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UNIVERSITY**

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**Wichita State University's National Institute for
Aviation Research presentation, February 25, 1994**

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Wichita State University
National Institute for Aviation Research

Presentation for
Dan Goldin, NASA Administrator

and

Dan Glickman, Kansas 4th District Congressman

by

Dr. Bill Wentz

Executive Director, NIAR

February 25, 1994



NATIONAL INSTITUTE FOR AVIATION RESEARCH



The
Wichita
State University

William H. Wentz, Jr., PhD, PE
Distinguished Professor
and Executive Director
National Institute for Aviation Research
A KTEC Center for Excellence

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Wichita / Sedgwick County

- 400,000+ population (Largest city in Kansas)
- Manufacturing produces 18% of Gross State Product with 13% of the Kansas workforce
- "Air Capital" (World's largest producer of airplanes)
 - Boeing, Cessna, Beech, Learjet
(30,000 + employment)
 - Sub-contractors / Support (> 1,000 firms)



NATIONAL INSTITUTE FOR AVIATION RESEARCH

WICHITA STATE UNIVERSITY

Students:

12,000 Undergraduate

3,000 Graduate

15,000 Total

Faculty:

550

Colleges:

Fairmount College of Liberal Arts and Sciences

Fine Arts

Barton School of Business

Education

Engineering

Health Professions



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PhD PROGRAMS at WSU

- 1959 Communicative Disorders & Sciences
- 1970 Aerospace Engineering
- 1970 Chemistry
- 1986 Electrical Engineering
- 1986 Industrial Engineering
- 1986 Mechanical Engineering
- 1986 Applied Mathematics
- 1989 Human Factors - Psychology
- 1992 Educational Administration
- 1993 Community / Clinical - Psychology



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MAJOR MILESTONES IN AVIATION RESEARCH AT WICHITA STATE UNIVERSITY

- 1928 - Clyde Cessna donation of \$1,000
- 4' Petroff Wind Tunnel constructed
 - B. S. in Aeronautical Engineering offered
- 1948 - Olive Ann Beech, others donate \$100,000
- 7' x 10' Walter Beech Memorial Wind Tunnel
 - Continuous service since completion
 - Research, development and education
- 1985 - National Institute for Aviation Research Created
- Federal, Industry, Wichita-Sedgwick County Support
 - 74,000 Sq. Ft. facility
 - \$5 Million equipment
 - 10 Laboratories
 - 5 new PhD programs in Aviation-related disciplines
 - 60 Faculty, 30 Students, 20 technicians and staff



NATIONAL INSTITUTE FOR AVIATION RESEARCH

MISSION

“The mission of the National Institute for Aviation Research is to conduct research, transfer technology, and enhance education for the purpose of advancing the nation’s aviation industries, and to assist local and regional non-aviation industries which may benefit from aviation-related technologies.”

- NIAR Mission Statement
Adopted 1990



NATIONAL INSTITUTE FOR AVIATION RESEARCH

ULTIMATE CLIENTS

Cessna, Learjet, Beech, Boeing . . . Evcon . . . Fiber Dynamics . . .

INTERMEDIATE CLIENTS

Federal

NSF / NASA / FAA / DOE / NIST

State

MAMTC / KTEC / WIN / REGENTS

FUNCTIONS

Research

Technology Application

Education

FACILITIES

Aerodynamics

Flight Simulation

Avionics

Manufacturers Asst. Site

Composites

Structures

Icing

Materials & Cryogenics

Software Development

Impact Dynamics

Propulsion

Human Factors

CAD/CAM

HUMAN RESOURCES

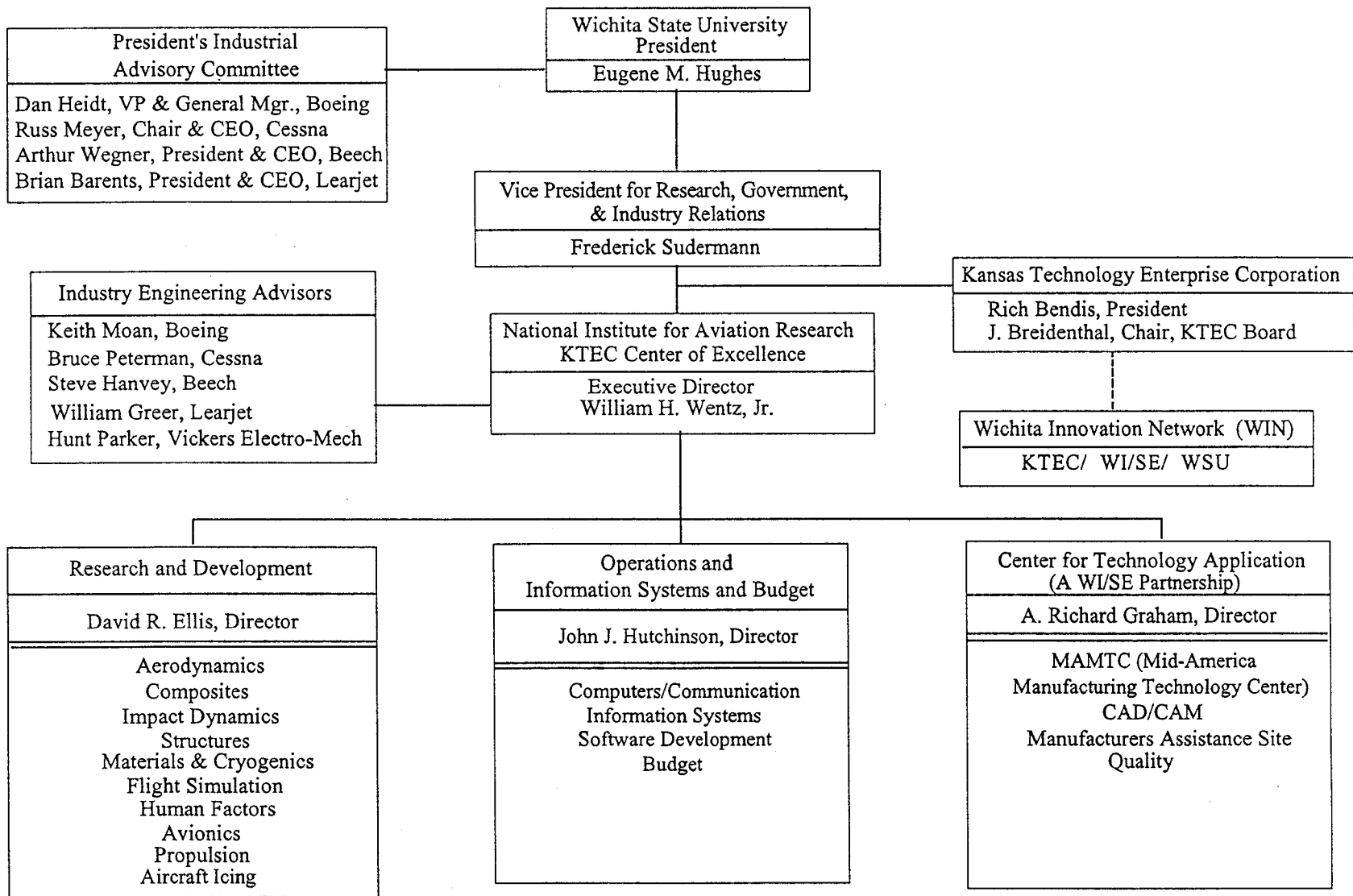
Faculty

Technical Staff

Students



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 A Kansas Center of Excellence at The Wichita State University
 Wichita, Kansas 67260-0093 (316)689-3678

Kansas Technology Enterprise Corporation "KTEC"

- Mission: "To Create and Maintain Employment"
- A non-profit, quasi-public corporation
- Core funding for NIAR
- Applied Research Matching Grants
(60% Industry, 40% KTEC)
- Equipment Matching Grants
(50% Non-state, 50% KTEC)



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CENTER FOR TECHNOLOGY APPLICATION

Mid-America Manufacturing Technology Center
(MAMTC Regional Office for Wichita area.)

Mission: "Improve the competitiveness of small and medium size manufacturers"

Director: Dr. A. Richard Graham

Sponsors: NIST and KTEC; a WI/SE Partner

Service Area and Staff

- One of six offices located in Kansas, Missouri and Colorado
- Serves approximately 800 manufacturers in a 13 county region of south-central Kansas
- Staff of 13 (full-time)



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CENTER FOR TECHNOLOGY APPLICATION (Continued)

Programs and Facilities

- Direct Assistance (Consulting Services) to Companies
- Quality
- CAD/CAM Facility
- Manufacturers Assistance Site
- Seminars and Training
- Special Interest Groups
 - Midwest Electronic Data Interchange (MEDIA)
 - Management Round-table Briefings

Accomplishments (FY93)

- 336 Companies contacted
- Direct Assistance to 59 Companies
- * CAD Training for 264 persons
- * Quality training for 464 persons



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FUNDING AND PERSONNEL

NIAR FUNDING (\$1,000)

<u>State Fiscal Year</u>	<u>1985</u>	<u>1993</u>	<u>1994</u>	<u>1995</u>	<u>2000</u>
<u>State</u>					
KTEC	0	780	780	800	1,600
Other	200	692	726	760	1,000
<u>Federal</u>					
FAA	0	1,103	1,000	1,100	2,000
NASA	300	100	500	1,000	2,000
Other	0	464	554	600	700
<u>Industry</u>					
Total	<u>700</u>	<u>3,903</u>	<u>4,460</u>	<u>5,460</u>	<u>10,000</u>

NIAR PERSONNEL

Faculty	3	19	20	25	45
Staff	5	38	40	45	70
Students	10	65	70	100	130



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NIAR FY 94 NASA - AWARDED

SUBJECT	INVESTIGATOR	FUNDING (\$1,000)	TYPE
Kansas Space Grant (w/KU, KSU, ESU)	Gawad Nagati	36	Grant
Airplane Design	Kamran Rokhsaz	22	Grant
Progressive Damage Analysis of Composite Materials	Steve Hooper	53	Grant
Composite Airplane Crashworthiness (SBIR Phase I)	Jim Terry, Steve Hooper	<u>60</u>	Grant
	Sub-total	171	



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NIAR FY94 - NASA (PENDING)

	INVESTIGATOR	FUNDING (\$1,000)	TYPE
Integrated Design and Manufacturing of GA Composites	Gail Brinkman	100	CA
General Aviation De-Icing Systems	David Ellis	29	CA
AGATE Test Platform Integration/Management	David Ellis	100	JSRA
General Aviation Market and Economic Impact Study	David Ellis	<u>100</u>	CA
	Sub-Total Pending	329	
	Sub-Total Awarded	<u>171</u>	
	TOTAL	500	

* CA = Cooperative Agreement

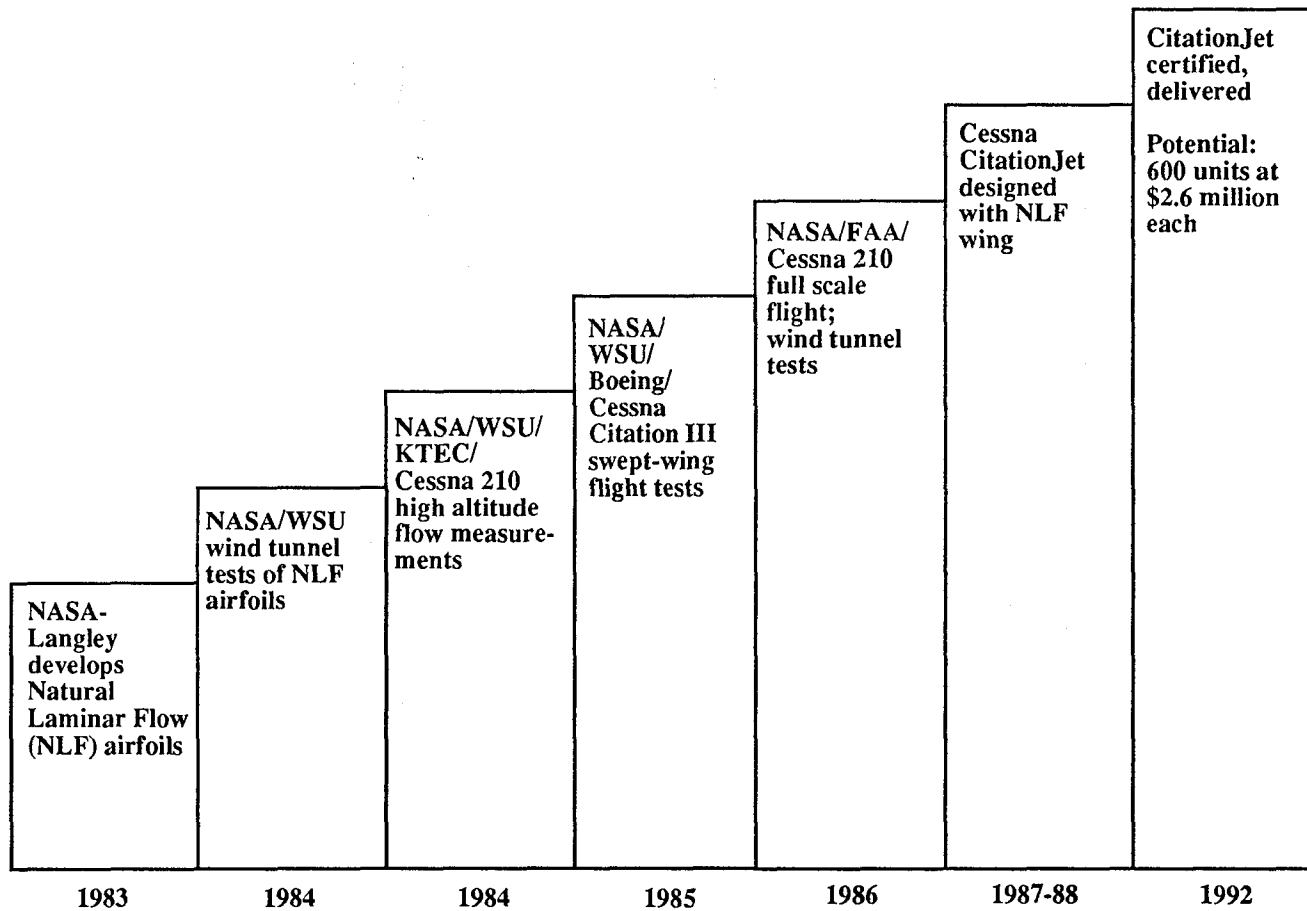
JSRA = Joint Sponsored Research Agreement



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Commercialization Case History: Cessna Aircraft, Wichita, KS Natural Laminar Flow for CitationJet

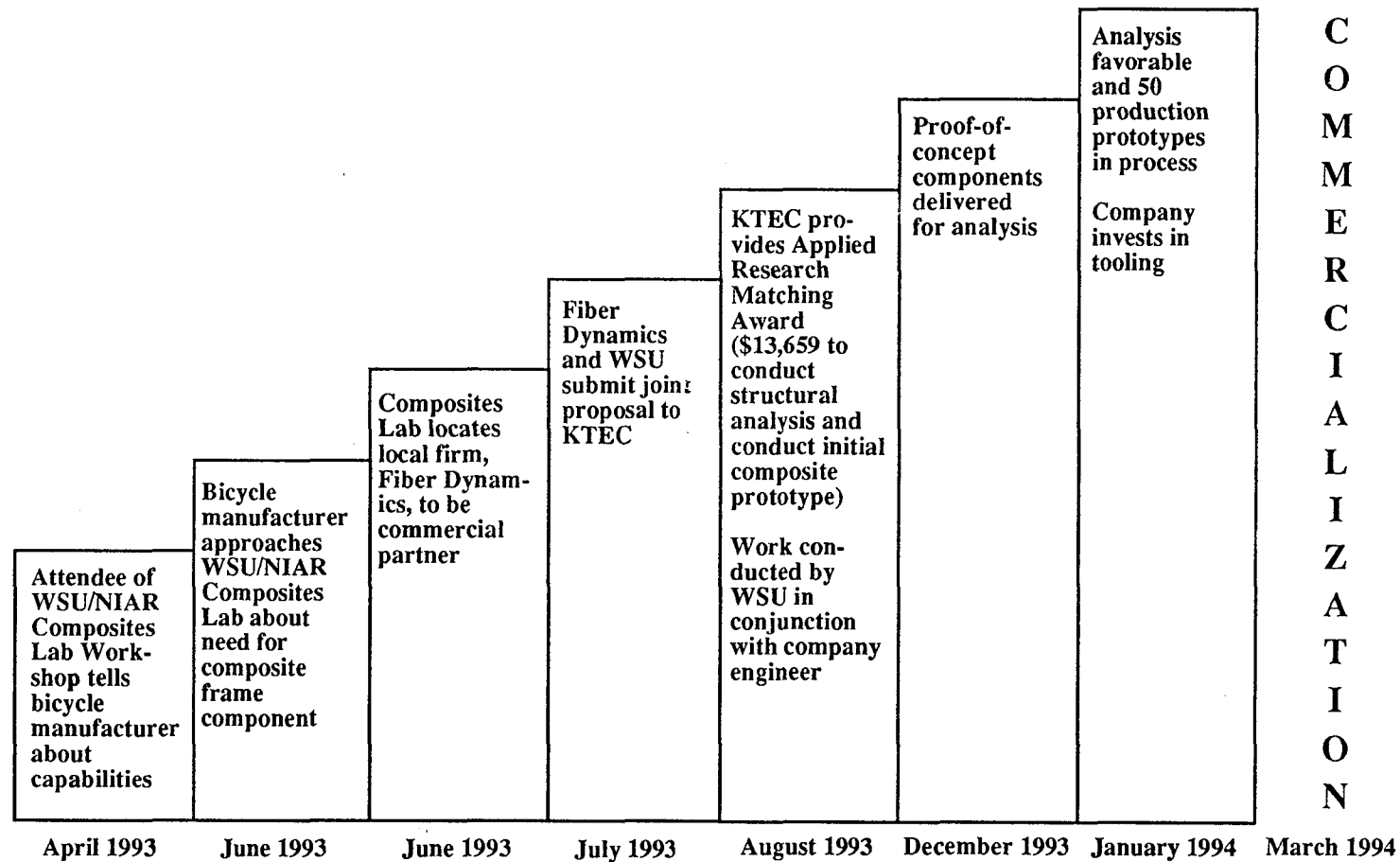
(9 years)



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Commercialization Case History: Fiber Dynamics, Valley Center, KS Rear Swing Arm for Mountain Bike

(9 months)



“Without innovation enabled by technological advancement, general aviation within the United States will fail to respond to opportunities for expanded use and is destined to continue its decline. NASA is the most capable and logical source of such enabling technology.”

- NASA General Aviation Task Force
September, 1993



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GENERAL AVIATION TASK FORCE RECOMMENDATIONS

- Revitalize NASA General Aviation Program
- Rebuild Infrastructure
- Technology Programs
- Coordinate Efforts with FAA
- Disseminate Research Information
- Establish Focus and Continuing Advisory Role
- Develop New NASA/Industry Partnerships



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- REBUILD INFRASTRUCTURE

(★ = Potential NIAR participation)

- Wind Tunnels

- ★ Low noise - Low turbulence
- ★ Multi-mode data collection - faster, cheaper
- ★ Global laser velocimetry

- Computer Simulation

- ★ Low-Cost Flight simulation
- ★ Applied Computational Aerodynamics (CFD)
- ★ Avionics Hot Bench

- Engine Test Cells

- ★ Small Sector Combustion research to reduce emissions
- ★ Small Engine testing at University of Kansas FRL

- Material Property Laboratories

- ★ Composites
- ★ Non-Destructive Evaluation



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- TECHNOLOGY PROGRAMS

(★ = Potential NIAR participation)

- Propulsion, Noise & Emissions

- ★ Business Jet Noise and Emissions
 - ★ Single-lever reciprocating engine control

- Aeronautical Systems

- ★ GPS: Navigation, Collision Avoidance
 - ★ Advanced Intuitive Cockpit Displays and Controls
 - ★ De-Icing Systems compatible with laminar flow

- Structures and Materials

- ★ Low-Cost Composites Manufacturing
 - ★ Crashworthy Composite Structures

- Aerodynamics

- ★ High-Lift to reduce community noise
 - ★ Applied Computational Aerodynamics



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CONCLUSIONS:

- Wichita State University has a tradition of research, technology application and education supporting the aviation industry and federal agencies since 1928.
- WSU, local aviation firms Wichita and Kansas believe in a strong future for civil aviation, and have been consistent in their support of the NIAR.
- We believe that the new NASA General Aviation Initiative will have a pivotal impact on retaining U.S. leadership in this important aviation sector.
- We are pleased to participate as a partner with NASA and industry in this endeavor.
- We commend Mr. Goldin for his leadership, and Congressman Glickman for his continuing support of aviation and the NIAR.



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