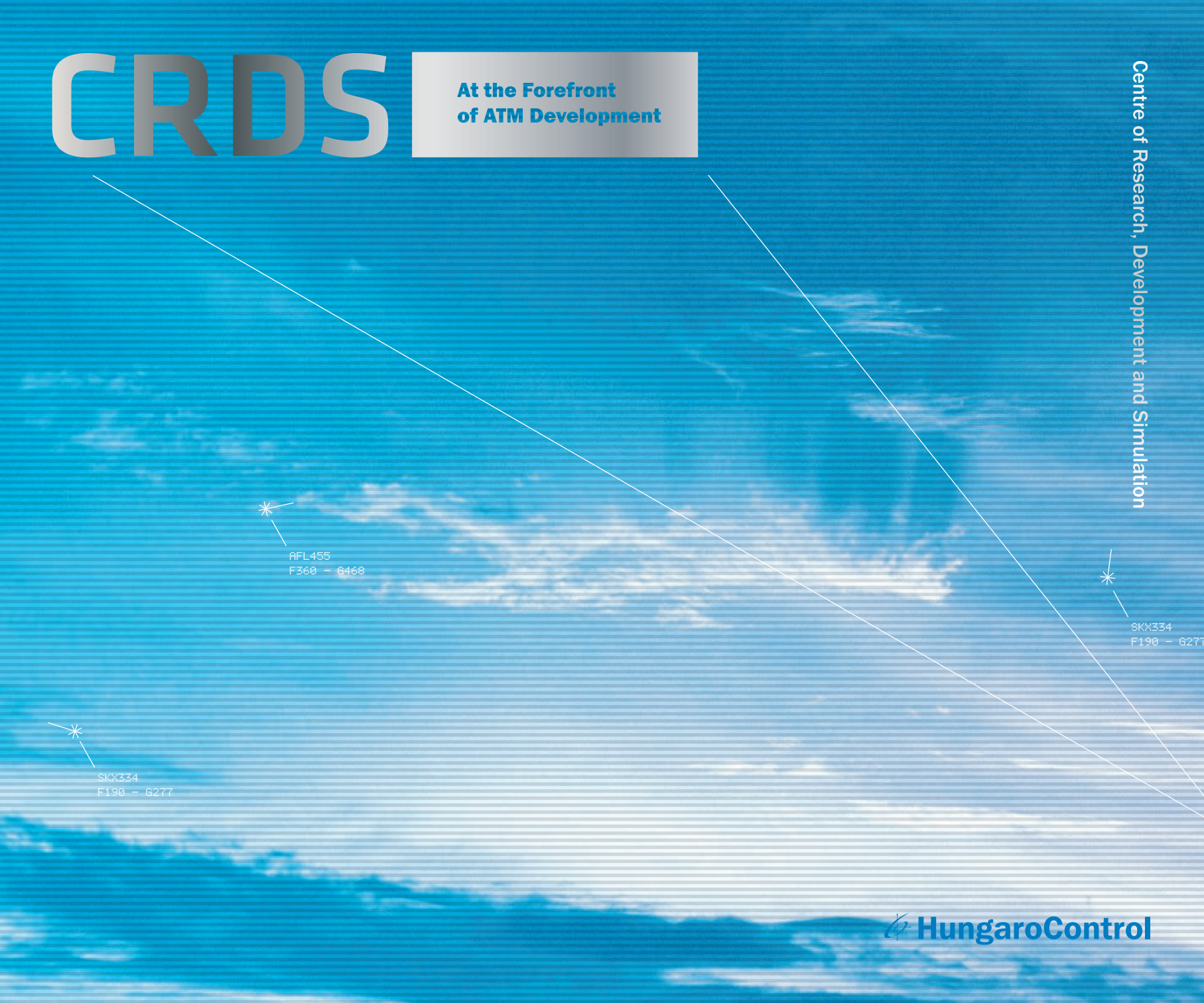
CRDS

At the Forefront of ATM Development

Centre of Research, Development and Simulation



HungaroControl

Dear Client,

Welcome to CRDS, the Centre of Research, Development and Simulation of HungaroControl.

Operating Central Europe's largest ATC simulator facility which provides leading-edge functionality, we are able to offer various solutions that are tailored to your needs. Our simulation platform is based on ACE developed by EUROCONTROL Experimental Centre.

Let me take the opportunity to present you in this brochure CRDS' current products: the CPDLC, CSO an PBN Solutions and the CINEMA training.

Should you have any questions, please contact us at crds@hungarocontrol.hu.

József Bánkuti
Head of CRDS

HOW WE WORK

SOLUTIONS TO VARIOUS ATM CHALLENGES

Defining the Problem

All our simulation based solutions start with a thorough preparation phase by measuring the traffic demand and assessing the future plans. As a result, we are able to design scenarios to be as close to the theoretical optimum as possible.

Elaborating the Solution

Our validation methods are in line with E-OCVM standards. During the process we record all relevant data in order to create customised statistics, furthermore we can estimate ATCOs' workload factors through Artificial Intelligence.

Feels Like Home

The state-of-the-art simulation platform of CRDS is able to reproduce the HMI of your home so that your ATCOs can easily and rapidly work with it.

From Drawing Conclusions to Making It Happen

We complete the picture by analysing both objective and subjective data. With the final report, we are ready to support implementation.
Then, the given solution can be refined through Fast-Time Simulation in order to keep a check on the real change of the relevant parameters.

Future Plans: Thinking Outside the Box

Using our experience in real-time and fast-time ATM simulation as well as our ATC experience as a solid foundation, and working with both industrial and academic partners, we are aiming to develop knowledge-based products and services in order to facilitate progress in the areas of flight safety, capacity, efficiency and the environment – as well as human factors.

SHORTCUT TO EFFICIENCY

OPTIMISED FUEL BURN, EMISSIONS AND FLIGHT PROFILES BY FREELY PLANNED ROUTES AND CONTINUOUS DESCENT APPROACHES.

Due to the growth in air traffic throughout the world, more and more conflicts and delays occur in departure and arrival procedures. As a solution to these challenging situations, the Concept of Seamless Operations (CSO) consists of two key elements: Free Route Airspace (FRA) and Continuous Descent Operations (CDO).

Free Route Airspace operations optimise fuel burn, flight time and emissions by reducing mileage, while Continuous Descent Operations have the same benefit as they allow aircraft to descend to airports at minimum thrust setting and also through shorter flight tracks.

The Problem

The regular changes in air traffic demand ANSPs to stay flexible and adapt their procedures as necessary since optimal and effective procedures are essential for successful operations.

Providers have to meet new requirements such as reduction of fuel consumption, mitigation of emission and improved noise abatement. At the same time SAFETY AND THE REGULARITY AND EFFICIENCY OF AIR TRAFFIC HAVE ALSO TO BE MAINTAINED.

The growth in air traffic brings more and more conflicts at the intersections of routes, departure and arrival procedures. Solving these situations increases the workload on the air traffic controllers thus reducing their capacity to deal with efficiency.

Due to these factors flight profiles are getting farther and farther away from ideal and delays are building up both on the ground and in the air. Chasing efficiency while applying dated procedures may easily lead to critical situations.

The Solution

The Concept of Seamless Operations (CSO) is comprised of two elements: Free Route Airspace (FRA) and Continuous Descent Operations (CDO).

Free Route Airspace operations optimise fuel burn, flight time and emissions by REDUCING MILEAGE SINCE USERS MAY FREELY PLAN THEIR ROUTES WITHIN A GIVEN AIRSPACE between defined entry and exit points.

Continuous Descent Operations reduce emissions by saving fuel as they allow aircraft to descend from high altitudes to airports at minimum thrust setting and also through shorter flight tracks.

Project Definition

The preparation includes measuring the traffic demand, assessment of the adherent route network, navigational facilities, ATM system, and the survey of the local aptitudes and geographical peculiarities.

New versions of routes and terminal procedures that are as close to the theoretic optimum as possible are designed according to these attributes.

Validation

CRDS applies validation methods in line with the E-OCVM standards.

FAST-TIME SIMULATION METHODS are used to test the different versions. We record all relevant parameters, such as total and specific numbers for distance and time travelled, fuel burnt, noise strain, entry rate and occupancy of different airspace sections, air and ground delays, utilisation of available capacities, number of conflicts. Customised statistics can also be created; even controllers' workload factors can be estimated through Artificial Intelligence.

THE MOST PROMISING VARIANTS ARE SELECTED THROUGH COMPARATIVE ANALYSIS.

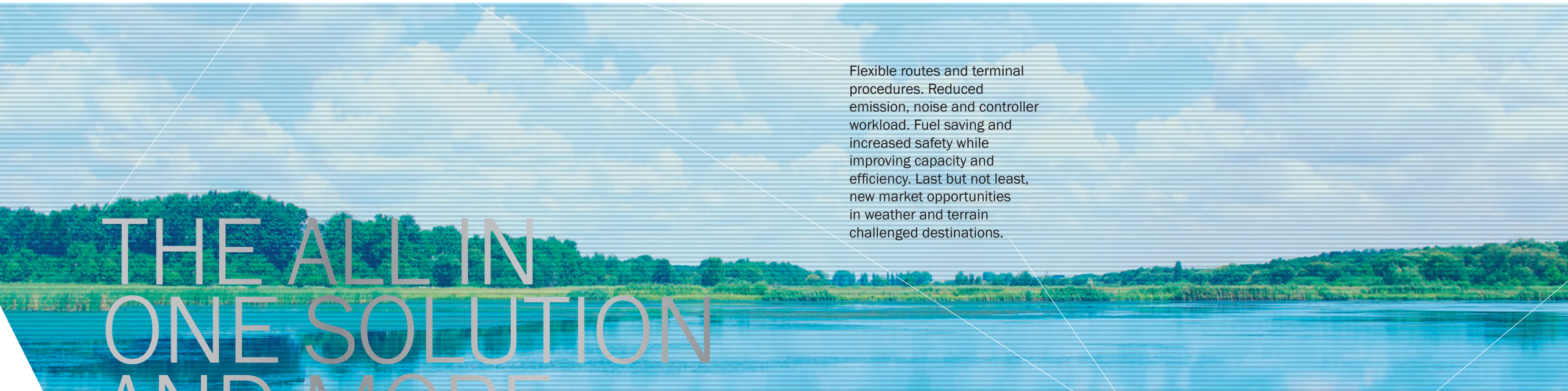
Selected scenarios will be validated by means of a Real-Time Simulation with the contribution of air traffic controllers proficient in the given airspace on our state-of-the-art simulation platform that reproduces the HMI of their "home" ATM system.

The results of this validation will be drawn from the same set of parameters that are recorded during the simulation together with specific "Human-in-the-Loop" parameters such as objective data for number and length of radio and telephone calls, number of co-ordination events, number of medium and short term conflict alerts, number of specific instructions performed through the HMI (direct clearance, turn, speed and level change, etc.). Also subjective workload assessment (ISA) data is gathered as well as subjective reflection on safety issues, hotspots, procedures, workload and situational awareness through questionnaires (NASA-TLX, SASHA-Q).

Follow Up

The simulation environment prepared for the validation can be utilised later on for the training of air traffic control personnel.

Following the implementation of the solution the real change of the relevant parameters can be evaluated from real-life recorded data through Fast-Time Simulation and the SOLUTION CAN BE FINE-TUNED AS NECESSARY.



THE ALL IN ONE SOLUTION AND MORE

Flexible routes and terminal procedures. Reduced emission, noise and controller workload. Fuel saving and increased safety while improving capacity and efficiency. Last but not least, new market opportunities in weather and terrain challenged destinations.

Flexible routes and terminal procedures. Reduced emission, noise and controller workload. Fuel saving and increased safety while improving capacity and efficiency. Last but not least, new market opportunities in weather and terrain challenged destinations.
By the application of Area Navigation (RNAV) and Required Navigational Performance (RNP) specifications, Performance Based Navigation (PBN) provides the means for flexible routes and terminal procedures.

PBN reduces emissions by saving fuel as it allows aircraft to descend from high altitudes to airports at minimum thrust setting and also through shorter flight tracks. It also helps cut noise levels, reduce controllers' workload and increase the level of safety. Last but not least, it also creates new market opportunities by providing safe access to terrain and weather challenged destinations.

The Problem

THE REGULAR CHANGES IN AIR TRAFFIC demand ANSPs to stay flexible and adapt their procedures as necessary since optimal and effective procedures are essential for successful operations.

Providers have to meet new requirements such as reduction of fuel consumption, mitigation of emission and improved noise abatement. At the same time safety and the regularity and efficiency of air traffic have also to be maintained.

The growth in air traffic brings more and more conflicts at the intersections of routes, departure and arrival procedures. Solving these situations increases the workload on the air traffic controllers thus reducing their capacity to deal with efficiency.

Due to these factors flight profiles are getting farther and farther away from ideal and delays are building up both on the ground and in the air. CHASING EFFICIENCY WHILE APPLYING DATED PROCEDURES may easily lead to high-energy and, subsequently, missed approaches. It means further unnecessary fuel burn, emission and noise and on top of that they represent safety implications as well. Apart from that it may also imply ineffective utilisation of the capacity of served airports.

As demand for air transportation services increases ANSPs are facing a challenge to safely INCREASE CAPACITY AND EFFICIENCY. The challenge is to overcome the limitations of reliance upon conventional ground-based navigation aids as they do not permit the flexibility of point-to-point operations.

The Solution

Through the application of Area Navigation (RNAV) and Required Navigational Performance (RNP) specifications, Performance Based Navigation (PBN) provides the means for FLEXIBLE ROUTES AND TERMINAL PROCEDURES.

PBN reduces emissions by saving fuel as it allows aircraft to descend from high altitudes to airports at minimum thrust setting and also through shorter flight tracks. Noise levels can also be reduced on account of the optimised profile descents and via consistent, precise paths that avoid noise sensitive areas.

PBN procedures reduce controllers' workload as it reduces the number of conflicts by enabling more closely spaced parallel tracks. They increase the level of safety by REDUCING THE RISK OF CFIT ACCIDENTS as well. It also creates new market opportunities by providing safe access to terrain and weather challenged destinations.

PBN

Project Definition

The preparation includes the measurement of the traffic demand, assessment of the adherent route network, navigational facilities, ATM system, and the survey of the local aptitudes and geographical peculiarities.

New versions of routes and terminal procedures that are as close to the theoretic optimum as possible are designed according to these attributes.

Validation

CRDS applies validation methods in line with the E-OCVM standards.

FAST-TIME SIMULATION METHODS are used to test the different versions. We record all relevant parameters, such as total and specific numbers for distance and time travelled, fuel burnt, noise strain, entry rate and occupancy of different airspace sections, air and ground delays, utilisation of available capacities, number of conflicts. Customised statistics can also be created; even controllers' workload factors can be estimated through Artificial Intelligence.

The most promising variants are selected through comparative analysis.

SELECTED SCENARIOS WILL BE VALIDATED BY MEANS OF A REAL-TIME SIMULATION with the contribution of air traffic controllers proficient in the given airspace on our state-of-the-art simulation platform that reproduces the HMI of their "home" ATM system.

THE RESULTS of this validation will be drawn from the same set of parameters that are recorded during the simulation together with specific "Human-in-the-Loop" parameters such as objective data for number and length of radio and telephone calls, number of co-ordination events, number of medium and short term conflict alerts, number of specific instructions performed through the HMI (direct clearance, turn, speed and level change, etc.). Also, subjective workload assessment (ISA) data is gathered as well as subjective reflection on safety issues, hotspots, procedures, workload and situational awareness through questionnaires (NASA-TLX, SASHA-Q).

Follow Up

The simulation environment prepared for THE VALIDATION CAN BE UTILISED LATER ON FOR THE TRAINING OF AIR TRAFFIC CONTROL PERSONNEL.

Following the implementation of the solution the real change of the relevant parameters can be evaluated from real-life recorded data through Fast-Time Simulation and the solution can be fine-tuned as necessary.

CONTROLLER-PILOT
DATA-LINK
COMMUNICATIONS

MEET THE INCREASING DEMANDS ON ATCO-PILOT COMMUNICATION

Enhanced flight safety, efficiency and airspace capacity by reducing controller workload and minimising congestion on voice communication channels.

Controller-Pilot Data-Link Communications (CPDLC) is a solution to increase capacity and the level of safety and efficiency at the same time. As CPDLC is mandated by the European Commission to be introduced by 2018, all European ANSPs need to be well prepared.

CPDLC provides an additional communication channel beside the regular VHF channels. It helps to reduce the workload of controllers thus increases capacity and the level of safety by taking advantage of the clarity of text messages. Last but not least, increased capacity means increased efficiency as well.

The Problem

The regular changes in air traffic demand ANSPs to stay flexible and adapt their procedures as necessary since optimal and effective procedures are essential for successful operations.

Providers have to meet new requirements such as reduction of fuel consumption, mitigation of emission and improved noise abatement. At the same time safety, regularity and efficiency of air traffic have also to be maintained.

The growth in air traffic brings more and more conflicts at the intersections of routes, departure and arrival procedures. Solving these situations involves increased amount of radio communication and increases the workload on the air traffic controllers thus reducing their capacity to deal with efficiency as well.

In many ATC sectors the CONGESTION ON VOICE COMMUNICATION RADIO CHANNELS has become by today a bit of a bottleneck limiting the available capacity of the airspace.

The Solution

Controller-Pilot Data-Link Communications (CPDLC) offers a solution to increase capacity and to enhance the level of safety and efficiency at the same time.

CPDLC provides an additional communication channel that REDUCES THE OCCUPANCY ON THE REGULAR VHF CHANNELS. It not only reduces the workload of controllers thus increases capacity and the level of safety itself but CPDLC has more to offer: It provides unambiguous means of communication by text messages that raise the level of safety even higher. On the other hand increased capacity means increased level of efficiency as well.

CPDLC

Project Definition

The preparation includes the measurement of the traffic demand, assessment of the route network and the ATM system.

The HMI reproduction capability of our state-of-the-art Real-Time Simulation platform can serve as a TEST-BED FOR PROTOTYPING CPDLC HMI SOLUTIONS.

Validation traffic scenarios are designed according to these attributes.

Validation

CRDS applies validation methods in line with the E-OCVM standards.

Fast-Time Simulation methods may also be used to assess preliminary results. We record all relevant parameters, such as total and specific numbers for distance and time travelled, fuel burnt, noise strain, entry rate and occupancy of different airspace sections, air and ground delays, utilisation of available capacities, number of conflicts. Customised statistics can also be created; even controllers' workload factors can be estimated through Artificial Intelligence.

DIFFERENT SCENARIOS WILL BE VALIDATED by means of a Real-Time Simulation with the contribution of air traffic controllers proficient in the given airspace on our state-of-the-art simulation platform that reproduces the HMI of their "home" ATM system.

The results of this validation will be drawn from the same set of parameters that are recorded during the simulation together with specific "HUMAN-IN-THE-LOOP" PARAMETERS such as objective data for number and length of radio and telephone calls, number of co-ordination events, number of medium and short term conflict alerts, number of specific instructions performed through the HMI (direct clearance, turn, speed and level change, etc.). ALSO SUBJECTIVE WORKLOAD assessment (ISA) data is gathered as well as subjective reflection on safety issues, hotspots, procedures, workload and situational awareness through questionnaires (NASA-TLX, SASHA-Q).

Follow Up

The simulation environment prepared for the validation can be utilised later on for the training of air traffic control personnel.

Following the implementation of the solution the real CHANGE OF THE RELEVANT PARAMETERS CAN BE EVALUATED FROM REAL-LIFE RECORDED DATA through Fast-Time Simulation and the solution can be fine-tuned as necessary.

Detecting strengths and weaknesses, improving personal capabilities thus maintaining efficiency and flight safety – these are the advantages that CINEMA (CRDS Interactive Stress Management) offers.

CRDS INTERACTIVE STRESS MANAGEMENT

DEVELOP YOUR ATCOs' STRESS MANAGEMENT SKILLS IN 3 DAYS!

Air traffic control is a high-stress environment. High pressure may lead to rush judgement and reduced attention levels and thus may potentially result in reduced capacity and safety issues.

CINEMA is a Human Factor training course for active air traffic controllers, with the goal of developing their stress management skills. Thanks to this course, ATCOs will be able to handle extreme situations better, improving capacity and flight safety at the same time.

The Problem

Work stress in high-traffic environments and non-standard and extreme situations (e.g. emergencies or adverse weather) is a major problem for air traffic controllers. High pressure may lead to impaired judgement and reduced attention levels and thus may potentially result in reduced capacity and safety issues.

ANSPs, therefore, must work to help ATCOs DEVELOP THEIR STRESS MANAGEMENT SKILLS.

The Solution

CINEMA (CRDS Interactive Stress Management) is a 3-day Human Factor training course LED BY A PSYCHOLOGIST, aimed at active ATCOs, with the goal of detecting their strengths and weaknesses in managing stress, and developing stress management skills. Thanks to this course, controllers will be able to MANAGE STRESS BETTER, MAINTAINING CAPACITY AND FLIGHT SAFETY.

Course Outline

The participants are first SUBJECTED TO STRESSFUL SITUATIONS in the CRDS simulator, while recordings are made of their physiological responses, the application of procedures and the traffic situation. The following session includes a theoretical introduction to the phenomena of stress and decision making in stressful situations.

Subsequently, the recordings are analysed in a group session, whereby TEAM WORK is examined as well as consulting each participant about their performance. With the lessons learned, the participants are subjected to stressful situations once again, with a thorough analysis of their personal improvement in stress handling under the course.

CINEMA

Course Syllabus

Day 1

- Training norms and introduction of the participants
- Familiarisation with the CRDS platform
- Hands-on experience of stressful ATC situations
- Brief overview of the nature of stress

Day 2

- The causes and signs of stress
- The physiology of stress
- Stress handling techniques, coping styles and methods
- Decision making in stressful situations
- Analysis of simulated traffic situations
- Analysis of participants' individual and group performance

Day 3

- Hands-on session of stressful ATC situations
- Analysis of personal improvement
- Individual and group consulting

WHO WE ARE

IN CASE YOU CHOOSE CRDS, THE FOLLOWING STAFF MEMBERS WILL CONTRIBUTE TO THE SUCCESS OF YOUR PROJECT

The Simulation Project Managers will lead you through the entire simulation – from gathering all operational details and needs to coordinating the participants and supervising the simulation itself. Also, a significant part of their role is to create the airspace and traffic sample based on the previously determined parameters. Solid expertise in Air Traffic Management is definitely a key feature of this team.

Software Developers are responsible for creating Human-Machine Interface solutions and System Functionality that are personalised to the needs of clients. In addition, our system administrators ensure that the overall technical background is operating smoothly and effectively. Their extensive experience and attention to detail ensures that your simulation meets the highest standards, also allowing CRDS to be a flexible and reliable service environment.

The Human Factors Analyst team defines the simulation objectives in accordance with the client's needs and break those down into claims. Afterwards, they clarify all the necessary measures, methods and simulation variables in line with the E-OCVM standards. During the project, Human Factors Analysts gather information using recorded data, self-assessment tools, questionnaires and debriefings. Having analysed all these inputs, they draw conclusions and present suggestions in the frame of the Final Report.

Our Customer Relations team performs its activities with the aim to maintain a fruitful relationship with our current and future clients. Market research, promotional actions and event management – including the organisation of workshops and visitors' days – form their core duties. The team is also responsible for CRDS' communication on both online and offline platforms.

Our Administrative Support is pleased to be at your service should any administrative issue occur and able to help with technical questions regarding your visit at CRDS. Besides, they are also responsible for supporting CRDS management by preparing and taking care of the administrative, contractual and financial aspects.

The Head of CRDS performs a variety of functions. His primary assignment is to hold the initiative in the mission of CRDS. Being a still practising radar controller, instructor, also a former supervisor and commercial pilot, he possesses a truly broad spectrum of experience in the ATC industry. This allows him to play the role of a consultant and ATM expert as well.

- High capacity simulator platform with 26 controller and 16 pilot working positions
- High performance ACE compliant software
- Flexible working environment
- Advanced ATM tools and applications – including:
  - Advanced HMI solutions
  - Full System Coordination
  - Data-Link services
  - Trajectory prediction and edition
  - Safety Net applications and functions
  - Independent, parallel simulation run capability
  - Multiple HMIs in one exercise for multi-national simulations

CONTACT US

For further information, including press
and media enquiries please contact us:

crds.hu