The PRAL Air Transport Office
Fiscal Year 2006 Annual Report
Abbreviations

AFT  Africa region (WBG)
ADS-B  Automatic Dependent Surveillance - Broadcast
ATAG  Air Transport Action Group (affiliated to IATA)
ATC  Air Traffic Control
ATKB  Air Transport Knowledge Base
ATM  Air Traffic Management
ATO  Air Transport Office of PRAL
ATR-42  Aerospatiale aircraft Model ATR-42
CAA  Civil Aviation Authority
CES  Charles E. Schlumberger, Principal Air Transport Specialist
CNS  Communication Navigation Surveillance services/systems
GNSS  Global Navigation Satellite System
GPS  Global Positioning System
DGCA/06  Director General of Civil Aviation Safety Conference 2006
DOT  Department of Transportation of the United States of America
EAP  East Asia & Pacific region (WBG)
ECA  Europe & Central Asia region (WBG)
ESW  Economic Sector Work
F-50  Fokker aircraft model F-50
FAA  Federal Aviation Administration of the United States of America
FY05  Fiscal Year 2005 of the World Bank Group (01JUL04 – 30JUN05)
HCB  Heinrich C. Bofinger, Air Transport Consultant at the World Bank
IATA  International Air Transport Association
IASA  International Aviation Safety Assessment (by the US FAA)
IBRD  International Bank for Reconstruction and Development (WBG)
ICAO  International Civil Aviation Organization (UN Agency)
IDA  International Development Association (WBG)
IFC  International Finance Corporation (WBG)
LAC  Latin America & The Caribbean region (WBG)
MNA  Middle East & North Africa region (WBG)
N/A  not available
NTSB  National Transportation Safety Board (USA)
PPIAF  Public Private Infrastructure Advisory Facility
PRAL  Ports, Railways, Aviation & Logistics thematic group
SAR  South Asia region (WBG)
T/A  Technical Assistance
TBD  To Be Determined
TTL  Task Team Leader
WBG  World Bank Group

Cover Page: A Let 410 of the Tanzanian operator “Precision Air” being prepared for departure at Bukoba airport. Being situated at the northern border with Uganda on the shore of Lake Victoria, air transportation is a vital infrastructure for the sub-region and its economic and social development. The Bank will finance the surfacing of the runway.
# Table of Contents

Abbreviations ........................................................................................................2  
Foreword ...............................................................................................................5 
Executive Summary ..............................................................................................6 
The WGB FY05 Air Transport Portfolio .................................................................7 
  Africa Region (AFT) ...........................................................................................8  
  Latin America & The Caribbean Region (LAC) ................................................8  
  South Asia Region (SAR) ..................................................................................9  
  Middle East & North Africa (MNA) .................................................................9  
  Europe & Central Asia (ECA) ..........................................................................9  
  East Asia & Pacific (EAP) ..............................................................................9  
  International Finance Corporation (IFC) ..........................................................10 
Air Transport Office Activities at a Glance ..........................................................11 
Operational Cross-Support .................................................................................13 
  Africa Region (AFT) .........................................................................................13 
  Mozambique – Communication Sector Reform Project (P073479) ................14 
  Cape Verde – Airline Privatization (P074055) ..............................................15 
  Latin America & The Caribbean Region (LAC) ..............................................18 
  Guatemala – PPIAF Study & Civil Aviation Component (P055084) ............18 
  Dominican Republic (DR) – Air Transport Component for the Proposed  
    Institutional Strengthening and Technical Assistance project (P094888) ....19 
  South Asia Region (SAR) ..............................................................................20 
  Afghanistan – Air Traffic Management & Airport Infrastructure (P078284) ..20 
  East Asia & Pacific (EAP) .............................................................................21 
  ASEAN – Air Transport Liberalization (IO2045963) .....................................21 
  Mongolia – Air Transport Sector Policy (P056200) ......................................22 
External Relations ...............................................................................................23 
  FAA – World Bank High Level Briefing on Aviation Safety and Security ....23 
  ICAO – Briefing of the Council and Participation to DGCA/06 Conference ....24 
  ICAO - World Bank - ATAG Development Forum .......................................25 
  US - Africa Air Transportation Summit (Miami FL) .......................................26 
  International Arab Civil Aviation Security Conference, Abu Dhabi ..........27 
  ACI Conference on Airport Safety, Santo Domingo, Dominican Republic ...27 
  ICAO-ACI Conference on the Global Air Transport Outlook, Montreal ....27 
Internal Dissemination ........................................................................................28 
  Air Transport Knowledge Base ....................................................................28 
  Air Transport and Maritime Learning Day .....................................................28 
  Air Transport Brown Bag Luncheon ...............................................................28 
Research and Various ........................................................................................29 
  ADS-B – The Surveillance Technology for the developing countries? .......29 
    Two Flavors of ADS-B .............................................................................29 
    ADS-B as the choice for developing countries ..........................................31 
  Flight Operation Activities ..........................................................................32 
Outlook for Fiscal Year 2007 ............................................................................33
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Foreword

The Transport Sector Board decided to reinstall the Air Transport Office (ATO) at the Bank’s transport anchor unit in July 2004. This came after the World Bank renewed its focus on financing infrastructure projects in developing countries. The renewed focus on infrastructure fostered the understanding that a safe, secure, reliable, and cost-effective air transport system is an essential tool for development, and part of a multimodal transport system of any nation.

After a challenging but rewarding first year of establishing the Air Transport Office while responding to high demand for bank-internal operational cross-support, the past fiscal year allowed consolidation and further development of air transportation both internally and with external partners. Internally, the WBG has engaged in several new air transport related projects. The overall WGB air transport portfolio has grown nearly 10%. Externally, the ATO has established a permanent working relationship with ICAO on air transport, including several bilateral and multilateral partners.

The outlook for air transport related projects looks very promising. While external demand is growing, internal recognition of air transport having to be part of any developed transport system has been constantly deepened. However, the challenge remains in building sufficient internal capacity to respond to the operational demand for air transport projects, which, compared to the overall transport sector, remains a niche. It is therefore important to develop staff with polyvalent knowledge and capacity for the transport and infrastructure sector.

Finally, I would like to thank management and my colleagues and support staff at the center and within the regions for their continued support and cooperation. Especially the devotion and support of my deputy, Heinrich C. Bofinger, was key for expanding the ATO activities while being constrained by internal resources.

Charles E. Schlumberger
Principal Air Transport Specialist

September 2006
Executive Summary

The WGB FY06 Air Transport Portfolio includes over 24 major projects in all six regions of the IBRD/IDA. The total volume financed by loans or grants of these two institutions is about US$ 714 million, which represents an increase of about 10% since FY06. The IFC has increased its air transport lending portfolio by 11% to US$ 309 million. Overall, the WBG air transport related project portfolio volume is now over US$ 1 billion.

As planned, the ATO has provided less operational cross-support (63% of time, down from 71%) to four of the six regions of the Bank. The main focus has been on the Africa Region (AFR), followed by the East Asia and Pacific Region (EAP), and the Latin America and Caribbean Region (LAC). Nearly two-thirds (63%) of cross-support was on actual lending or grant operations, and one third on technical assistance to clients. The operational focus of cross-support shifted to a focus on sector policy and infrastructure, followed by safety and security related projects.

The second activity, external relations, built on the joint ICAO, World Bank, and ATAG (IATA) working group, which held its second air transport workshop in Montreal. Furthermore, the ATO organized a high-level meeting between Bank management and aviation representatives, and co-organized or participated in various external events around the world.

To support internal dissemination of air transport information, the ATO expanded the web based Air Transport Knowledge Base. It also held a joint Air Transport and Maritime learning event, and a Brown Bag Luncheon.

Finally, the ATO deepened technical and industry relevant research, which will serve in projects, as well as in additional research.

The outlook for FY07 focuses on three areas: (i) operational cross-support (50%), (ii) research and publications (Yamoussoukro Decision, Air Cargo and Trade Logistics), and (iii) external relations (partnership with ICAO).
The WGB FY06 Air Transport Portfolio

The WGB FY06 air transport portfolio is composed of various lending or technical assistance (ESW) projects in the six regions of the Bank (IDA, IBRD). In addition, the IFC has a current portfolio of proposed and active lending or investment financing throughout the aviation sector.

<table>
<thead>
<tr>
<th>Loans, Credits &amp; Commitments</th>
<th>IBRD</th>
<th>IDA</th>
<th>IFC</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>(in millions USD)</td>
<td>FY06</td>
<td>FY05 change</td>
<td>FY06</td>
<td>FY05 change</td>
</tr>
<tr>
<td>WB Group</td>
<td>103,004</td>
<td>104,401 -1.3%</td>
<td>127,028</td>
<td>120,907 5.1%</td>
</tr>
<tr>
<td>Transport Sector</td>
<td>15,450</td>
<td>15,660 -1.3%</td>
<td>15,243</td>
<td>14,509 5.1%</td>
</tr>
<tr>
<td>% of WGB</td>
<td>15.0%</td>
<td>15.0% 0.0%</td>
<td>12.0%</td>
<td>12.0% 0.0%</td>
</tr>
<tr>
<td>Air Transport</td>
<td>411</td>
<td>380 7.5%</td>
<td>303</td>
<td>270 10.9%</td>
</tr>
<tr>
<td>% of Transport</td>
<td>2.7%</td>
<td>2.4% 9.6%</td>
<td>2.0%</td>
<td>1.9% 6.8%</td>
</tr>
</tbody>
</table>

The overview above summarizes the most important projects of the WBG. However, there are currently several smaller projects or project components in various WBG projects that are not included due to their small dimension or their preliminary stage.
### Africa Region (AFT)

<table>
<thead>
<tr>
<th>Country</th>
<th>Description</th>
<th>Amount</th>
<th>Type</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tanzania</td>
<td>Safety and security of the ports, rail, and aviation sectors</td>
<td>est. US$ 42 million</td>
<td>IDA loan</td>
<td>preparation</td>
</tr>
<tr>
<td>Mauritania</td>
<td>CAA capacity building, airport security, airport concession</td>
<td>est. US$ 5 million</td>
<td>IDA loan</td>
<td>active</td>
</tr>
<tr>
<td>West &amp; Central Africa (ECOWAS &amp; CEMAC Region)</td>
<td>Regional air transport safety project (multi-donor grants for reg. organizations of 23 countries, IDA loans to five countries)</td>
<td>est. US$ 50 million</td>
<td>Donor grants/IDA loans: TBD</td>
<td>active</td>
</tr>
<tr>
<td>Tanzania</td>
<td>Safety and security of the ports, rail, and aviation sectors</td>
<td>est. US$ 42 million</td>
<td>IDA loan</td>
<td>preparation</td>
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<td>IDA loan</td>
<td>active</td>
</tr>
<tr>
<td>West &amp; Central Africa (ECOWAS &amp; CEMAC Region)</td>
<td>Regional air transport safety project (multi-donor grants for reg. organizations of 23 countries, IDA loans to five countries)</td>
<td>est. US$ 50 million</td>
<td>Donor grants/IDA loans: TBD</td>
<td>active</td>
</tr>
<tr>
<td>Sierra Leone</td>
<td>Infrastructure rehabilitation at Freetown International Airport</td>
<td>est. US$ 11 million</td>
<td>IDA grant</td>
<td>active</td>
</tr>
<tr>
<td>Cape Verde</td>
<td>Airline privatization of TACV</td>
<td>US$ 1.3 million.</td>
<td>IDA loan: $1.3m.</td>
<td>done</td>
</tr>
<tr>
<td>Liberia</td>
<td>Assessment of needed emergency repairs at Roberts Intl. Airport</td>
<td>N/A</td>
<td>T/A</td>
<td>active</td>
</tr>
<tr>
<td>Mali</td>
<td>Airport rehabilitation (technical assistance &amp; construction)</td>
<td>US$ 6.55 million</td>
<td>IDA loan: $5.81m.</td>
<td>active</td>
</tr>
<tr>
<td>Kenya</td>
<td>Airports capacity building projects (ATM and GNSS improvements), airport security, and regulatory framework</td>
<td>US$ 51.65 million</td>
<td>IDA loan: $44.84m.</td>
<td>active</td>
</tr>
<tr>
<td>Madagascar</td>
<td>Airport safety &amp; security improvements and PPI financing</td>
<td>US$ 79.32 million</td>
<td>IDA loan: $7.77m.</td>
<td>active</td>
</tr>
<tr>
<td>Mozambique</td>
<td>CAA capacity building, airport concessioning, airline privatization</td>
<td>US$ 5.5 million</td>
<td>IDA loan: $5.3m.</td>
<td>active</td>
</tr>
<tr>
<td>W &amp; C Africa (ECOWAS &amp; CEMAC)</td>
<td>Institutional strengthening of regional organizations for the liberalization of air services.</td>
<td>US$ 0.5 million</td>
<td>IDA grant</td>
<td>closed</td>
</tr>
</tbody>
</table>

### Latin America & The Caribbean Region (LAC)

<table>
<thead>
<tr>
<th>Country</th>
<th>Description</th>
<th>Amount</th>
<th>Type</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>OECS (St. Vincent &amp; the Grenadines, Grenada, St. Lucia, Dominica, St. Kitts &amp; Nevis)</td>
<td>Transport security infrastructure improvements, regulatory framework and capacity building (sea ports &amp; airports)</td>
<td>US$ 20.5 million</td>
<td>IDA / IBRD loans: $13.3m.</td>
<td>closed</td>
</tr>
<tr>
<td>Guatemala</td>
<td>Capacity building at CAA</td>
<td>TBD</td>
<td>IBRD loan</td>
<td>active</td>
</tr>
</tbody>
</table>

PRAL Air Transport Office Annual Report - Fiscal Year 2006
### South Asia Region (SAR)

<table>
<thead>
<tr>
<th>Country</th>
<th>Description</th>
<th>Amount</th>
<th>Type</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nepal</td>
<td>Airline privatization</td>
<td>TBD</td>
<td>T/A</td>
<td>active</td>
</tr>
<tr>
<td>Afghanistan</td>
<td>Airport rehabilitation, CNS &amp; CAA capacity building</td>
<td>US$ 19.3 million</td>
<td>IDA loan: $17.9m</td>
<td>active</td>
</tr>
<tr>
<td>Bhutan</td>
<td>Air Transport Sector Diagnostic Note</td>
<td>T/A</td>
<td>N/A</td>
<td>done</td>
</tr>
</tbody>
</table>

### Middle East & North Africa (MNA)

<table>
<thead>
<tr>
<th>Country</th>
<th>Description</th>
<th>Amount</th>
<th>Type</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iran</td>
<td>Reconstruction of transportation infrastructure after earthquake (highways, roads, BAM airport)</td>
<td>US$ 3.16 million</td>
<td>IBRD loan</td>
<td>active</td>
</tr>
<tr>
<td>Egypt</td>
<td>Construction of third terminal at Cairo’s international airport and T/A for gradual liberalization of sector.</td>
<td>US$ 574 million</td>
<td>IBRD loan: $335m.</td>
<td>active</td>
</tr>
<tr>
<td>Algeria</td>
<td>Air transport liberalization, airport and ATM policy framework, CAA</td>
<td>US$ 0.97 million</td>
<td>IBRD loan: $0.83m.</td>
<td>active</td>
</tr>
</tbody>
</table>

### Europe & Central Asia (ECA)

<table>
<thead>
<tr>
<th>Country</th>
<th>Description</th>
<th>Amount</th>
<th>Type</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tajikistan</td>
<td>Air transport sector reform in policy based credit</td>
<td>TBD</td>
<td>IDA loan</td>
<td>preparation</td>
</tr>
<tr>
<td>Kazakhstan</td>
<td>Air Transport Sector Strategy Note</td>
<td>N/A</td>
<td>ESW</td>
<td>active</td>
</tr>
</tbody>
</table>

### East Asia & Pacific (EAP)

<table>
<thead>
<tr>
<th>Country</th>
<th>Description</th>
<th>Amount</th>
<th>Type</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indonesia</td>
<td>Roads, bridges, and non-road transportation facilities improvements (sea ports &amp; airport infrastructure)</td>
<td>US$ 191.05 million</td>
<td>IBRD loan: $133.97m.</td>
<td>active</td>
</tr>
<tr>
<td>Lao PDR</td>
<td>Airfield rehabilitation at Boun Neua (Phongsaly Province)</td>
<td>US$ 1.25 million</td>
<td>IDA loan</td>
<td>active</td>
</tr>
<tr>
<td>Mongolia</td>
<td>Air transport sector aspects for a transport sector policy project</td>
<td>N/A</td>
<td>T/A</td>
<td>done</td>
</tr>
</tbody>
</table>
International Finance Corporation (IFC)

The IFC, which is specialized at providing financing to private sector companies, has traditionally financed air carriers and airport infrastructure projects. It currently has several projects in a proposed or active status.

<table>
<thead>
<tr>
<th>Country</th>
<th>Description</th>
<th>Amount</th>
<th>Type</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brazil</td>
<td>TAM Airlines: pre-delivery payments for the purchase of Airbus A-320 family aircraft; corporate loan to support ongoing operations</td>
<td>US$ 50 million</td>
<td>Rev. Credit and Corp. Loan</td>
<td>active</td>
</tr>
<tr>
<td>Brazil</td>
<td>GOL airline: financing of spare parts</td>
<td>US$ 50 million</td>
<td>Corp. Loan</td>
<td>active</td>
</tr>
<tr>
<td>Brazil</td>
<td>Embrear: certification of 170/190 model airliners</td>
<td>US$ 30 million</td>
<td>A &amp; B Loans</td>
<td>active</td>
</tr>
<tr>
<td>Cambodia</td>
<td>Cambodia Airports: privatization of Phnom Penh International Airport</td>
<td>US$ 10 million</td>
<td>Direct Loan</td>
<td>active</td>
</tr>
<tr>
<td>Costa Rica</td>
<td>Aeropuerto Internacional Juan Santamaria: expansion and development of airside, terminal and landside facilities</td>
<td>US$ 40 million</td>
<td>A &amp; B Loans</td>
<td>active</td>
</tr>
<tr>
<td>Dominican Republic</td>
<td>Expansion of the immigration and customs areas, the streamlining of duty free areas, and the addition of new passenger boarding bridges, x-ray equipment and air conditioning systems at airports run by Aerodom</td>
<td>US$ 33 million</td>
<td>A Loan</td>
<td>active</td>
</tr>
<tr>
<td>El Salvador</td>
<td>TACA: pre-delivery financing of A320 aircraft</td>
<td>US$ 30 million</td>
<td>Rev. Credit</td>
<td>active</td>
</tr>
<tr>
<td>Jamaica</td>
<td>Expansion and redevelopment of Sangster International Airport</td>
<td>US$ 42 million</td>
<td>A &amp; B Loans</td>
<td>active</td>
</tr>
<tr>
<td>Russian Federation</td>
<td>Volga-Dnepr Airlines: expand fleet by acquiring two additional An-124-100 aircraft and four D18T engines</td>
<td>US$ 55 million</td>
<td>A, B. &amp; C Loans</td>
<td>active</td>
</tr>
<tr>
<td>Algeria</td>
<td>RedMed: purchase of refurbished aircraft for Star Aviation subsidiary of oil and mining logistics firm</td>
<td>US$ 4 million</td>
<td>Senior C Loan</td>
<td>pending</td>
</tr>
<tr>
<td>Georgia</td>
<td>Tbilisi Airport: privatizaion</td>
<td>US$ 27 million</td>
<td>A Loan</td>
<td>pending</td>
</tr>
<tr>
<td>Mexico</td>
<td>Vuela: pre-delivery financing of up to 20 A-319 aircraft for Volaris airline</td>
<td>US$ 30 million</td>
<td>Rev. Credit</td>
<td>pending</td>
</tr>
<tr>
<td>Panama</td>
<td>Copa Airlines: working capital</td>
<td>US$ 15 million</td>
<td>Standby Credit</td>
<td>pending</td>
</tr>
<tr>
<td>Russia Federation</td>
<td>Air Transport Systems: purchase of small aircraft for air taxi operation</td>
<td>US$ 15 million</td>
<td>C Loan</td>
<td>pending</td>
</tr>
</tbody>
</table>
Air Transport Office Activities at a Glance

The overall Air Transport Office activity consisted of a total time of 2,542 hours, compared to 2,223 hours in FY05. This represents an increase of 14.4%. CES provided 69% (1,742 hours) and HCB 31% (800 hours).

The main activity was centered on providing Operational Cross-Support to units of four regions of the Bank (63% of total time), which was reduced as planned from 71% in FY05. This was followed by external relations (20%), research & internal dissemination (14%), and internal activities (3%).

**Air Transport Office Activities**

(In hours)

In terms of regional focus distribution, the Air Transport Office provided operational cross-support to four of the six regions of the Bank. The main demand came again from the Africa region (58% of total), followed by the East Asia and Pacific region (29%), the Latin America and the Caribbean region (8%), and the South Asia region (5%).

Of all operational cross-support provided, 63% (1,010 hours) was in the context of an actual lending or grant operation, and 37% (587 hours) as technical assistance to clients.
The operational focus of cross-support shifted from a well balanced situation in FY05 to a strong focus on (i) sector policy (35%) and (ii) infrastructure (30%), followed by (iii) safety (19%), (iv) security (11%), (v) regulatory (4%), and (vi) airline restructuring (1%).
Operational Cross-Support

Africa Region (AFT)

West & Central Africa Air Transport Projects (P083751)

In April 2006 the Board of the World Bank approved the first regional Air Transport Safety and Security Project for West and Central Africa. CES has been working on the preparation of this regional project since its inception in 2003. This region of 23 African nations has experienced a poor safety and security record in the past. However, the declared willingness of the African Governments to improve the situation, the increased international pressure against unsafe carriers and poor regulatory oversight, and the Bank's understanding that safe, secure, and reliable air transportation services are key for economic development, were the driving arguments for this innovative project.

The project is structured as a horizontal Adaptable Program Lending (APL) that will enable any of the west and central African countries not included in the initial phase to join during subsequent phases, using the same eligibility criteria. As other countries join the project, regional standards for air safety and security will improve. This should result, over the medium term, in increased worldwide and African market access for local airlines, enhanced competition among them, and ultimately, more reliable, economical, and safer air services.

The APL supports initiatives from the Economic Community of Western Africa States (ECOWAS) and the Economic and Monetary Community of Central Africa (CEMAC) to create regional safety agencies as well as national autonomous civil aviation agencies in order to improve West and Central Africa's aviation safety and security record. It is also intended to foster further growth in the region's high value goods export chain and tourism industry, since both activities heavily depend on the existence of safe, reliable, and affordable aviation services.

The first phase of the project, with four countries, includes IDA credits to Burkina Faso (US$ 6.46 million) and Mali (US$ 5.51 million), and IDA grants to Cameroon (US$ 14.50 million) and Guinea (US$ 7.10 million). Phases II and III of the project, which will include most of the remaining countries in West and Central Africa, will require up to US$ 118 million, and will bring the project total funding under all three phases to over US$ 150 million.
In this project the Bank is providing financing to strengthen national civil aviation authorities, and to procure necessary operational infrastructure improvements for safety and security. However, the Bank also played an instrumental role in the coordination of the regional initiatives, which will be implemented by the International Civil Aviation Organization (ICAO). The regional capacity building initiative of ICAO, called "Cooperative Development of Operational Safety and Continued Airworthiness" (COSCAP), is divided into three programs for the three West and Central African Organizations (UEMOA, BANJUL ACCORD, and CEMAC). These programs are financed by the African Development Bank, the French Cooperation Agency, and the European Commission. The objective is the creation of three subsequent aviation safety agencies during implementation of the COSCAP programs.

The Board of the World Bank commended staff for this innovative project. It recognizes air transportation as essential for development, by not only focusing on air transport infrastructure, but also on air services and their improvements.

**Mozambique – Communication Sector Reform Project (P073479)**

During an additional two missions in FY06, CES has provided operational cross-support on the air transport component of this project, which consisted of three sub-components: (i) airport concession of Maputo International Airport, (ii) privatization of the national air carrier (LAM), and (iii) strengthening of the Civil Aviation Authority (ICAM).

The process of granting a concession remains pending, as noted in the previous two supervision missions. In order to assist the government in the reconsideration of the concession, the Bank had recommended preparing an alternative financing concept for the airport infrastructure system. The consultants (Nathan Associates) have visited the country and submitted a draft inception and summary concept report for the proposed study, “Financing Concept for the Airports in Mozambique”, including a financial model. Based on these recommendations, the GoM is currently evaluating an alternative to the initially proposed concession.

The mission has reviewed the current situation of LAM and discussed the situation concerning the previously-proposed privatization. LAM has continued to downsize and restructure staff. The mission recommends continuing the restructuring process, which should aim at the establishment of a strategic partnership with another airline. In such a case, the Bank could support the government by financing an advisor for the search of candidates and for the preparation of the transaction.

LAM, Mozambique’s national carrier, continues to undergo restructuring. However, a strategic partnership with a larger airline seems the only sustainable long-term solution.
Finally, progress was noted at IACM on the implementation of the capacity building component. The procurement of the consultancy for the Enhancement of Safety Oversight Capability including the consultancy for regulation and capacity building for aeronautical medicine has started. The procurement of the planned consultancy for Regulation of Airport and Aerodrome Certification (including certification of three airports) was awarded to Nathan Associates. The regulation has been prepared, and the manuals and checklists shall be completed by August 2006. English language training for IACM staff in Maputo has been undertaken. The procurement of the planned consultancy for the Civil Aviation Law with initiation of the required legislative procedure is launched. While the procurement of a detailed Air Transport Masterplan for Mozambique remains pending, the component of developing RNAV non-precision approaches (“GPS approaches”) for seven selected airports has been suspended for later financing.

**Cape Verde – Airline Privatization (P074055)**

In the context of the Privatization and Regulatory Capacity Building Project, cross-support was provided by CES for the selection process of advisors for the privatization of the national airline TACV.

The Government of Cape Verde (GoCV) intends to privatize TACV, which could develop a more dynamic role if owned and managed by the private sector. However, a difficult industry environment after 9/11, as well as TACV’s role of assuring a “public service” linking the various islands together, renders this privatization project particularly challenging.

The Bank supports the GoCV by financing a specialized consulting firm, which will prepare and lead the carrier for privatization. The mandate is results and transaction oriented, which includes financial restructuring, operational improvements, management support, and M&A activities.

**Zambia – Air Transport Sector Policy (P092149)**

CES joined the Services Trade Reform for Development mission of the Trade Team (DECRG) in Lusaka in order to provide cross-support on the air transport sector. The objective was to review the air transport sector of Zambia in view of trade facilitation.

The main focus of the mission was the constraints on the improvement of air transport services by examining and evaluating inadequacies in bilateral air transport agreements, studying the domestic regulatory framework and infrastructure, analyzing domestic policies in order to help overcome resistance to liberalization, and examining the need for external policy actions (e.g. liberalization and enforcement of competition policy).
The mission prepared a Technical Note which concluded that Zambia’s air transport market is small, and that its growth potential lays primarily in the development of regional air services. This can be achieved by focusing on negotiating bilateral air service agreements (BASA) with neighboring COSMESA states under similar conditions (no capacity constraints, up to Fifth Freedom) as the future COMESA framework for liberalization of air service would provide. The development of air traffic with South Africa should be continued by (i) making full use of the existing BASA, (ii) negotiating new capacities under the existing BASA, and (iii) continuing to propose and request Fifth Freedom rights for foreign carriers from Lusaka to South Africa. In addition, the problem of high jet fuel prices in Zambia must be corrected, the creation of a new national carrier, as examined in a recent study, must be evaluated with greatest skepticism, and the unsatisfactory regulatory framework and oversight mechanism must be addressed in order support the implementation of Zambia’s Air Transport Policy. The authorities must focus on (i) the creation of a Civil Aviation Authority, (ii) the creation of regulation and technical guidance material, and (iii) capacity building for continued surveillance obligations.

**Tanzania – Airport and Air Traffic Control Infrastructure (P055120)**

CES and HCB conducted an air transport infrastructure review and workshop in two missions to Tanzania. The first mission was the preparation of an air transport component for the TRANSPORT SECTOR SUPPORT PROGRAM for Tanzania. The mission met with the authorities, spoke to several air transport operators, and visited 16 airports in the country. The mission concluded that investment in the Tanzania airport infrastructure was clearly warranted and prepared a detailed report, which was discussed and endorsed in a subsequent workshop.

The report recommends the financing of five runways (Arusha, Bukoba, Kigoma, Tabora, and Mafia) with a preliminary (high-end) cost estimate of US$ 23.2 million. In addition, the mission recommends the establishment of several GNSS non-precision approaches to ten airports, at an estimated cost of US$ 1 million.
The mission came to the conclusion that the country's air transport management and surveillance system would greatly benefit from the introduction of a satellite based air traffic surveillance system. The mission has discussed with the FAA their sponsored ADS-B project in Alaska ("CAPSTONE") and its possible introduction in Tanzania. With the FAA’s confirmation of support for such a project component in the context of the US Safe Skies for Africa initiative, and after strong requests from the client and endorsement by a technical workshop, the ATO proposed financing of such a component, which is estimated to be about US$ 10.0 million for the entire country.

The financing of new air traffic control technology (ADS-B) poses a great opportunity and challenge for the country. While the project clearly foresees the establishment of a dual ADS-B system, with transponder mode S “extended squitter” for air carriers and ADS-B UAT for general aviation, many non-US authorities question the proposed dual system concept. However, a technical demonstration during the workshop in Dar-es-Salaam, the confirmation by ICAO that SARPs exist for ADS-B UAT, the reality that no ADS-B “extended squitter” is currently available for general aviation aircraft, and the fact that the cost of a dual system does not significantly increase the overall project scope, convinced both the workshop participants as well as the authorities of several East African states.

As a next step the ATO shall conduct a technical audit, supported by the involvement of ICAO and the FAA, in order to evaluate: (i) current ground infrastructure to support ADS-B, (ii) current aircraft avionics situation, and (iii) regulatory environment. In addition, the Tanzania Airport Authority will now proceed with the preparation of the Request for Proposal package for the design and the preparation of bidding documents for the rehabilitation / upgrading of the chosen runways.

Finally, during the technical audit the ATO will also appraise the financing of GNSS non-precision approaches for the proposed secondary airports of the country. This will have a profound impact on flight safety and requires very little to no maintenance.

**ADS-B Technologies, a FAA contractor, organized the first ADS-B UAT flight demonstration in Africa during the technical workshop in Dar-es-Salaam.**
Latin America & The Caribbean Region (LAC)

Guatemala – PPIAF Study Outcome & Civil Aviation Component (P055084)

In 2004 the Bank, in cooperation with PPIAF, has financed a review and workshop on needed infrastructure improvements in the areas of road, port, and air transport in Guatemala. The workshop, in which CES participated, presented the conclusion of the study, which recommended abandoning plans to construct a new international airport for Guatemala City, and to instead focus on the reconstruction of the existing airport "La Aurora" in order to comply with international safety and security standards, and to meet future traffic demand. In addition, the study recommended improving and upgrading several key airports of the country, which will help develop regional air traffic, stimulating trade and tourism arrivals.

Despite the fact that there were strong advocates for the construction of a new international airport, the Government of Guatemala (“GoG”) has successfully initiated a well planned and structured air transport infrastructure improvement program, which follows the recommendations of the PPIAF-financed study. After less than one year of planning, the authorities (CAA “DGAC”) have started the construction of a new terminal at La Aurora airport.

The Bank's cost estimate for the construction at La Aurora amounted to over US$ 300 million (PPIAF Workshop 2004). The GoG initial investment is planned at US$ 80 million. Under management by the Technical Cooperation Bureau of ICAO, which is supervising procurement and execution of the construction, the overall program will invest about US$ 92 million in six airports (La Aurora $80 million, San José $3 million, Tikal $2.5 million, Puerto Barrios $2 million, Retalhuleu $0.5 million, and Quetzaltenango $3.5 million). With the exception of Quetzaltenango, all airports will become international airports. The main milestones for the construction of La Aurora airport are March 2007 (opening of main terminal), August 2007 (initial section finalized of the main terminal), and end of 2007 (new taxiway).

In order to facilitate future private participation in infrastructure the DGAC has prepared a law for the creation of an autonomous airport authority. This law is currently pending at congress. However, together with the also pending new concession law, the new airport may one day become a private concession. As for now, the DGAC has renegotiated contracts for 55 shops and restaurants. The airport, currently serving about 2 million passengers, will have a good growth potential (easily doubling passenger numbers) and may become a candidate for a concession agreement with a private investor.
CES also continued to supervise the air transport component of the Competitiveness and Growth Project, which has assigned US$ 400,000 for the Civil Aviation Authority capacity building and technical assistance program. These funds allowed the DGAC to procure IT equipment for the implementation and upgrade of data systems for use in different departments. The remainders of the Bank funds are currently earmarked for capacity building programs for DGAC staff in view of the requirements of the FAA IASA category 1.

ACSA (Central American Air Safety Agency), the DGAC, and the FAA have signed an agreement to assess and prepare Guatemala in view of reaching FAA IASA category 1. According to officials of the DGAC, the program is well advanced, and at 75% implementation. The current phase of implementation includes the revision of re-certification of all Guatemalan operators, which have an air operator certificate authorized by the DGAC. This process is programmed to be completed in November 2006. Guatemala could then ask for a technical review by the FAA in January 2007, which could lead to the IASA category 1 certification in early 2007.

**Dominican Republic (DR) – Air Transport Component for the Proposed Institutional Strengthening and Technical Assistance Project (P094888)**

CES visited the Dominican Republic for an appraisal mission of the air transport component of the Institutional Strengthening Technical Assistance project. The objective was to appraise the component by determining the necessary technical assistance to be financed. Prior to this mission, CES consulted with the US FAA as well as ICAO. The FAA expressed their optimism that the DR could achieve the necessary category 1 of the FAA IASA in reasonable time. In addition, it welcomed the World Bank and the proposed financing as another sign of good cooperation in the area of air safety.

The authorities confirmed their strong interest of including an air transport capacity component in the proposed ISTAL project. Their prime concern was to prepare the Civil Aviation Authority to comply with SARP of the ICAO in order to get recertified IASA category 1 by the US FAA.

The proposed approach for support included (i) an assessment of the level of compliance with ICAO standards and the development of a detailed implementation plan, (ii) the preparation of the operational procedures and manuals for regulatory oversight, and (iii) capacity building and institutional strengthening for the establishment of a performing autonomous civil aviation authority, including the preparation of financial and budgetary frameworks.
After the visit of CES to Kabul in December 2004 for evaluation of the current situation of the Afghan air traffic management system and its potential for further development, a study was launched to evaluate the necessary investments in the country’s CNS infrastructure. The final report is expected by the end of 2006, and will be the basis for an air transport CNS infrastructure program.

Afghanistan has a privileged geographical situation in relation to international overflight corridors. Despite the fact that the country currently does not provide any positive air traffic control, it nonetheless generated an income from ATC of over US$ 25 million annually. However, for the future sustainable development of air traffic, investments in infrastructure for a modern ATM system are necessary.

Afghan air traffic control is still only providing flight information services. Separation of aircraft is coordinated by neighboring air traffic control centers. In addition, the Bank is financing satellite based (GNSS) non-precision approaches to five airports in the country. The contract was awarded to Jeppesen, and is expected to be implemented end of 2006 or early 2007.

Finally, the Bank is also financing urgently needed airport equipment, such as fire/crash vehicles and snow removal engines. This, as well as the preparation of future capacity building projects, is done in constant communication with both US and European authorities, as well as with NATO, which coordinates several development activities for the country.

CES continues to provide internal cross-support to the project unit. He also coordinates communication and information exchange with the US FAA.

The project financed the ILS and its approach procedure for Kabul International Airport. In addition, for the airports of Heart, Jalalabad, Kandahar, Mazar-I-Sharif, as well as for Kabul, the project is implementing satellite based GNSS approaches, which will greatly enhance flight safety.
East Asia & Pacific (EAP)

ASEAN – Air Transport Liberalization (IO2045963)

In March 2006, HCB, together with air transport consultant John King, conducted a mission to five of the Association of Southeast Asian Nations (“ASEAN”) countries for the study of their efforts and progress in air transport liberalization. The objective of this technical assistance was to prepare a report, which was to be submitted to the ASEAN secretariat. Countries visited were Thailand, Malaysia, Singapore, Indonesia, the Philippines, and Vietnam.

The ASEAN nations declared in their Bali Concord II in 2003 the objective of establishing an ASEAN Economic Community by the year 2020. The objective aims at creating a fully integrated single market and production base for the region. During the 10th ASEAN Summit in November 2004 the heads of states reaffirmed the above mentioned objective and additionally identified air transport as one of the eleven key priority sectors which needed to be reformed and liberalized in order to achieve the region’s economic integration by 2020.

The mission had found the state of progress hard to measure, and that one of the most important aspects in systematically evaluating movement towards liberalization is the central keeping of up-to-date air services agreements, including their Memoranda of Understanding (MOU). Several steps were recommended, including (1) the implementation of policies as suggested in a three phased approach presented in a previously authored report (“Preparing ASEAN For Open Sky”), (2) adding responsibility to the ASEAN Secretariat for keeping track of changes in agreements, changes in their related MOUs, and related effects in the air transport market place, (3) harmonization or clarification of a previously agreed-upon ASEAN roadmap with the steps outlined in report mentioned above, (4) deciding on how to proceed with standardizing air service agreements while establishing more liberal multilateral agreements, (5) re-examining the support of state carriers or other domestically based carriers by their respective governments, and (6) integrating planning on the country level and within the ASEAN framework in the sectors of aviation and tourism.

The mission was conducted on behalf of the Poverty Reduction and Economic Management Network (PREM), with a final report submitted to the ASEAN Secretariat, and a related presentation held at the Senior Economic Officials Meeting in May 2006 in Bangkok.
Mongolia – Air Transport Sector Policy (P056200)

In March 2006, HCB visited Mongolia in order to assess the state of the domestic commercial air transport industry, the current condition of the Mongolian Civil Aviation Authority, and the need for a new international airport in Ulaanbaatar.

The East Asia Region of the World Bank was preparing an infrastructure strategy for Mongolia with one of the inputs being a revised transport strategy. The ATO provided a Civil Aviation Strategy and Evaluation which, among other topics, assessed the need for restructuring domestic civil aviation services, taking particular account of their commercial viability and any assessed need for the provision of non-commercial services.

As part of the mission, options on creating an “Essential Air Services” program were explored. Mongolia, a very large and sparsely populated country, has had a precipitous drop in domestic air travel from almost 1 million passengers to roughly 150,000 since the collapse of the Soviet Union and the related heavily subsidized Aeroflot domestic air transport model. With per capita income of about US$ 600, an estimated population of about three million, rugged terrain of over 1.5 million square miles, and a road network still much in development, air services are seen as a vital tool for social cohesion and national integration. The possibility of offering specific routes for tender, allowing service providers to offer a predetermined number of seats at an affordable fare, was discussed amongst other subsidization models.

The need for intervention was highlighted by the fragile state of current carriers providing service – MIAT, the state-run flag carrier, has been forced to reduce its domestic fleet to one sole Antonov AN-26, soon to be retired, and the only other regularly operating carrier, Aero Mongolia, has been reported to face challenges in terms of profitability and increasing indebtedness.
External Relations

FAA – World Bank High Level Briefing on Aviation Safety and Security

A high level briefing was held at the World Bank by the US Federal Aviation Administration on 19. October 2005. The objective was to inform the Bank's Transport Sector Board and staff about the FAA's promoting of aviation safety and security in developing countries.

Kathy Sierra, VP Infrastructure, welcomed the FAA Administrator, Ms. Marion Blakey, to this first event of its kind. She underlined the fact that the Bank and the FAA already have a long history of cooperation, including joint missions, and that this meeting was very welcomed by the Bank's management. The FAA Administrator, Ms. Marion Blakey, addressed the meeting, along with several aviation leaders from Canada, Chile, France, Japan, and Kenya. Director Generals of Civil Aviation from Colombia, The Gambia, Guatemala, Mexico, and Trinidad and Tobago also attended. In addition, the Secretary General of the International Civil Aviation Organization, Dr. Taïeb Chérif, participated in the briefing, along with senior representatives from the International Air Transport Association (IATA) and the Air Transport Action Group (ATAG).

The meeting provided a global perspective on the most basic and critical aviation needs in developing countries, and addressed ways in which countries can seek to bring aviation safety oversight, air traffic management, and airport systems into compliance with international standards. Aviation has become a critical economic lifeline for practically every country in the world. For many, a safe and efficient air transportation system is the only way of attracting levels of tourism and trade necessary for promoting thriving economies.

The meeting underscored the basic requirements that countries must meet to participate in today's global air transportation system. It concluded with the finding that all participants (CAA's of developing countries, donor agencies, international organizations, and the industry) should increase their level of cooperation in order to pool their efforts of bringing developing countries to a level of compliance that ultimately will result in lowering the still too high accident rate.
ICAO – Briefing of the Council and Participation in DGCA/06 Conference

Maryvonne Plessis-Fraissard, Director Transport and Urban Development, and CES visited ICAO for a briefing of the ICAO Council in February 2006. The objective was to further formalize the Bank's cooperation with ICAO in the domain of air transport and development.

During the briefing the mission outlined the Bank's renewed focus on the development of air transport services in Bank client countries. It was emphasized that World Bank - ICAO cooperation is of great importance. The council members strongly welcomed the briefing and presentation of the Bank. They raised several questions related to Bank policy, procedure, and in regard of existing projects.

Following a briefing to the Council of ICAO in February, the World Bank had submitted Working Paper 29, which explains the Bank's involvement in the financing of air transport related projects, and its interest particularly in safety and security. WP/29 also makes clear that financing of Bank projects depends on a country's level of transparency and good governance. It finally recommends open sharing of ICAO safety and security audits, and preparation each year by ICAO of a report on air transport infrastructure needs of developing countries. These reports would serve the Bank to better identify the specific needs of client countries in the domain of air transport.

In addition to participating in the conference, the mission met with client countries and development partners on air transport related matters, and participated in the West African Economic and Monetary Union (UEMOA) second COSCAP Steering Committee Meeting.

The DGCA/06 conference on air safety was called following the surge of air crashes in 2005, which triggered increased pressure on countries with bad safety records (e.g. EU list of banned carriers). The conference was attended by 566 participants from 153 contracting states and 23 international organizations. In several WP and Information Papers (IP) the participating states and observing international organizations presented views and proposals on how to strengthen air safety. ICAO presented a new safety management system, which consists of establishing a structured safety system and culture in contracting states, with a set of well defined procedures and audits. The main focus was on lesser developed countries in South America and Africa, where safety compliance remains poor, and accident rates high.

In the past, some developing countries proudly announced they were working with ICAO and being audited on aviation safety oversight. However, in reality often no or only little follow-up resulted after these audits. The chairman of the conference, Dr. Assad Kotaite, suggested to the conference that ICAO safety audits were to be made public. After opposing countries gave in, and with support from European countries, the US, and the World Bank, the conference agreed to the proposed two year transition period for disclosure.
ICAO - World Bank - ATAG Development Forum

The second ICAO, World Bank, and ATAG (IATA) air transport workshop was held from 6. to 8. June 2005. The workshop, which was named the “ICAO - World Bank - ATAG Development Forum”, aimed at analyzing and discussing issues concerning the objective of maximizing civil aviation's economic contribution. It was attended by over 140 participants from industry, governments, organizations, universities, and individuals from various countries.

The agenda contained 24 speeches and presentations addressing the following themes: air transport as an economic catalyst, safe and efficient air transport in Africa, sustainable infrastructure in the air and on the ground, challenges facing air carriers in developing economies, safety and security in the air and on the ground, and resource mobilization for air transport development. In addition, the workshop formed four working groups, each one of which discussed and analyzed one air transport issue. They concluded:

1. **Air Transport Infrastructure** is facing increased challenges with higher demand for safety and security, higher traffic, but limited funding. This is especially true in developing countries where political will, necessary to establish transparent and financially soundly run entities, is often missing. Access to finance is therefore difficult, and currently low traffic figures in developing countries often do not support the case for full privatization.

2. **Air Carriers** are facing various challenges, such as high fuel cost, liberalization, and in some cases now low cost carriers (often with poor safety standards) entering the markets. However, in developing countries liberalization is perceived a risk if the necessary competition rules and dispute settlement mechanism are not in place (e.g. price dumping by dominating carrier). On the other hand, liberalization should put an end to protecting an inefficient state-owned carrier. Finally, safety and security are increasingly perceived as a basic condition for carriers of all regions to be in business.

3. **Safety and Security** is considered the very basic condition for the development of sustainable air transport services. ICAO is setting the minimum standards, which are also audited by the US FAA and European JAA/EASA. For smaller developing countries, a regional approach to address, improve, and supervise safety and security standards is considered the best way forward. For air carriers, the currently launched IATA IOSA audit program is an excellent tool, however only covering IATA carriers. It was concluded that the World Bank should use the donor meeting process to build stronger support to enforce necessary safety and security standards in developing countries.

4. **Resource Mobilization & Cooperation** must be better coordinated between the different donors. A useful tool will be the proposed country database, which was presented at, and endorsed by, the workshop. This should lead to further coordination of development efforts by different entities, such as the Asian Development Bank, the European Commission, the US FAA/DOT, and ICAO.
CES participated as speaker and panelist in the US Africa Air Transportation Summit in Miami, FL, from 31. October to 2. November 2005. The summit was organized jointly by the Foundation for Democracy in Africa and the Miami International Airport.

Joined by U.S. Deputy Secretary of Transportation Maria Cino and air transportation leaders from throughout the United States and Africa, Governor Jeb Bush addressed the U.S.-Africa Air Transportation Summit, "A U.S. and Africa Partnership." The Governor applauded efforts to establish direct air service between the two regions, and highlighted Miami's role as one of the nation's most important international gateways.

Currently, the entire United States has just 23 direct flights to Africa. While there is no direct link between Florida and Africa, the Sunshine State is the third-largest U.S. destination for travelers from Africa. Establishing direct air service between Florida and Africa will build new partnerships, expand existing relationships, and stimulate trade and investment between the two regions. Coupled with the soon-to-be-implemented U.S.-Morocco Free Trade Agreement, and the U.S.-South African Customs Union (South Africa, Namibia, Lesotho, Botswana, and Swaziland) Free Trade Agreement under negotiation, the direct travel link will increase economic opportunities between Florida and Africa. Florida's total merchandise trade with Africa and the Middle East reached $2.4 billion in 2004, with North Africa and Sub-Saharan Africa valued at $70.9 million and $542 million respectively. According to Miami International Airport, Africa-Miami air trade totaled over $94.4 million in 2003.

The three-day U.S.-Africa Air Transportation Summit identified barriers to air service growth between both regions. Topics for discussion included aviation safety and security, emerging challenges for U.S.-Africa bilateral agreements, demand for air service, absence of U.S. carriers in the U.S.-Africa market, airport marketing, and African aviation infrastructure projects. The Foundation for Democracy in Africa is a development-based, nonprofit organization promoting democracy, sustainable development, and economic growth throughout Africa. Other collaborating partners include the African Union, the International Civil Aviation Organization, the U.S. Department of Transportation, the U.S. Transportation Security Administration, the World Bank Group, and the Export-Import Bank.

CES spoke behalf of the World Bank on the topic of "Financing Africa's Aviation Infrastructure", outlining the Bank's air transport related projects with special focus on Africa. The participants of the summit expressed particular interest in the West and Central African Air Transport Safety and Security Project, which was in its final stage of preparation at the time.
International Arab Civil Aviation Security Conference, Abu Dhabi

CES traveled to Abu Dhabi from 4. – 10. February 2006 and participated as speaker and moderator in an ICAO sponsored International Conference for Aviation Security, on invitation by the Arab Civil Aviation Commission (ACAC). The conference was hosted by the UEA Civil Aviation Authority, and co-organized by ICAO and ACAC.

The objective was to promote the rapid establishment of aviation security frameworks and procedures in all Arab States. The strong US presence and declared support was a clear sign that aviation security has become a global matter where the US likes to set the standards. However, the foreign input, be it the US, or also a delegation of the European Commission and Australia, was very well taken and welcomed in the local press. The members of ACAC have decided to establish a committee of experts in aviation security, which shall assist member states in their efforts of establishing their aviation security.

The World Bank presentation on aviation security was followed with great interest. Several member states of the Arab Civil Aviation Commissions are developing countries (e.g. Sudan, Egypt), of which some need support for financing of equipment and capacity building. The presentation gave information on how to work with the IBRD, IDA, or IFC for obtaining the necessary financing.

ACI Conference on Airport Safety, Santo Domingo, Dominican Republic

CES participated as keynote speaker and as presenter to the Airport Council International (ACI) Fund Conference on Airport Safety from 3. – 5. April 2006. The conference, which was held in Santo Domingo, Dominican Republic, focused on airport safety and safety management issues of developing countries. The conference was attended by 64 airport executives from 20 Latin American, Caribbean, and African countries.

The objective of informing the participants about the World Bank group activities in the area of air transport infrastructure and safety projects was achieved by giving both a keynote speech at the presence of the Secretary of State and several national and international dignitaries, and a presentation during the conference. In addition, the mission met with several participants to discuss air transport and safety related matters in their respective countries.

ICAO-ACI Conference on the Global Air Transport Outlook, Montreal

HCB spoke in Montreal, Canada on 27. – 30. June 2006 at the opening panel of the ICAO-ACI conference on the Global Air Transport Outlook. HCB shared the panel with Dr. Assad Kotaite, President of the Council of ICAO, and Mr. Robert J. Aaronson, Director General, Airports Council International.

The purpose of the conference, the first of its kind chaired by ICAO and ACI, was to explore the challenges ahead in the air transport industry, and the necessary steps in building the capacity in meeting expected future demand. The conference also included workshops, in particular one on statistical methods of traffic forecasting used for airport and other capacity planning.
Internal Dissemination

Air Transport Knowledge Base

The prime tool for internal dissemination of air transport relevant information is the web-based Air Transport Knowledge Base (ATKB). The ATKB was developed during FY05 under the technical guidance of HCB. During FY06 the ATKB was further enhanced with new reports, studies, and aviation news.

The site contains eleven directories with numerous sub-directories, links to internal and external sites, as well as a frequently asked question and feedback section. The ATKB continues to be regularly updated with new documents. However, the ATO intention to fully extend the ATKB to the Bank’s external website during FY06 was not achievable due to higher priority activities. It is a declared objective for FY07 to establish an informative external website.

Air Transport and Maritime Learning Day

During the Transport Learning Week of the Bank, an Air Transport and Maritime Learning Day was held on 6. April 2006. The objective of a combined maritime and air transport learning event was to enable more participants to attend both specialties. The air transport elements of this learning day included a presentation by an official of ICAO on the new air transport security audit program, a presentation on ATC commercialization, and a presentation on air transport liberalization.

The few participants who attended this learning event rated all presentations as very relevant and well presented. However, the low turnout, which was due to the fact that many transport sector staff were attending regional retreats, was a disappointing fact, especially given that two international speakers attended the event on their own cost. Given this experience, the ATO intends to return to the proven concept of organizing full day Air Transport Clinics. However, this should be done in two year intervals, well coordinated with other sector events.

Air Transport Brown Bag Luncheon

A brown bag luncheon was held on 1. February 2006 on air transport indicators. The discussion centered on the use and meaning of ICAO data made available to the Bank, which has proven to be extensive, and of great help in analyzing and understanding the challenges of regions and countries. Beyond traffic, industry, and institutional figures, the Bank received a copy of the air transport accident database kept at ICAO. With all accidents involving commercial aviation worldwide reported between 1990 and 2004, the database serves as a tool in reviewing a country’s or region’s history in air safety.

In terms of measures, though air transport is one of the best reported-on transport industries, not all aspects relevant to development are clearly identifiable with readily collected data. It is the combination of statistical measures and direct knowledge of circumstances within a country that must be used to assess the most urgent needs.
Research and Various

ADS-B – The Air Traffic Surveillance Technology for the Developing Countries?

The acronym “ADS-B” stands for:

- **Automatic**: As soon as the electric system of the aircraft is turned on, the reporting mechanism for the aircraft is activated, and the aircraft is visible to the control network, and to other aircraft if so equipped.
- **Dependent**: The system depends on GPS satellites to determine each aircraft’s position.
- **Surveillance**: The system provides radar-like position awareness to ground controllers and, depending on the system type, other aircraft.
- **Broadcast**: The aircraft, instead of being “interrogated” by radar, broadcasts its position continuously.

Figure 1 shows the basic features of an ADS-B system. The system requires only six core components:

1. A satellite navigation system (typically GPS)
2. GPS equipment aboard the aircraft
3. Transmitter aboard the aircraft
4. Ground-based transceiver to receive data broadcast by aircraft
5. A data link to the air traffic control center
6. An air traffic control center, if not already in place

**Two Flavors of ADS-B**

Two approved standards of ADS-B have emerged. Their core difference lies in their ability to share information between the ground and aircraft in the air, and amongst aircraft themselves. Operationally, their difference lies in the equipment found aboard aircraft and in the ground-based transmitter.
**Extended Squitter**

Transport category aircraft are now equipped with a standard “Mode S” transponder, which, if equipped with an “extended squitter” box, is able to broadcast a digital message providing basic aircraft information, such as the longitude, latitude, airspeed, and barometric altitude, transmitted at 1090 MHz. Mode S does not require geographic information be derived from a satellite navigation system – data can come from anywhere in the flight management system, and in aircraft not equipped with satellite navigation the data may well come from inertia – based equipment.

However, the information transmitted via the Mode S transponder is highly limited, and the capacity of the 1090 MHz bandwidth is stretched. More importantly, the standards of Mode S extended squitter ADS-B only allow for digital data to be broadcast, but allow for no reception of digital data. Though the more common standard today in transport class aircraft, only 25% of aircraft now being equipped with Mode S transponders will also be equipped with the extended squitter capability.

**UAT**

The newer ADS-B standard operates on 978 MHz and is called “Universal Access Transceiver” (UAT). UAT operates with a different transceiver box in the aircraft than the Mode S transponder, and is able to not only send data but also to receive data from the ground and from other aircraft (see Figure 2). This has significant advantages – if equipped with a standard multi-function display (the Garmin MX-20 would be a good example), the pilot is be able to see all other traffic in the vicinity and perhaps up-to-date weather information, all super-imposed on a terrain map for the current location (see Figure 3). The safety implications of seeing other traffic, especially in uncontrolled environments, regardless of weather, are significant. In addition, because ADS-B Extended Squitter’s bandwidth is somewhat limited in terms of bi-directional capability and growth, most experts agree that 978 MHz has better long range potential for growth and additional cooperation for uplink services.

*Figure 2: In contrast to ADS-B following the extended squitter standard, ADS-B UAT allows for bi-directional communications, giving the aircraft the possibility to receive information from the ground (weather, other aircraft in the area) and from other traffic in the air.*
The Added Safety of UAT

The highest risk aircraft operations are those not involving large jets flying over the country in the upper airspace, but lighter commercial operations flying at lower altitudes, often in terrain that is hostile in bad weather or in case of serious technical malfunctions. These are the same operations that occur in airspace not having much, if any, surveillance, and where up-to-date weather information is not readily available.

Having good surveillance capabilities on the ground is of obvious help in avoiding obstructions and other traffic. However, the capability of seeing, on one display in the cockpit, all surrounding terrain, the weather conditions en-route, and all other traffic, significantly lowers the risks that are most commonly leading to accidents with lighter aircraft. In the United States, the Federal Aviation Administration launched a test program in the state of Alaska where operators using the ADS-B UAT system reduced their fatal accident rate by over 50%. If one compares the cost of the system for an entire country such as Tanzania to the loss of one Cessna Caravan fully loaded with passengers, the benefits become apparent immediately.

Figure 3: In this display, traffic can be seen superimposed on the surrounding terrain. The information is received live from other transmitting aircraft and from the ground-based transceiver.

ADS-B as the choice for developing countries

ADS-B today presents the best fit choice for bringing airspace control to countries lacking such infrastructure. The technology presents itself as optimal because of its low cost of introduction, its much lower maintenance cost, its accuracy compared to traditional radar, and its independence from most other infrastructure networks, such as the power grid.

Complete coverage of a country such as, for example, Tanzania (945,087 km2) would require the installation of about ten ground based transceivers. With the cost per transceiver at about US$ 165,000, excellent coverage could be achieved for under US$ 2 million. By contrast, a single radar installation today costs about US$ 6 million. A requirement is that aircraft be equipped with the transceivers and GPS equipment. Assuming no GPS devices previously installed, the basic cost per unit would be US$ 20,000. In Tanzania for example, with 210 aircraft registered, this would add US$ 4.2 million to the introduction. Even if half of the aircraft were registered for commercial use, and it would be deemed necessary to add the cost of multifunction displays, the cost would still only increase by about US$ 2.1 million, bringing the total installation, including training, and interfacing with the current radar system, to about US$ 10 million.
Flight Operation Activities

Both CES and HCB are licensed and active pilots, certificated by the US FAA and European Joint Aviation Authorities JAR. In August 2005 CES underwent annual simulator training for the renewal of his US FAA commercial pilot license and flight instructor certificate.

CES and HCB of the PRAL Air Transport Office have conducted several “Angel Flight” missions during the 2005 hurricane season. The first mission was requested as a Hurricane Katrina relief flight helping evacuate displaced persons from the affected areas. On 21 September 2005 the team flew Mr. Salvador Midence (84) and his wife Florinde (67) to relatives in the New York area. Mr. Midence, a Honduran immigrant who retired in New Orleans after having spent most of his life in the merchant marine, has lost his home during Hurricane Katrina. After having spent two weeks in a shelter in Baton Rouge, LA, the US NGO Angel Flight arranged for the elderly couple, which is suffering from health issues, to be evacuated, and flown to New York to be reunited with family members in Farmingdale, NY. The Bank staff received, in accordance to Staff Manual 9.10, one day administrative leave to carry out this very rewarding community service.

On another Hurricane related Angel Flight mission on 23. and 24. September 2005, CES and HCB evacuated the Perish-Hill Family (parents, child, grandmother, and dog) from their suburban Houston, Texas, home to the Washington, D.C. area. As airlines did not accept any reservations since the hurricane had been announced, and since the US Air Force concentrated their evacuation of the population on a few selected communities, the only remaining option for leaving the city was via general aviation. However, the Perish-Hill Family were not in a financial situation that would have permitted the chartering of an aircraft. The mission arrived as an Angel Flight evacuation mission at 23:45 in Houston, just a few hours before hurricane Rita hit the coast. After a quick refueling the mission left and returned to Virginia, where it landed after 12 hours and 56 minutes, with refueling stops in Birmingham, AL, each way. The whole mission, including stops, took 17 hours, spanning from Thursday afternoon to Friday morning.
Outlook for Fiscal Year 2007

OPERATIONAL CROSS-SUPPORT

The objective is to provide a maximum of 50% billable time on operational cross-support. However, given the fact that last year’s high demand still resulted in 63% operational cross-support, and that demand continues to rise, one priority will be to continue to establish a network of internal specialists and external consultants who are able to respond.

RESEARCH AND PUBLICATIONS

The Bank, as a leading development institution, must maintain high standards in its specialized technical sectors by maintaining research, conducting high level technical exchanges, and fostering specific industry contacts. Given the reality that the African continent lags behind in the development of air transport services, two of the following three areas of research and publication, which have been identified for FY07, focus on Africa:

1. Research and authoring of a publication on *The Implementation of the Yamoussoukro Decision*, which aims at (i) evaluating the potential economic impact of liberalization of air transport in Africa, and (ii) analyzing the legal situation and requirements for successful implementation;

2. Preparation of an air transport for development paper, which will be focusing on *air cargo and trade logistics* with emphasis on Africa that will feed into the FY07 flagship Freight Transport for Development;

3. Updating of the current *Air Transport Knowledge Base*, and the external publication of elements of the knowledge base, including continued data collection and maintenance to support the various reports and research project in air transport.

EXTERNAL RELATIONS AND COOPERATION

Given the renewed emphasis on Africa, the ATO will participate in a cooperative working group between ICAO, the African Union, ATAG, others, and the Bank, which aims at launching a *multi-donor facility to support the implementation of a Project for Sustainable Air Transport in Africa*. This facility will research and prepare several air transport related reports, including a detailed implementation tool kit. It will be domiciled at ICAO in Montreal.

The Air Transport Office shall continue to participate in selected *conferences and working groups* in order to develop and expand external relations with air transport related industry, organizations, and authorities, and to exchange relevant knowledge and data.