Welcome to the High Rate Aerostructures Fabrication IACMI Working Group

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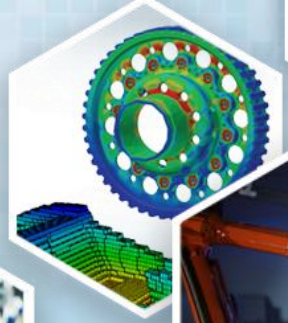
October 8, 2020



Working Group Meeting Rules/Guidelines

- **Format includes an introduction and opening presentation from the meeting leader(s)**
- **All participants will be muted once the presentation starts**
  - Remain on mute unless you wish to speak. You will need to unmute yourselves to speak. Please re-mute yourself after speaking.
  - If you are on the meeting via phone, use *6 to unmute and re-mute
- **The platform allows for live polls**
  - One poll will be for meeting frequency
  - Other polls may be created by the leaders or in live time based on input

Consortium Working Groups

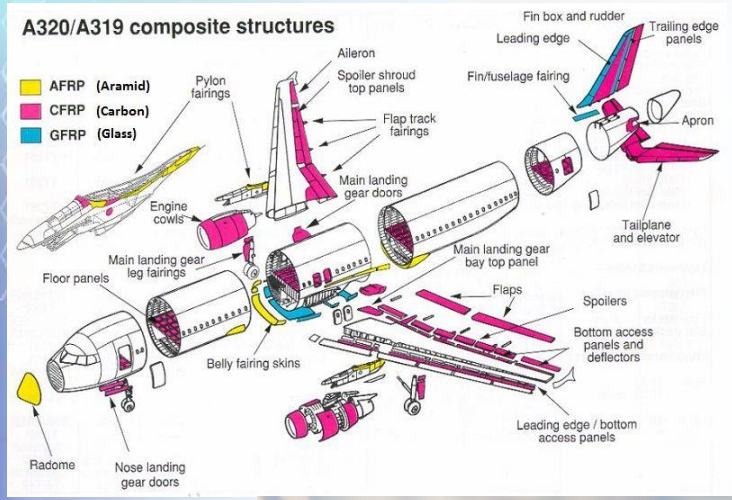
- **Mission – Focus on addressing technoeconomic barriers to mass adoption of composites in partnership with similarly aligned organizations**

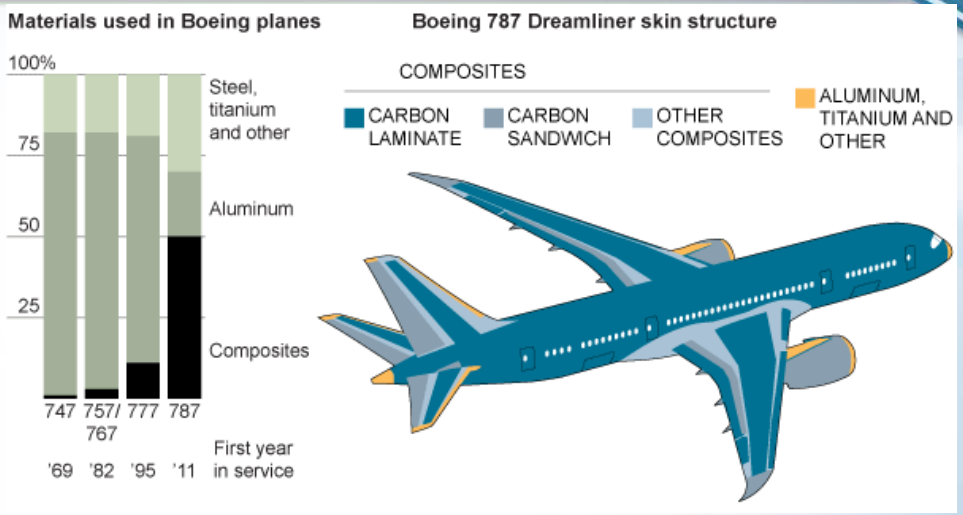
- **Formation**
  - Topic based, ideally formed organically from the membership
  - Members include industry, academic, national laboratory at all levels of consortium
  - Elect chair, meet at least 4x per year, more if desired by group
  - Opportunity to align with external entities (ACMA, ACC, other organizations)

Consortium Working Groups

- **Principal Activities**
  - Identify key technical and cost challenges and possible solutions to those
  - Conduct roadmapping as needed specific to topical market or technology focus
  - Inform funding agencies (DOE, DOD, etc.) of priority R&D needs
  - Propose projects for funding – using working group funds or IACMI pool funding
  - Propose mini-conferences or other activities, possibly with outside entities
  - Report activities and successes at IACMI member meetings and other forums, including trade press and conferences

Emerging Opportunities for Aerostructures





High Rate Aerostructures Fabrication Working Group Scope

- Currently federal and industry partnerships have formed to address broad issues relating to implementation of urban air mobility systems over the next several years.

- Opportunities for high rate manufacturing are projected supporting both commercial single aisle (A320 and 737 series) and urban air mobility aircraft including air-taxi and cargo delivery for short hauls (typically under 100 miles).

- **The IACMI consortium is uniquely positioned to foster technology, workforce, and value chain development supporting high rate, low cost aerostructure manufacturing to meet an anticipated rapidly growing need for both defense and commercial needs**.

High Rate Aerostructures Fabrication Working Group Objectives

- Facilitate communications regarding issues and opportunities
- Maintain a technology development roadmap
- Communicate manufacturing R&D projects for funding opportunities
- Formulate and conduct directed manufacturing R&D
- Support technology transition through conferences and workshops

Advancing Aerial Mobility: A National Blueprint (2020)

The National Academies Press:
PROMOTING U.S. COMPETITIVENESS

…..

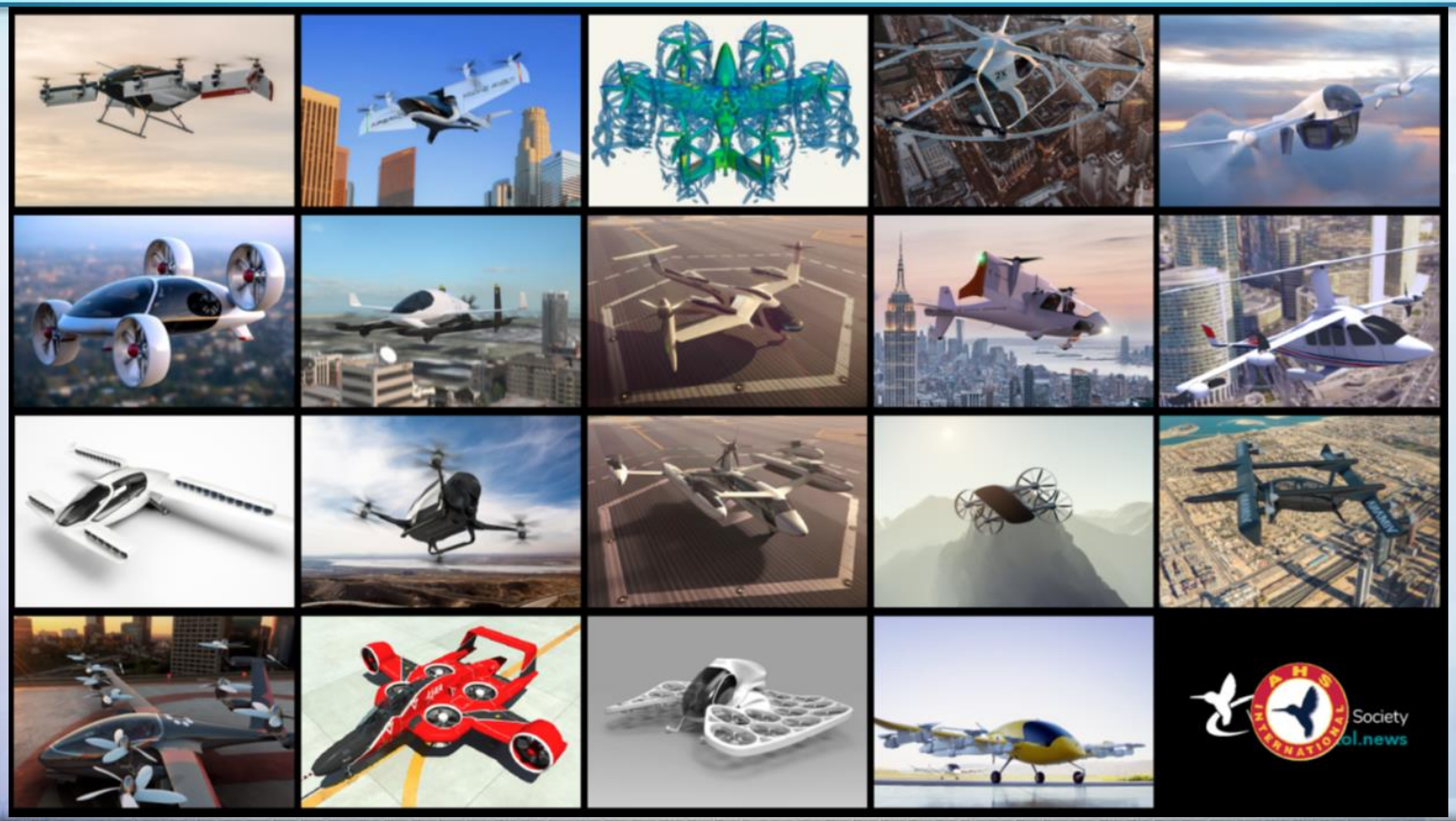
Over the course of this study, it has become clear that the advanced aerial mobility market is poised for massive and rapid evolution and growth over the coming decade and that many other countries are viewing the advanced aerial mobility opportunity space as a potentially transformative societal element and emergent driving force of their economy.

Mastery of advanced aerial mobility, given its wide-ranging impacts on society and the economy, will be one of the highlights of civilization. The size and importance of this vision means that governments are viewing it as strategic and taking various approaches to compete for leadership and prepare for its adoption.

U.S. leadership in advanced aerial mobility is in no way assured, despite our strong legacy in aerospace. The new technologies enabling advanced aerial mobility are widespread across developed and developing countries. Their fundamental nature lowers the barrier to entry, despite the complex systems engineering involved. …

Source: Page 2-13 (http://nap.edu/25646, The National Academies Press)

Uber Elevate –
Fast Forwarding to a Future of On-Demand Urban Air Transportation



Source: Elevate+Whitepaper Oct 27, 2016

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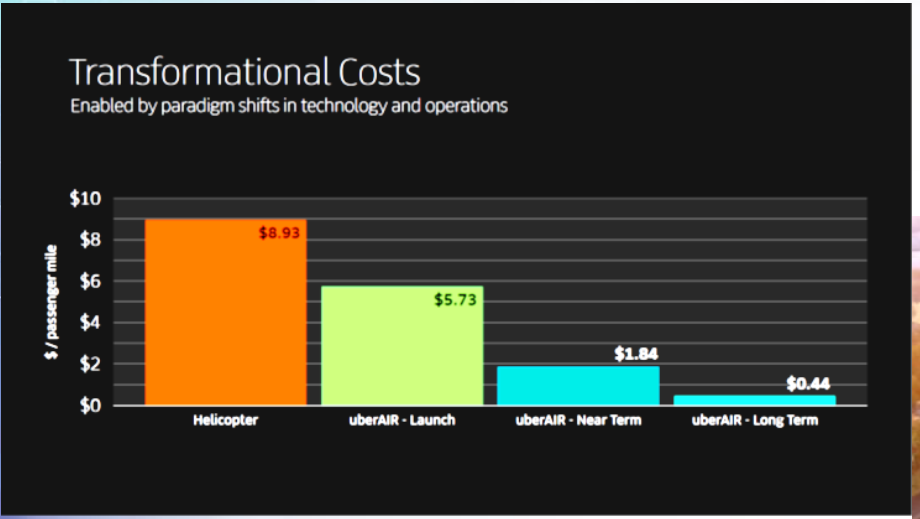
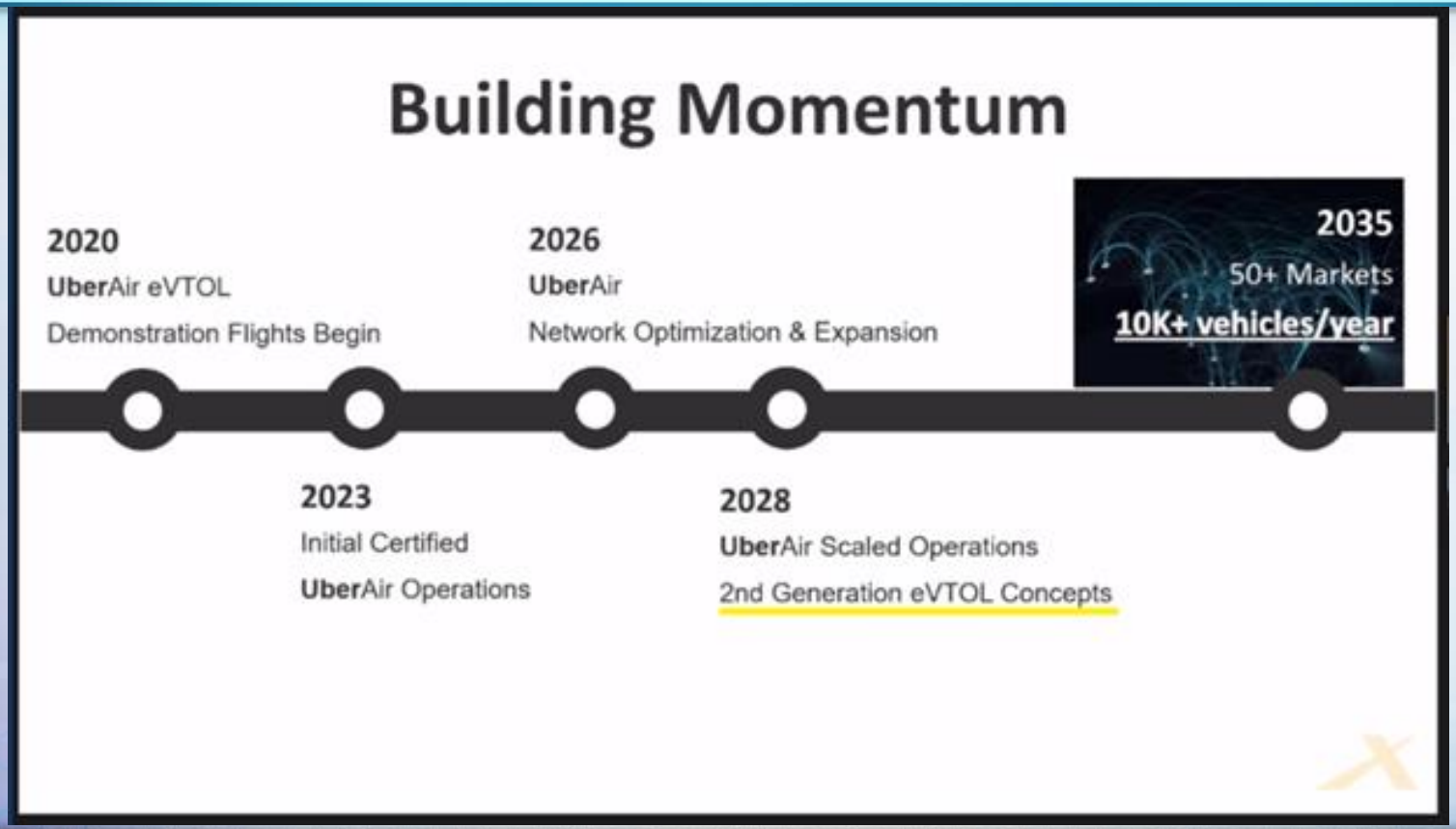


Source: Elevate+Whitepaper Oct 27, 2016

UberAir Timeline



Source: https://www.uber.com/us/en/elevate/uberair/

Air Force AFWERX – AGILITY PRIME

- The Air Force recently launched Agility Prime, a non-traditional program seeking to accelerate the commercial market for advanced air mobility vehicles (i.e., "flying cars").
- Leveraging unique testing resources and revenue generating government use cases for distributed logistics and disaster response, the government plans to mitigate current commercial market and regulatory risks.
- Agility Prime also aims to bring together industry, investor, and government communities to establish safety and security standards while accelerating commercialization of this revolutionary technology.
- The Innovative Capabilities Opening, below, establishes a rapid contracting mechanism beginning in 2020 with a “Race to Certification” series to drive government procurement of operational capability by 2023.

Source: https://agilityprime.com/

NASA – Advanced Air Mobility Supply Chain Working Group

- NASA Aeronautics Research Institute (NARI) is supporting NASA's Advanced Air Mobility (AAM) mission to promote the development of a strong and resilient AAM supply chain that can scale as the market matures.

- NARI and the US Air Force"s Agility Prime initiative are collaborating to better understand and develop the AAM supply chain and are issuing this RFI to gather data for that purpose. The intent is to map and share the current AAM supply chain via an electric platform, model and simulate the network's ability to scale, and ensure that the industry has the human capital to meet future needs. The electronic platform, and modeling and simulation capabilities will also help connect original equipment manufacturers (OEMs) with current and aspiring aerospace suppliers.

- The working group participants will be asked to share their diverse expertise, information, and opinions on these topics. The working groups will be a forum to communicate industry priorities, research and development (R&D) priorities, and share supply chain needs that may enable AAM. Participants will help identify the critical needs related to aircraft subsystems and critical parts, airspace subsystems, infrastructure subsystems, and talent and skills.

Source: https://nari.arc.nasa.gov/aamsupplychain

Polling Questions Begin

Instructions for polling

Open the meeting chat for a SurveyMonkey link.

Click on the link to be taken to a survey and respond accordingly.

We'll share the results after 2-3 minutes and discuss.

Poll – Make up of Work Group Participants (Select One)

A) Aircraft fabricator, OEM

B) Manufacturer of composite structures

C) Manufacturing equipment supplier

D) Materials supplier

E) Engineering and services supplier

F) University

G) Federal or state agency

H) Membership organization, conference, advocacy, etc.

Poll - Meeting Frequency (Select One)

How often should this working group meet?

- A) Quarterly (4x per year)
  - IACMI virtual member meeting - week of February 15, 2021
  - SAMPE Long Beach – May 24-27, 2021
  - IACMI summer meeting Detroit – week of July 19, 2021
  - CAMX Dallas – October 18-21, 2021
- B) Bi-monthly (6x per year)
  - Four meetings above plus two additional meetings
- C) Monthly (12x per year, or 11x if December skipped)
  - Four meetings above plus virtual in other months

Poll – Opportunities and Challenges, (Select Top 3)

A) Structure and process certification and material qualification

B) Developing the value chain

C) Meeting growth projections

D) Develop agile, low cost, manufacturing methods

E) Develop low cost aerospace grade materials

F) Innovation in composite design and FEA

G) Education and workforce development

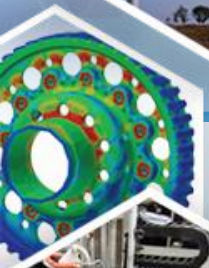
H) R&D funding opportunities

I) Opportunity awareness

Open Discussion

Speed will be the name of the game for the e-VTOL design teams. The ability to design, build and certify a design quickly and then adapt that design to changing market needs will determine the teams success. Teams will need to consider all aspects

- Design simulation
- Material selection and implementation
- Rapid tooling
- Rapid manufacturing process
- Challenges for Certification
- What game changers can the team use



Thank you for attending!!