Agenda Item 2

UMD Unmanned Aircraft System (UAS) Test Site Briefing
**TOPIC:** UMD Unmanned Aircraft System (UAS) Test Site Briefing – Matt Scassaro, Director

**COMMITTEE:** Economic Development and Technology Commercialization

**DATE OF COMMITTEE MEETING:** March 30, 2017

**SUMMARY:** Unmanned and Autonomous Vehicles are becoming more prevalent with applications in a variety of industries, including hazardous environment navigation for DoD and natural disasters, utility repair work, medical supply delivery farming, and more. UMD is on the forefront of working with these technologies. The UAS Test site offers researchers, students, government, and industry access to extensive resources and pools of expertise in every aspect of UAS research.

**ALTERNATIVE(S):** This item is for information purposes.

**FISCAL IMPACT:** This item is for information purposes.

**CHANCELLOR’S RECOMMENDATION:** This item is for information purposes.

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**COMMITTEE RECOMMENDATION:**

**DATE:**

**BOARD ACTION:**

**DATE:**

**SUBMITTED BY:** Tom Sadowski (410) 576-5742 / Suresh Balakrishnan (301) 445-2783
UAS in Maryland

March 30th, 2017

University System of Maryland

UAS TEST SITE
It’s a competition
UAS Research in Maryland

- **Research** is a centerpiece of economic development and a catalyst for both innovation and entrepreneurship
  - Ties directly into USM goals statewide to create companies and jobs
- **UAS** is a new economy on the brink of breakthrough leaps
  - Economic impact of UAS nationally >$82.1B 2015-2025
    - 34,000 manufacturing jobs; total job creation 103,776 by 2025
  - **Maryland** 2015-2025 = $2.017B economic impact, $15.85M in taxes and 2,549 high-paying jobs
- **Challenges** – regulation and technology
  - **Regulation** – Integration into the manned national airspace system – **SB370**, 1 of 2 pro-UAS bills *in the nation*
  - **Technology** – traffic management, sense and avoid, cybersecurity, applications technology
- **UMD UAS Test Site** – nationally recognized UAS research facility
  - **Government**
    - FAA
    - NASA
    - NOAA
    - Navy
    - DHS
    - Local/state public safety
  - **Industry**
    - Lockheed-Martin
    - Google
    - Textron
    - Numerous regional companies
  - **Academia**
    - UMD and other USM institutions
    - Johns Hopkins
    - GWU
    - USNA
UMD UAS Test Site

• Operational flight research site
  – First research flight 05 December 2014
  – UMD airworthiness process
  – Expanded FAA flight authorizations
  – ~30 research projects executing/in development
  – >45 vehicles

• Collaborative effort
  – UMD/academia/government/industry
SMHEC campus

- Buildings I and II
  - Continued SMHEC programs
- Building III
  - USM built, co-use (SMHEC/UMD)
  - Classroom/lab expansion
  - Autonomous technologies research

Possibilities
- Outdoor test track
- Buildings IV, V
Building III - Autonomous Technology Research Center

• Research into **all** domains autonomous technologies
• Attract world-wide talent
  – Partners from academia, industry and government

• Build off of UMD existing capabilities, **partner with Navy**
• Transition from basic to applied research
• Complete 2020
What is it *really* all about?

*Requirements-based UAS R&D*

- What Does FAA **Need** to Support Integration Rulemaking?
- What Does the Industry/Government/Academia Customer **Need**?
- What Does the UAS User Community **Need** to Enable Safe and Cost-Effective Applications?

- **Solve** the challenges
- **Get** and **focus** the resources
Funded projects

- DARPA High-Assurance Cyber Military Systems (HACMS)
- Airport Intrusion Counter-UAS - DHS, CACI
  - *First civil UAS in Class C airspace*, Atlantic City Airport
- Lockheed NEXT – Tiger team of young scientists
- **NOAA GOES-R (plus)** – 5 year project; $750K/annual
- **Navy Tigershark** – Navy and non-Navy
  - Support = $75K/annual; **Flight activity = $1M/annual**
- NSWC Panama City – unmanned surface/subsurface vessels – all domain – resident researchers
- GWU/USNA – at-sea wake measurement
- MD State Police and other public safety
- UMD researchers
  - Agriculture - MNLGA
  - Path planning - NAWCAD
  - Belize – Anthropology – 5 year NSF project
Agriculture / Aquaculture

- Ongoing projects with several customers
- Multi-spectral images/data to impact productivity and environmental aspects
- Partnering with state and county extension offices and UMD AG
Public Safety

- Working with EMS on a variety of applications
- Limited only by imagination
- Great public outreach
- On team with MEMA and MSP to rewrite ESF-9 state SAR manual
  - Include air ops and UAS
UAS Traffic Management System
– Part of six test site national campaign
– First flights 19 April 2016
  • 22 aircraft up nation-wide
  • Additional projects flown at same time
    – Network control of UAS
  – Future tasks to be flown
    • BLOS
    • Network control
    • Cybersecurity
Belize Anthropology Project

– Sean Downey, Anthropology/GIS project looking at foliage, “swidden” and effects on culture
– Flying in Belize over 5 year period, sensitive project
– Just mapped 10,000 acres of rainforest
• Brian Kelley (h/w, Aero) and Ryan Wong (s/w, EE) under Imraan Faruque
• Design, build and fly/swim a UAS/UUV
• Continuing work

AQUA

With

Underwater

Ability

• Weight (including battery): 1226.7g
• Diagonal Size: 50 cm
• Max Flight Time: Approx. 15 minutes
• Radio Frequency: 72MHz
• Full Manual Control—No self-level
• Motors: 1400KV
• Propellers: 8 inch diameter
• Dimensions (cm): 36x36x13
• Battery: 5100mAh, 11.1 V Lithium Polymer
Lifeline across the Bay

• 1st flight of civil/commercial UAS across the Chesapeake
• 1st Cargo/Medical package delivery in Maryland
• Autonomous flight with human-on-the-loop handoff
• Worked with Calvert/Dorchester Counties, UMD Shore Regional Medical Center
Big activities / targets

• Navy
  – Non-program of record Group 1-3
  – Software & algorithms
  – NAWCAD BAA - PIA

• NOAA
  – GOES-R
  – Environmental sensing

• Disaster response / Cargo
  – FEMA/MEMA
  – Medical community

• Technologies
  – BVLOS/BLOS
  – SAA
  – Counter-UAS
  – Payloads/sensors of all types
  – Collaborative control
  – Cargo

• Working with non-air domains
Some of our research partners in government, academia, & industry
takeaways

• Requirement-based R&D
• Strengthening relationships
• Exercising leadership roles
FEARLESS FLIGHT
UAS TEST SITE