

Aviation – On Demand

NASA AERONAUTICS

With you when you fly

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NASA Aeronautics Research A Strategic Vision

The background of the slide is a composite image. It shows a futuristic, white, sleek aircraft with red and green stripes on its tail and fuselage, flying towards the right. The aircraft is positioned in the foreground. In the background, there is a stylized Earth with a grid overlay, showing continents and oceans. The grid lines are white and form a perspective grid that recedes into the distance. The overall color palette is dominated by blues, whites, and greens, with a hint of red from the aircraft's stripes.

Solving Aviation's Challenges Through NASA Innovation

Why is aviation so important?



The air transportation system is critical to U.S. economic vitality.



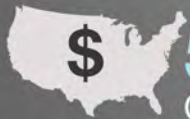
\$1.3 TRILLION
TOTAL U.S. ECONOMIC ACTIVITY
(civil and general aviation, 2009)



\$47.2 BILLION
POSITIVE TRADE BALANCE
(civil aviation, 2011)



10.2 MILLION
DIRECT AND INDIRECT JOBS
(civil and general aviation, 2009)



5.2%
OF TOTAL U.S. GROSS DOMESTIC PRODUCT (GDP)
(civil and general aviation, 2009)



Why should I care?



Take the system view. You may not have flown today but something you needed did.



\$1.6 TRILLION
VALUE OF FREIGHT TRANSPORTED BY AIR
(exports, domestic, indirect spending, 2008)



\$636.1 BILLION
SPENT BY AIR TRAVELERS IN U.S. ECONOMY
(foreign and domestic travelers, 2008)



734 MILLION
PASSENGERS ON U.S. CARRIERS
(domestic and international, 2012)

Mobility Matters

(Ground, Sea, or Air)



Proximity to Resources Has Always Shaped Civilization
And It Continues to do so in Dramatic Ways



PARCEL DELIVERY



Aviation

The Real World Wide Web

 OXFORD ECONOMICS

 OXFORD ECONOMICS

The background of the slide is a vibrant blue sky filled with numerous white, fluffy clouds of varying sizes. The clouds are scattered across the frame, with a larger cluster in the upper left and several smaller ones towards the bottom. The overall atmosphere is bright and clear.

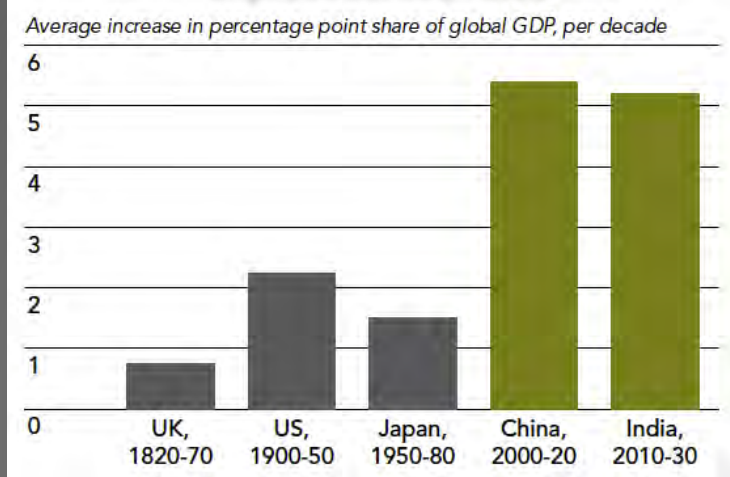
The World on Demand

What do emerging global trends reveal?

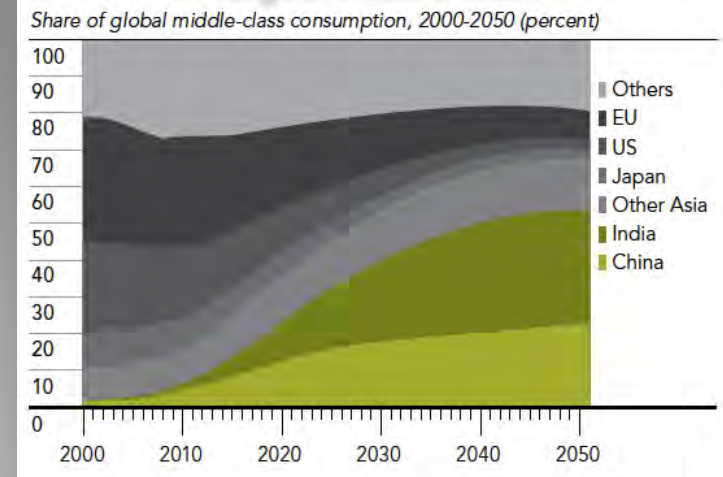
New realities challenge traditional approaches to strategic planning.



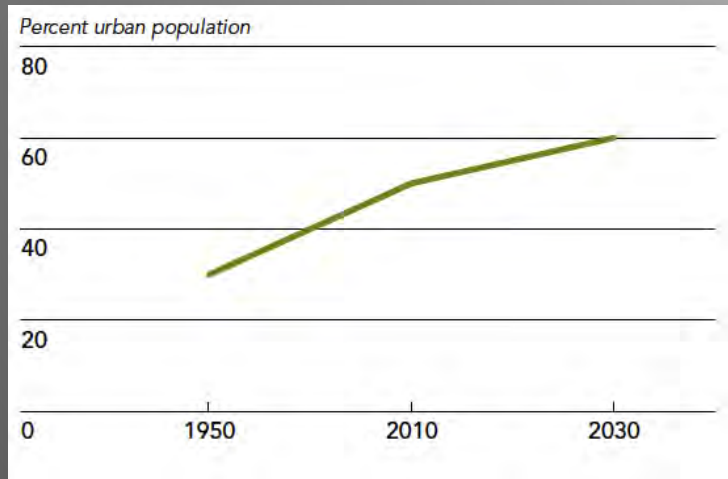
China and India growing economically at unprecedented rates



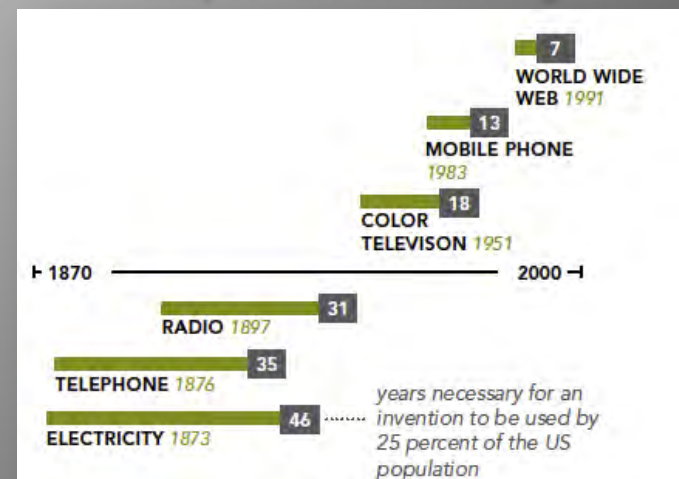
Asia-Pacific will have the largest middle class



The world will be predominantly urban



Revolutionary technology development and adoption are accelerating







Texas Transportation Institute

**\$87,200,000,000
LOST PRODUCTIVITY
AND WASTED FUEL**

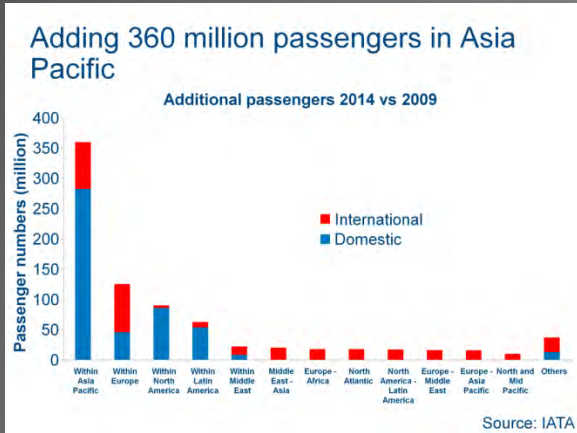
An aerial photograph of a multi-lane highway completely gridlocked with cars. The scene is captured at dusk or dawn, with the headlights and taillights of the vehicles creating a dense pattern of light across the road. Several large commercial trucks are visible among the passenger cars. In the background, an elevated highway structure is visible. A yellow text box is superimposed over the center of the image.

1,400,000,000
Cars by 2030



Why are these trends important?

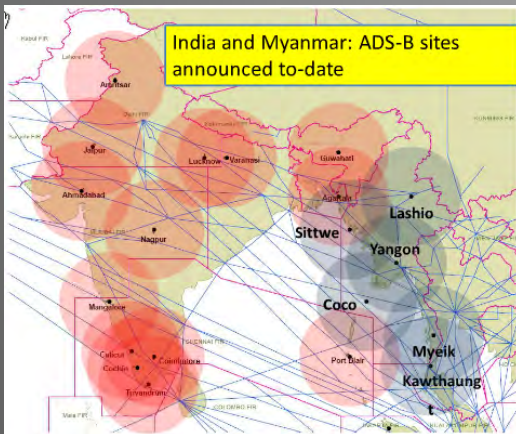
Challenges are multiplying and accelerating. Technology is a catalyst.



They drive global demand for air travel...



They drive expanding competition for high-tech manufacturing...



They drive "leapfrog" adoption of new technology/infrastructure...



They drive resource use, costs, constraints and impacts...

How do these trends affect aviation?

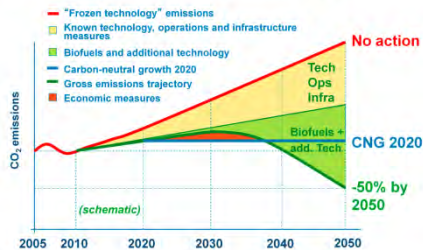
Three mega-drivers emerge.



Traditional measures of global demand for mobility – economic development, urbanization -- are growing rapidly



Emissions reduction roadmap



Severe energy and climate issues create enormous affordability and sustainability challenges



Revolutions in automation, information and communication technologies enable opportunity for safety critical autonomous systems

How is NASA Aeronautics responding?

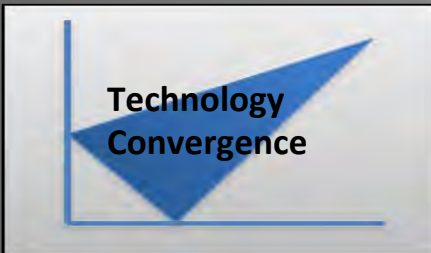
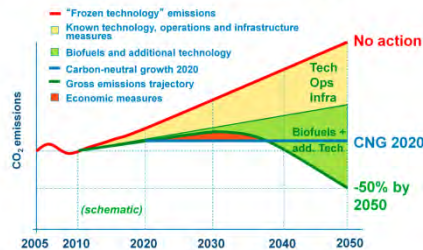


Research is organized into six relevant themes.

3 Mega-Drivers



Emissions reduction roadmap



6 Strategic Research & Technology Thrusts

Safe, Efficient Growth in Global Operations

- Enable full NextGen and develop technologies to substantially reduce aircraft safety risks

Innovation in Commercial Supersonic Aircraft

- Achieve a low-boom standard

Ultra-Efficient Commercial Transports

- Pioneer technologies for big leaps in efficiency and environmental performance

Transition to Low-Carbon Propulsion

- Characterize drop-in alternative fuels and pioneer low-carbon propulsion technology

Real-Time System-Wide Safety Assurance

- Develop tools for use in a prototype of an integrated safety monitoring and assurance system

Assured Autonomy for Aviation Transformation

- Develop high-impact aviation autonomy applications

What vision has NASA set for aviation?

A revolution in sustainable global air mobility.



Transformative

Sustainable

Global

**Safety
NextGen
Efficiency
Environment**



On-Demand

Fast

Intelligent

Low-Carbon









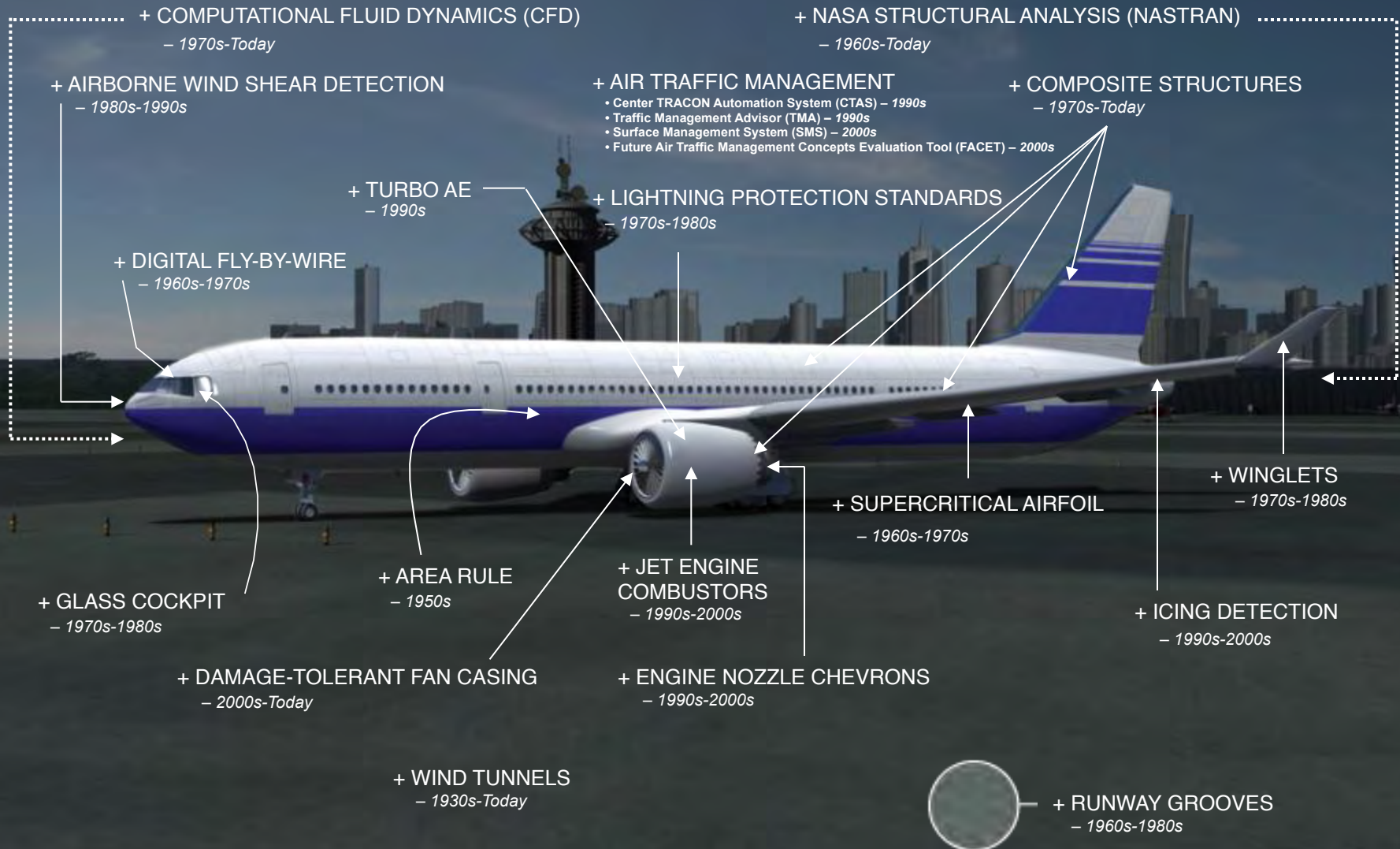


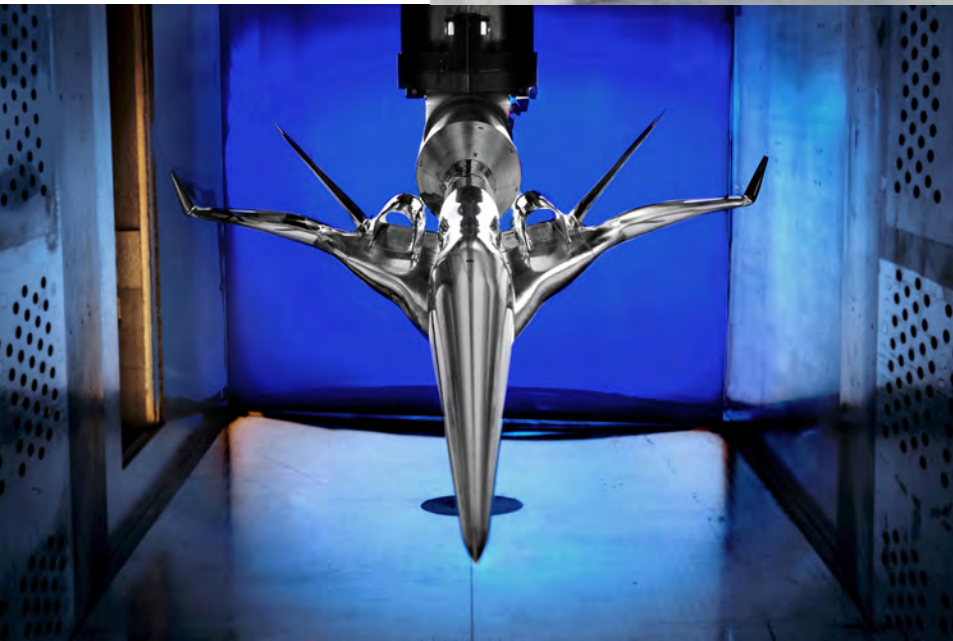


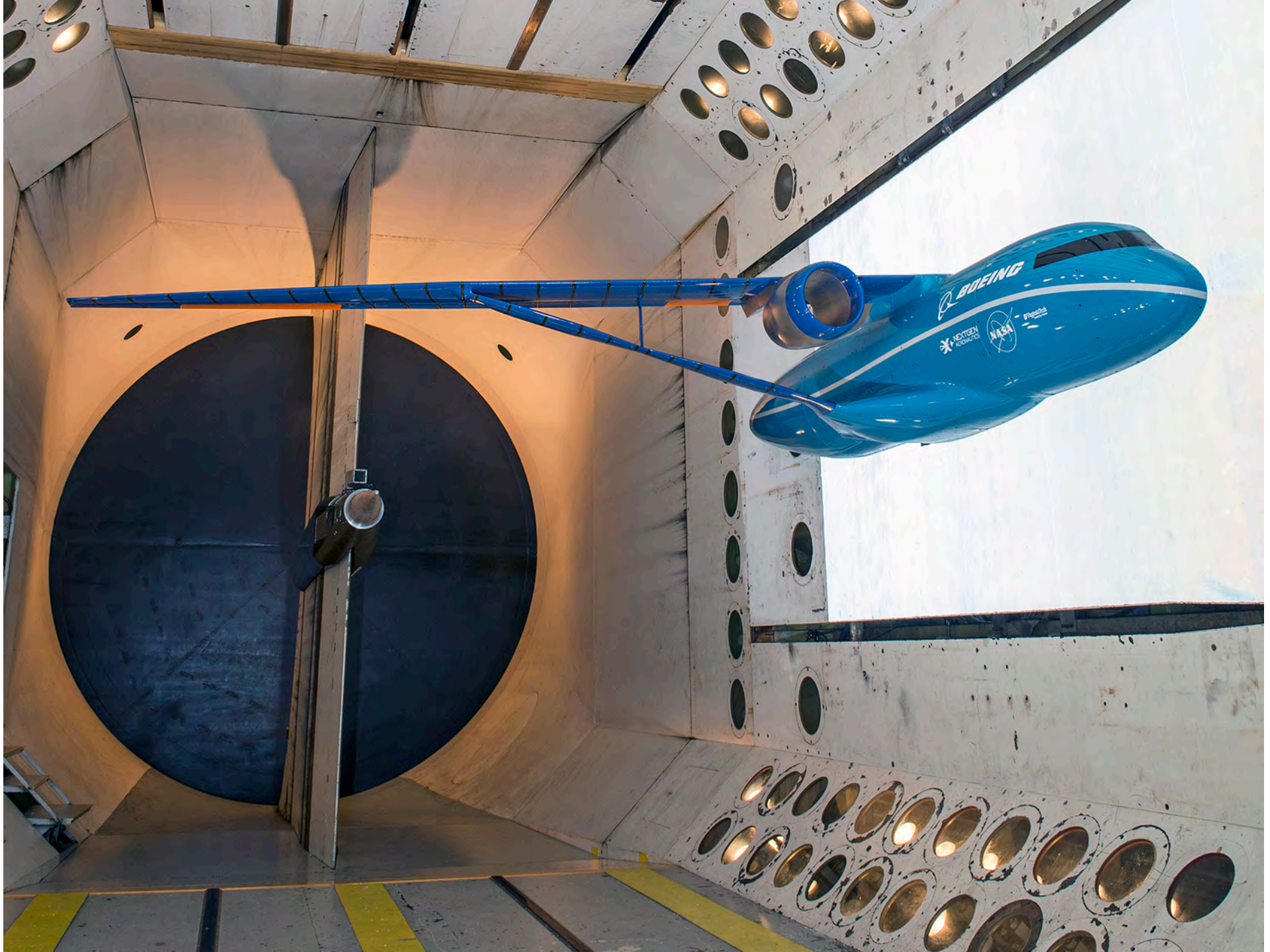
Can NASA make it happen?



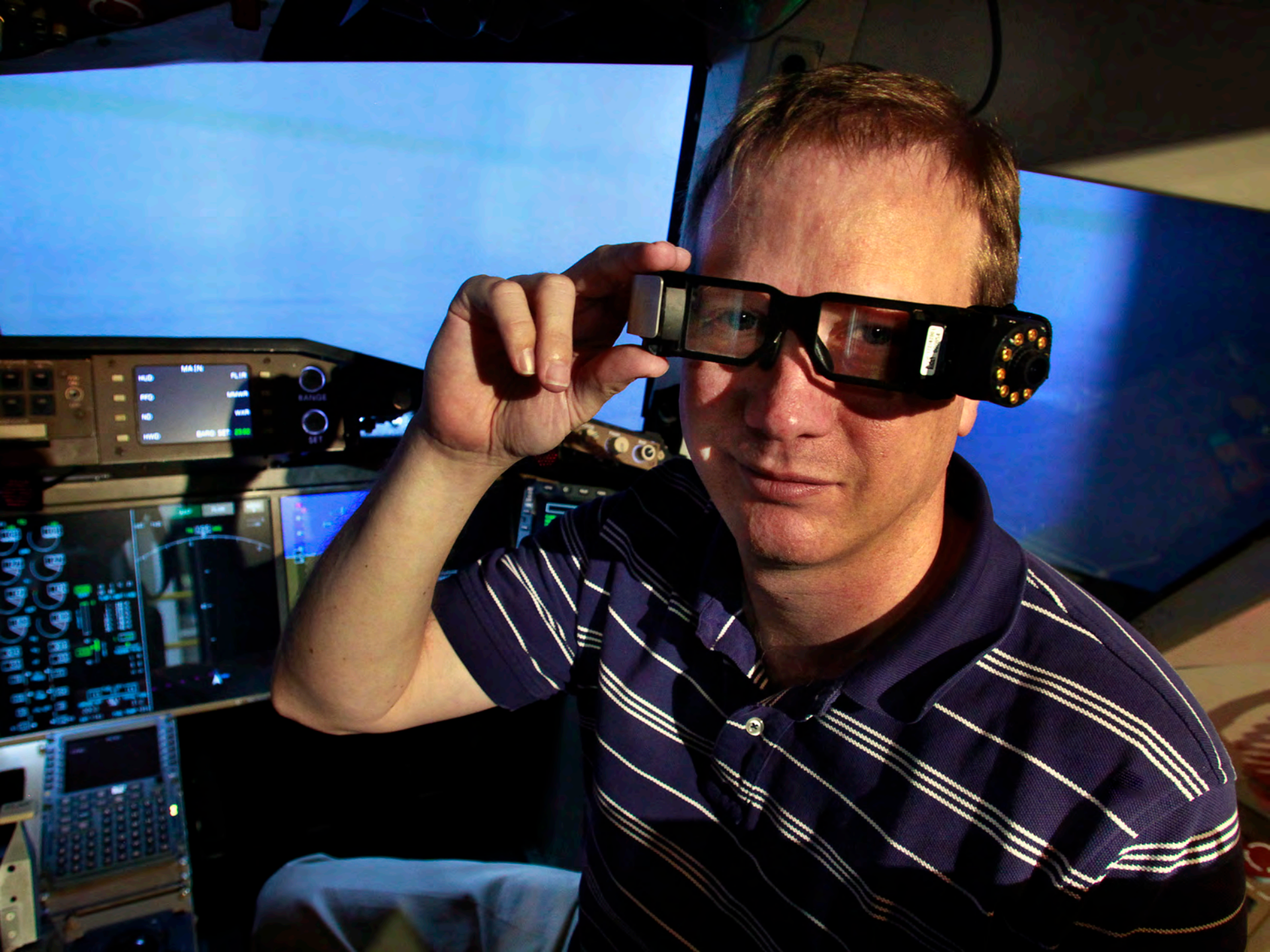
The proof is onboard nearly every commercial aircraft flying today.













Preparing the
Cirrus SR-22 for
testing unmanned
concepts

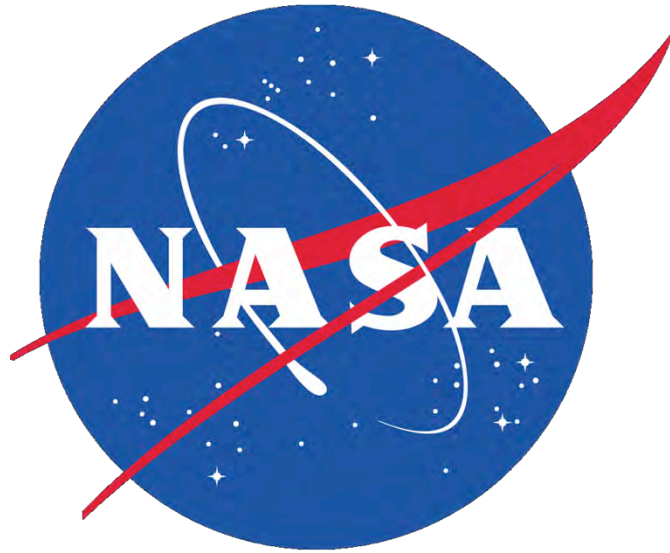




What will the headlines say?

The best news is just on the horizon.





[www. Aeronautics.NASA.gov](http://www.Aeronautics.NASA.gov)

