The

Aeronautical Collaborative Ring (ACR)

Transforming ATM Performance through Regional Collaboration and Cooperation

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Presentation Overview

The Aeronautical Collaborative Ring (ACR)
Readying Your Enterprise for SWIM

CORPORATE INTRODUCTION

About IDS

Canadian IDS Branch
located in Ottawa and Montreal, Canada

Over 20% of annual turnover is spent on research activities!

Subsidiary of Ingegneria Dei Sistemi (IDS)
located in Pisa & Rome, Italy

400+ Total Employees
Over 200 of which are dedicated to the aviation field

Who is IDS?

- IDS Ingegneria Dei Sistemi, founded in 1980, is a world leader as a high technology solution provider in selected niche defense and civil market sectors

- Private capital

- Independent of other companies or agencies both at stock level and at decision level

- IDS group totals 400+ persons, 75% with technical degrees

- IDS's Quality System is certified ISO 9001 Ed. 2008

- IDS has the highest Military Clearance

Pisa

Rome

Global Corporation

→ Local offices across the world provide expertise, services, and 24/7 support for customers with time, quality, and cost critical requirements.

→ Highly trained distributors and agents extend the IDS Network to nearly every country in the world

IDS Organization Structure

NAVAL DIVISION — maximizing mission success probability

More than 35 naval projects for different navies, in 26 years

GEORADAR DIVISION — Unveiling the underground

Ubitech is now part of the Air Navigation Division

AERONAUTICAL DIVISION — Conceiving tomorrow's aircrafts

AIR NAVIGATION DIVISION — AIS to AIM transition

Worldwide References

Eurocontrol, Belgium
ACG, Austria
LVNL, Netherlands
SLV, Denmark
IAA, Ireland
STNA, France
Airfrance, France
CECAF, Spain
ISDEFE, Spain
AENA, Spain
DFS, Germany
Fraport, Germany
Lufthansa, Germany
ENAV, Italy
CIGA, Italy
ASSI, UK
Navtech, Sweden
LFV, Sweden
FINAVIA, Finland
Latvian CAA, Latvia
PANSA, Poland
CAA, Czech Republic
CAA, Cyprus
NavCanada, Canada
SENAM, Mexico

FAA, USA
NOAA, USA
Jeppesen, USA
UAEAC, Colombia
DECEA, Brazil
Moroccan CAA, Morocco
GACA, Saudi Arabia
CAA, Angola
AAI, India
Chinese CAA, China
DCA, Malaysia
Indonesian CAA, Indonesia
Airservices Australia, Australia
RAAF, Australia
Taiwanese CAA, Taiwan
KAC, South Korea
JCAB, Japan
ATCAJ, Japan
JCAA, Jamaica
IDAC, Dominican Republic
NAATC, Curacao
Aerocivil, Colombia
CAAB, Botswana
NACL, Zambia
DGCA, Kuwait

Oro Navigacija, Lithuania
Aerothai, Thailand
AASL, Sri Lanka
NANSC, Egypt
MoldATSA, Moldova
CAA, Uganda
ECAA, Ethiopia
CAA, DR Congo
PJIA, St. Maarten
CAF, Fujairah
ICAA, Iraq
CAA, Turkmenistan
AZANS, Azerbaijan
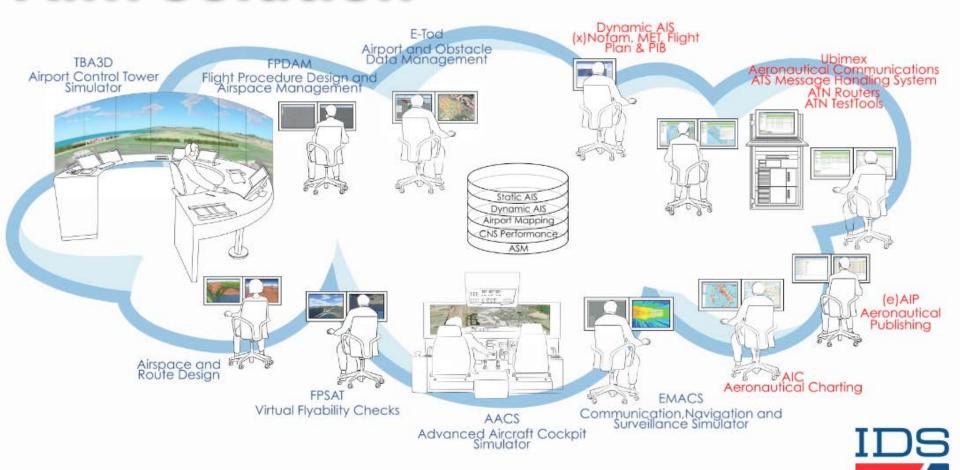
AIM Solution

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SWIM INTRODUCTION

SWIM

Acronym: System Wide Information Management

Definition: SWIM is an open, flexible, and secure information management architecture and technology infrastructure designed to facilitate the <u>sharing of ATM system information</u> to all ATM stakeholders at all points along the information lifecycle.

Key Technology: SWIM employs Service Oriented Architecture (SOA) which relies on the development and international adoption of open standards for system interfaces and data exchange.

Sponsors: FAA NextGen & Eurocontrol SESAR

SWIM Explained (Cont'd)

Stakeholders:
Pilots
Airports
Airlines
Civil Aviation Authorities
Air Navigation Service Providers (ANSPs)
Meteorological Authorities
Military
More………

Data types:
Static Aeronautical Data
Dynamic Aeronautical Data
Flight trajectory
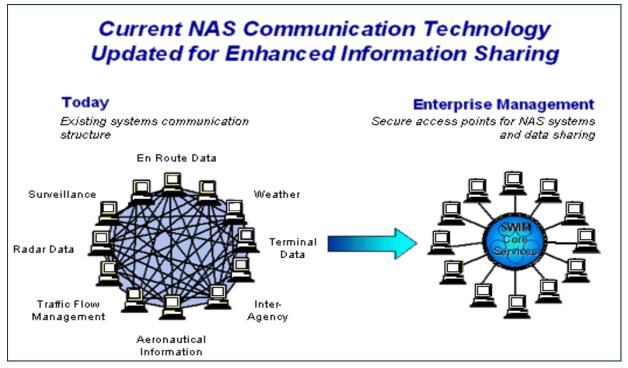Aerodrome operations
Meteorological
Air traffic flow
Surveillance
Capacity and demand ……..

Today and Tomorrow (SWIM)

Current NAS Communication Technology Updated for Enhanced Information Sharing

Today
Existing systems communication structure

Enterprise Management
Secure access points for NAS systems and data sharing

En Route Data

Surveillance

Weather

Radar Data

Terminal Data

Traffic Flow Management

Inter-Agency

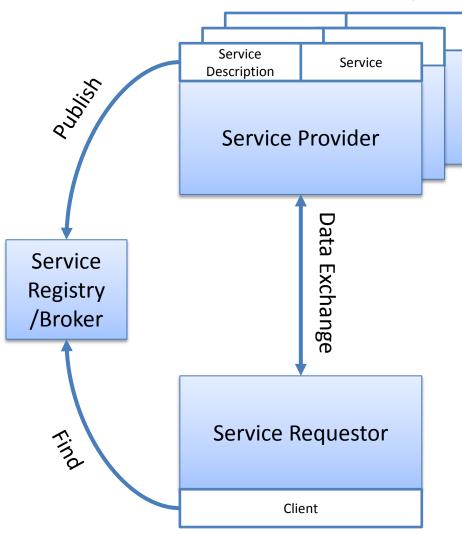Aeronautical Information

SWIM Core Services

Source: http://www.faa.gov/about/office_org/headquarters_offices/
ato/service_units/techops/atc_comms_services/swim/program_overview/

- ✈ Removal of the traditional point-to-point communications environment
- ✈ Creation of with a <u>scalable enterprise service bus</u> (ESB) that provides secure interoperability between enterprise applications

Service Oriented Architecture (SOA)

- Architectural approach for organizing and using services to support interoperability
- Helps align software applications with business requirements and provide quicker, cheaper adaptation to future requirements
- Leverages reusable technology and information
- Decouples the development of business applications from the information technology

Publish

Service Description | Service

Service Provider

Service Registry /Broker

Data Exchange

Find

Service Requestor

Client

Benefits of SWIM

→ By assuring the provision of quality information to the right people at the right time, SWIM will:

  → Improve the efficiency of airspace usage

  → Increase aviation safety through common situational awareness

  → Reduce environmental impact

  → Shrink infrastructure costs through standardized system interfaces

Overall enhance the Total Sharing of Information among the different Airspace Users

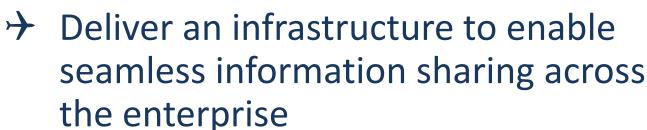*The Aeronautical Collaborative Ring (ACR)*
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AERONAUTICAL COLLABORATIVE RING

→ R&D project in partnership betweer IDS & ENAV (Italian ANSP)

→ Deliver an infrastructure to enable seamless information sharing across the enterprise

→ Build an enterprise Service Bus (ESB) infrastructure to provide secure interoperability between enterprise applications

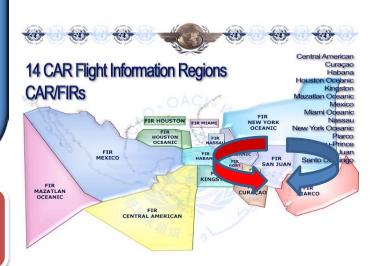→ To be developed and delivered in an iterative fashion over 2 years

Implementation of a PIARCO/Curacao AIM/NOTAM Contingency Plan

→ Establishment of an Agreement between Curacao and Trinidad ANSPs to be signed in the next week at the ICAO NACAR DG meeting in Port Of Spain , TT

→ Establishment of a SWIM based structures for the sharing of the AIM static data enabling synchronization

→ Virtual Address Centralization, after contingency switch, for NOTAMs, FPLs and Mateo information

Other Caribbean ANSPs has already expressed interest in joining the Contingency Infrastructure

14 CAR Flight Information Regions CAR/FIRs

Central American
Curaçao
Habana
Houston Oceanic
Kingston
Mazatlan Oceanic
Mexico
Miami Oceanic
Nassau
New York Oceanic
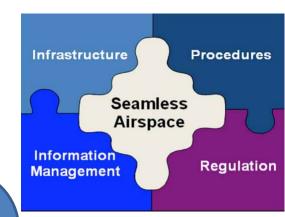Piarco
Au-Prince
San Juan
Santo Domingo

SWIM Seamless Airspace

✈ The contingency plan is meant to be a first step in the Caribbean region towards the Seamless Airspace implementation of the Region

Seamless Airspace is defined as:

Contiguous airspace that is technically and procedurally interoperable universally safe and in which all categories of airspace users transition between Flight Information Regions, or other vertical or horizontal boundaries, without requiring a considered action to facilitate that transition and without any noticeable change in:

(1) Type or quality of service received
(2) Air navigation and communications performance standards
(3) Standard practices to be followed

Therefore for a Seamless Airspace:

✓ Infrastructur   be **interoperable**

*ATM systems mus   se services from and between
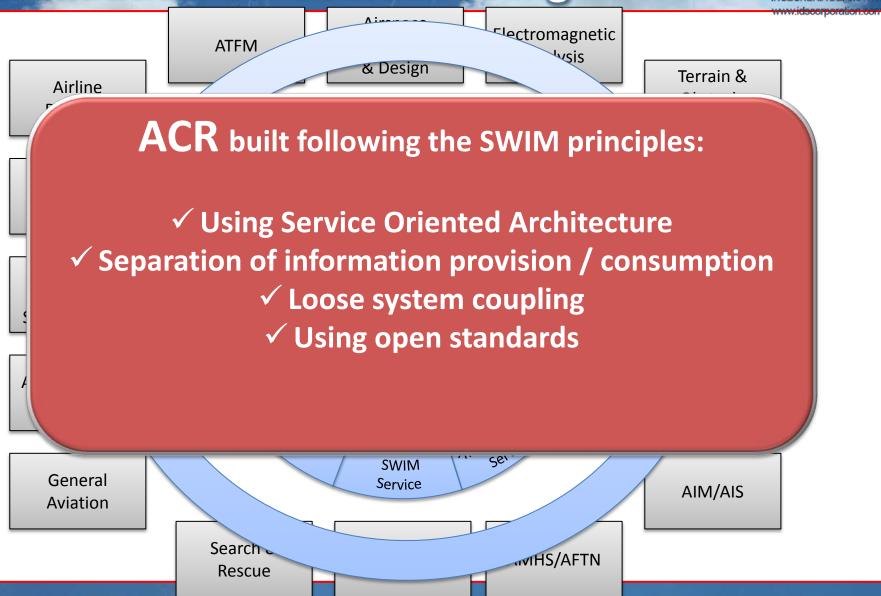component system   nd efficient operations*

✓ Procedures r

The Implementation of ATM systems and services must be in accordance with

> ## SWIM is a key Component for the implementation of the Seamless Airspace

✓ The manner in which information is defined, formatted, and exchanged must be **standardized**

Conforming to an ICAO or other internationally recognized standards (eg. AIMX/FIXM)

ATFM

Airspace
& Design

Electromagnetic
Analysis

Terrain &

Airline

ACR built following the SWIM principles:

✓ **Using Service Oriented Architecture**
✓ **Separation of information provision / consumption**
✓ **Loose system coupling**
✓ **Using open standards**

SWIM
Service

General
Aviation

AIM/AIS

Search &
Rescue

MHS/AFTN

ACR Core Capabilities

→ **Messaging** –<u>decoupled communication</u> and interoperability between distributed end-user applications. ACR supports Request/Reply, Publish/Subscribe, and Push/Pull communications.

→ **Authentication** –<u>standardized, secure, and consolidated access</u> to information, abstracting consumers from the complexity that lies behind in the backend systems. ACR infrastructure supports multiple authentication levels as well as promotion/demotion of the user authentication.

→ **Security** –protection of Confidentiality, Integrity and Availability. ACR implements security principles of access control, accountability, authenticity, non-repudiation and reliability.

➤ **Notifications & Alerts** –interaction services for applications communicating through ACR. Allows connected applications to publish event notifications and alerts, enable subscribers to express their interests in receiving events, and mediate published notification and alerts to affected subscribers.

➤ **Reporting** – collects, stores and retrieves all relevant information exchanged during the communication sessions via the ACR Interfaces. It provides means for recording/ logging the data exchange as well as functionality for recorded data retrieval.

ACR (SOA Based) Functional Services

- ✈ **Aeronautical Information Service** – provides exchange of aeronautical data in AIXM format using an enhanced Web Feature Service (WFS/WSF-T) to provide AIXM baseline data, AIXM deltas, and xNOTAMs.

- ✈ **Flight Data Service** – enables exchange of flight object information in FIOPS and FIXM formats using WFS.

- ✈ **Surveillance Data Service** – enables exchange of aircraft position information in FIXM , ASTERIX Categories in XML & BXML WFS.

- ✈ **Weather Service** – provides exchange of weather data in WXXM, iWXXM format using WMS/WFS.

- ✈ **Briefing Service** – provides exchange of consolidated AIS and MET information in upcoming ePIB format using Web Service (WS).
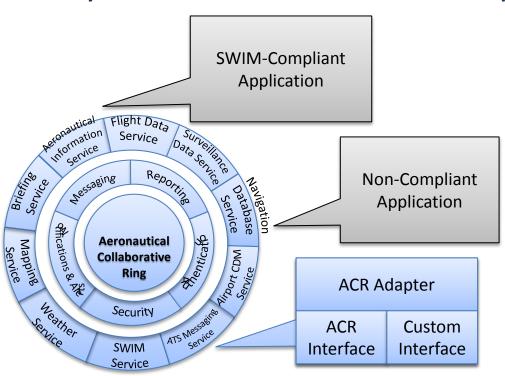
ACR Functional Services (Cont'd)

✈ **Navigation Database Service** – provides exchange of aeronautical data in ARINC 424A in XML/FIXM/BXML using WFS which can be used to directly populate the FMC.

✈ **Mapping Service** – provides the exchange of aeronautical/geographical data and satellite imagery in the form of maps using Web Mapping Service (WMS), GML. Aeronautical chart types with predefined styles and symbology are supported.

✈ **Airport CDM Service** – provides the exchange of airport operations information in AOXM formats using AOCC data, XML standards at airports, GML, and WFS.

✈ **ATS Messaging Service** – provides capability to send and receive messages over the AMHS or AFTN networks.

✈ **SWIM Service –** enabling connection of end-user applications, connected to ACR, with other SWIM-compliant functional services all over the world.

ACR Adaptors

✈ Most systems in operation today are not SWIM compliant and cannot be replaced quickly

✈ Through the use of **ACR Adapters** these non-SWIM systems can be made active participants in the ACR

- ✓ The <u>ADAPTER</u> acts as a mediator between different legacy systems

- ✓ The <u>ADAPTER</u> translates data/services among Legacy and ACR

- ✓ Each <u>ADAPTER</u> might be further decomposed in different adapters dedicated to the served "Data Domains" (they will be detailed later)

Operational Concept

➤ ANSPs are responsible for the data and making it available to Stakeholders

  ➤ ACR can facilitate this collaborative data sharing while still keeping data ownership within the related ANSP

➤ Access to data by Stakeholders should be regulated by the ANSP

  ➤ ACR provides access-level security down to the attribute level

➤ Example:

  ➤ Coordination of GeoBorders for adjoining airspaces of different ANSPs

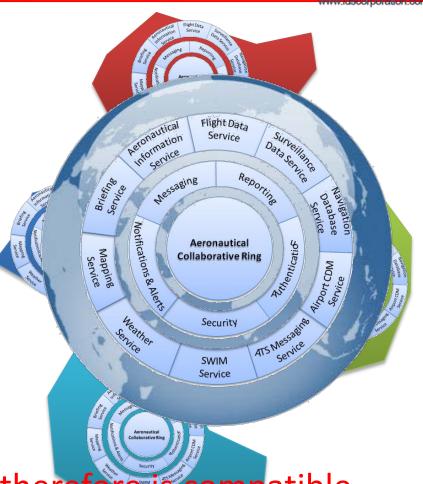# Towards Global SWIM with ACR

✈ **National ACR**

   ✈ Individual states implement ACR

✈ **Regional ACR**

   ✈ Through bi-lateral coordination, states grant access to the ACR to regional peers

✈ **Global ACR**

   ✈ As ACR implementation expands at the national and regional level, global coordination can occur

ACR is SWIM-compliant and therefore is compatible with other non-ACR SWIM infrastructure

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CONCLUSION

Why start today?

→ The ACR provides these direct technical benefits immediately:

  → *Reduce the complexity of the information system-level applications*

  → *Reduce the number of application services, which are then reused in different applications and functions*

  → *Reduce costs associated with the development and maintenance*

  → *At the business level, greater flexibility and agility*

Questions?