5th ANNUAL TRANSFORMATIONAL VERTICAL FLIGHT WORKSHOP

PAST WORKSHOPS/ROADMAPPING and Roadmap Working Group Panel Introductions

January 18, 2018

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A community of Aerospace professionals ranging from technologist to business entrepreneurs, recognized that emerging technologies can transform air transportation by enabling new aviation transportation systems that:

- **Provide greater operational flexibility**
- **Improve user convenience**
- **Does not degrade the environment**
- **Enhance air transportation services**

A compelling story is required to engage stakeholder support:

- **It must explain how all the elements necessary to achieve TVF will be addressed:**
  - Definition of Operational Concepts
  - Overcoming Technology Challenges
  - Identification Business Opportunities
  - Managing the Stakeholder Expectations and the Regulatory Environment

A TVF Roadmap can be a valuable tool to tell this story
Elements of a Good Story


Operational Concepts
- Addresses Stakeholders needs
- Identifies market opportunities
- Sets Technology requirements

Missions-Operational Concepts
What capability is being created?

Technical Challenges
How do we get there?

Stakeholder and Regulatory Requirements
Who is impacted?

Market/Business Opportunities
Why do it?

Integrated Roadmap

Technology
- Enables the Operational Concepts
- Establishes market feasibility
- Promotes Stakeholders confidence

Stakeholders
- Drive Operational Concepts
- Judge technology creditability
- Create the markets

Market
- Satisfy Stakeholders needs
- Demand technology performance
- Justify the Operational Concepts

5th Annual Transformative Vertical Flight Workshop
January 18-19, 2018
What is driving TVF?

The convergence of several factors:

- **Emerging Technologies**
  - Automated/Autonomous Systems
  - Electric Propulsion and airframe integration
  - Higher performance electrical energy storage

- **Societal demands**
  - Affordable on-demand air mobility
  - Relief from ground and air traffic congestion

- **Business opportunities**
  - Urban and regional air transportation services
  - Manufacture of new vehicle types and systems

- **Possible relaxation to some operational constraints**
  - Alternatives/better utilization of existing infrastructure
  - Enhanced air traffic management (ATM) systems/practices

Not an exhaustive list.
Summary of AHS/AIAA/SAE/NASA Transformative Vertical Flight (TVF) Workshops

Workshop 1: August 2014 – Arlington, VA
- Identified the existence of a multi-disciplined community interested in TVF
- Established a consensus that further collaborations were warranted
- Resolved to conduct a series of Workshops

Workshop 2: August 2015 – NASA Ames, Moffett Field, CA *
- Assembled a community of interest to advocate for TVF development
- Initiated TVF Roadmap development

Workshop 3: September 2016, – Hartford, CT **
- Inform participants about developments in transformative flight design configurations, operational concepts, technology, market opportunities, and regulatory environment
- Collected participants’ preliminary (un-vetted) suggested activities to serve as a starting point for the TVF Roadmap development

Workshop 4: June 2017, – Denver, CO **
- Formed four mission oriented roadmap development (tele-presentation) Working Groups
- Recruited WG leaders and conducted processes practice sessions

* https://nari.arc.nasa.gov/tvf  ** www.vtol.org/transformative
Roadmap Status

Workshop 3 participants suggested over a hundred activities to start populating a TVF roadmap

Workshop 4 organized the activities into four core mission elements

- Private Recreational Vehicles
- Commercial Intra-city (Short range)
- Commercial Inter-city (Longer range)
- Public Services (Medical, fire, disaster, enforcement)

Working Groups (WG) established for mission elements

- Created 4 virtual online WG’s to operate at a faster cadence
- Currently 42 WG members (seeking more)
- WG website https://nari.arc.nasa.gov/wg/home
Consensus definition/description for Roadmap activities

• Develop concise activity title
• Describe activities and identify dependencies (paragraph)
  - Precursor enabling activities
  - Follow-on efforts dependent on the activity’s success
• Assess the validity of the expected timing

Reconcile the activity definitions across the WG’s

• WG leads serve as inter-group liaison

Provide periodic Roadmap updates to public version

• Expected to evolve, not finalize
Panel Members’ Introductions

Anthony Linn
Private/Recreational Vehicles: Working Group 1

Anubhav Datta, University of Maryland
Commercial Intra-city (Short range): Working Group 2

Yolanka Wulff, Ampaire
Commercial Inter-city (Longer range): Working Group 3

Johnny Doo (JD), International Vehicle Research, Inc.
Public Services: Working Group 4