



UNIVERSITY CONSORTIUM FOR APPLIED HYPERSONICS



UCAH Structure and Prototype Proposal

Interim Governance Board:

J. Austin, R. Bowersox, G. Candler, E. Corral, W. Harris, A. Karagozian, D. Ranjan,
J. Schmisser, S. Schneider, C. Scott, K. Stephani

TEES:

M. Andrews, L. Akin, M. Avery, R. Bowersox, J. Crawford, K. Gamache, R. Marianno



Texas A&M Engineering
Experiment Station

Acknowledgements



UNIVERSITY CONSORTIUM
FOR APPLIED HYPERSONICS



- The OUSD(R&E) JHTO (Drs. M. Lewis, G. Bussey) is gratefully acknowledged for providing support to TEES to manage and lead the University Consortium for Applied Hypersonics.
- We also gratefully acknowledge the OUSD(R&E) team for continued support and interactions.
- We also gratefully acknowledge the University, Industry, Federal, and National Laboratory ecosystem for the enthusiastic engagement.

Outline



UNIVERSITY CONSORTIUM
FOR APPLIED HYPERSONICS




- Introductory Comments
- Acknowledgements
- UCAH Structure (Bowersox)
 - UCAH Vision and Mission
 - TEES Management Team
 - University Membership
 - Governance Board
 - Industry and Laboratories Advisory Boards and Affiliate Memberships
- Research Engagement (Harris)
- Teaming and Prototype Research Proposal Process (Candler)
- TEES Management (Crawford)
- Review Membership and Schedule of Events (Bowersox)
- Workforce Development (Marren)
- Project Solicitations (Marren)

UCAH Vision and Mission



UNIVERSITY CONSORTIUM
FOR APPLIED HYPERSONICS



- **Vision.** UCAH is envisioned as an inclusive, collaborative network of universities working with government, industry, national laboratories, federally funded research centers, and existing university affiliated research centers.
- 
- The image shows the X-51 hypersonic missile in flight, ascending steeply against a clear blue sky. The missile is white with a black nose cone and a black tail section. A bright orange and yellow flame trail is visible behind the missile, indicating its high-speed propulsion. The text 'X-51' is visible on the side of the missile.
- **Mission.** Serve the U.S. Department of Defense (DOD) requirements in science and technology, workforce development, and technology transition by mobilizing and leveraging the academic community and its partners to deliver time-sensitive basic and applied solutions to the DOD-defined research and prototype projects
 - Core, next-generation (enabling technologies), and challenge (multidisciplinary efforts) projects
 - **Demand Signal.** Answering the Joint Hypersonics Transition Office call.



UNIVERSITY CONSORTIUM FOR APPLIED HYPERSONICS



Structure and Processes

R. Bowersox



Texas A&M Engineering
Experiment Station

UCAH Structure



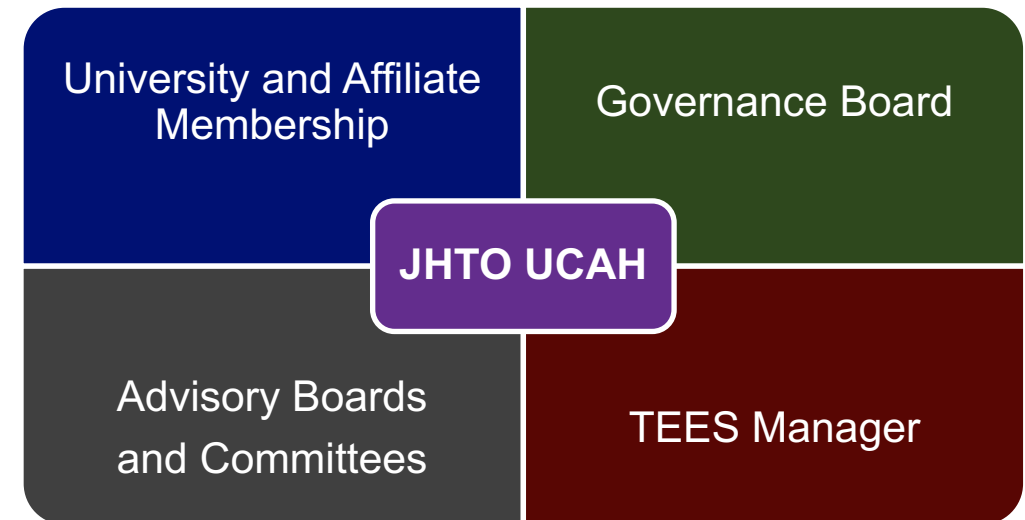
UNIVERSITY CONSORTIUM
FOR APPLIED HYPERSONICS



“The University Consortium for Applied Hypersonics at Texas A&M is an extension of the JHTO” – *G. Bussey*

Opportunities:

- *Expand Capability through Inclusion*
- *Serve to Advance National Defense Efforts*
- *Build the future (Workforce and Technology)*
- Key elements
 - Membership (University and Affiliate)
 - Governance Board
 - Industrial Advisory and Laboratories Advisory Boards
 - TEES Management



TEES Management



UNIVERSITY CONSORTIUM
FOR APPLIED HYPERSONICS



- Texas A&M Engineering Experiment Station (TEES) is serving as the consortium manager
 - Not-for-profit state agency that also serves as the research arm of Texas A&M University Engineering.
 - Experience, established operating procedures, a highly trained staff, and logistical infrastructure to manage UCAH Operations.
 - TEES mission is anchored in (1) research, (2) education and workforce development, and (3) technology transfer and commercialization.

Key Points of Contact:

R. Bowersox, UCAH Project Lead
J. Crawford, UCAH Project Financial Lead
R. Marianno, Acting UCAH Project Director
<https://hypersonics.tamu.edu>
ucah@tamu.edu

TEES Operations

Contracts and Fiscal Operations
Project Management
Ethics & Compliance
Research Development
Information Technology
Marketing and Communications
Workforce Development
Nationally renowned security office



Governance Board



UNIVERSITY CONSORTIUM
FOR APPLIED HYPERSONICS



- The mission of the governance board (GB) is to provide the leadership to achieve JHTO goals and the UCAH mission.
- The GB will ensure the following:
 - Ensure fair and equitable member representation
 - Maintain equitable By-laws for Consortium members
 - Make recommendations to the government regarding Consortium operations to include issues related to governance, research, and membership.
 - Provide technical support for OUSD JHTO S&T Roadmap review/refinement and research project impact review.
- The UCAH Director will serve for a single term of two years.
- Director responsibilities include:
 - Develop internal governing processes and procedures (with the GB)
 - Develop and manage GB Agenda and convening of the GB
 - Report GB Activities



Interim GB



UNIVERSITY CONSORTIUM
FOR APPLIED HYPERSONICS



Governance Board (GB)/Interim GB.

Consortium Engagement Board

Director, R. Bowersox (TAMU)

Co-Director, J. Austin (Caltech)

Co-Director, G. Candler (UMN)

Co-Director, E. Corral (UA)

Co-Director, W. Harris (MIT)

Co-Director, J. Schmisser (UTSI)

Co-Director, C. Scott (Morgan St)

Co-Director, K. Stephani (UIUC)

Technical Advisory Board

A. Karagozian (UCLA), D. Ranjan (GT),

S. Schneider (Purdue), ...

TEES Ex Officio

The interim GB (IGB) was assembled by the UCAH proposal team to establish the consortium. TEES will coordinate IGB/GB activities and provide logistical support.

JHTO, Governance Board, and TEES

Membership
Recruitment
Committee

Federal and
National Lab
Ad. Board

Industrial
Advisory
Board

Research
Engagement
Committee

Leverage university and affiliate membership to establish teaming and impact committees

Technical
Area
Leads

Cross
Functional
Leads

Technology
Transition
Committee

Outreach &
Workforce
Committee

Annual GB Elections. 50% each year.

University Membership



UNIVERSITY CONSORTIUM
FOR APPLIED HYPERSONICS



- **Goal.** Collaborative network of universities, government, industry, national laboratories, federally funded research centers, and university affiliated research centers.
- **University Membership.** Consortium Membership Agreements are required to participate in the JHTO sponsored projects:
 - 43 universities (24 states and three countries), with ~600 researchers, have expressed interest in joining the consortium
 - There is no financial cost to be a member
 - All faculty are required to be represented on the CMA
 - TEES Membership POC: R. Bowersox (ucah@tamu.edu)
- **Process.** Membership Agreements are in-progress
 - Will likely require a few months
 - TEES POC for questions: Mr. Mark Andrews (ucah@tamu.edu)



- Help shape the national hypersonics S&T roadmap
- Respond to DoD research needs via JHTO projects
- Develop (and recruit) new talent to the hypersonics ecosystem

Industrial and Laboratories Engagement



UNIVERSITY CONSORTIUM
FOR APPLIED HYPERSONICS



- **Advisory Boards.** Industry and laboratories engagement in advisory board roles is encouraged
 - TEES Industry POC: Dr. Y. Elabd (ucah-IAB@tamu.edu)
 - TEES Federal / National Labs / FFRDC / UARC POC: Dr. Diane Hurtado (ucah-FNLAB@tamu.edu)
- **Affiliate Membership.** Affiliate Members Agreements are required for industry, national labs, FFRDCs, and UARCs participation.
 - 30-40 Companies/Laboratories (>200 contacts) have expressed interest in joining the consortium.
 - Industry, national labs, FFRDCs, and UARCs can participate in projections as subcontractors to a university member
 - There is no financial cost to be a member
- **Process.** Membership Agreements are in-progress
 - TEES POC for questions: Mr. Mark Andrews (ucah@tamu.edu)

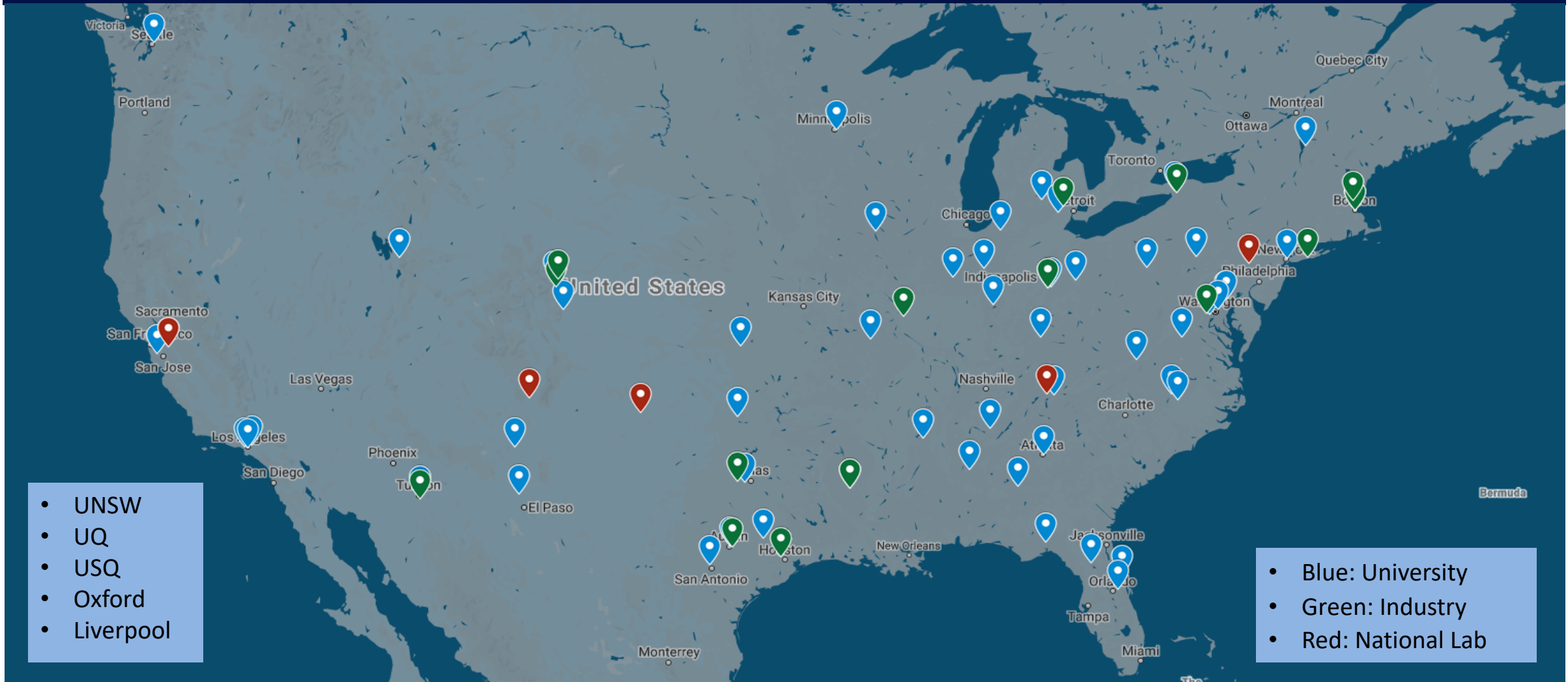


- Partner with university researchers on JHTO Projects
- Provide workforce need guidance
- Provide guidance on technology transition and proprietary collaborations

National Representation Based on Interest Letters and Interactions



UNIVERSITY CONSORTIUM
FOR APPLIED HYPERSONICS





UNIVERSITY CONSORTIUM FOR APPLIED HYPERSONICS



Research Engagement

Dr. Wesley Harris
Massachusetts Institute of Technology



Texas A&M Engineering
Experiment Station

Research Engagement



UNIVERSITY CONSORTIUM
FOR APPLIED HYPERSONICS



Research Engagement Committee: Bowersox, Candler, and Harris.

Task: Leverage university membership Technical Area and Cross-functional task force leads to create a connected ecosystem.

- Leverage extensive hypersonics experience across academia, industry, national labs, DoD, and NASA to develop methods to facilitate interdisciplinary applied research solutions, workforce, and technology transitions.

Consortium Interest:

- 43 Universities (>600 Faculty)
- 30-40 Industry/Nat Lab Affiliates (>200 personnel)

GB, Technical Area and Cross Functional Leadership teams include 19 Universities (18 states):

(Caltech, GT, MIT, Morgan St, OSU, Purdue, TAMU, UA, UAH, UCLA, UCo, UIUC, UK, UMich, UMN, USAFA, UT, UTSI, WSU)

UNIVERSITY CONSORTIUM FOR APPLIED HYPERSONICS

Headquarters

Joint Hypersonics
Transition Office

Governance Board
TEES-UCAH Office

Industrial
Advisory
Board

Fed / Nat.
Lab Advisory
Board

University and Affiliate Membership

TA1
Materials,
Structures &
Thermal Protection

TA2
GNC, Artificial
Intelligence, Machine
Learning, Sensors

TA3
Hypersonic
Airbreathing
Propulsion

TA4
Hypersonic
Environments
& Phenomenology

TA5
Applied
Aerodynamics &
Hypersonic Systems

TA6
Lethality, Energetics
& Ordnance Systems

CFT1
Physical
Information &
Basic Sciences

CFT2
Advanced
Projects and
Prototypes

CFT3
Systems
Engr., Test
& Evaluation

CFT4
Manufacturing

CFT5
Workforce
Development

Applied Hypersonic S&T Solutions, Workforce, Accelerated Transitioning

- 6.2 – 6.3 Research/Prototyping Results, Components & Systems, and Test
- Highly educated and clearable workforce
- Transition Promising Consortium Technology Products to U.S. Gov't & Industry




Research Engagement



UNIVERSITY CONSORTIUM
FOR APPLIED HYPERSONICS



Task: Collect quad charts of expertise, facilities, computational methods, and tools.

University Consortium for Applied Hypersonics Participant Statement of Capabilities and Expertise		Name																					
		Affiliation																					
<p>What & Why</p> <p>Briefly describe your research and how it would contribute to: (a) national RDT&E efforts on applied hypersonics; and (b) Consortium Technology Areas (TAs) and/or Cross-Cutting Areas (CCAs) of specific interest to you (see list at the slide bottom).</p> <p>Consider including specific reference to not only basic and/or applied research but also pathways to advanced development, systems engineering and integration, and technology maturation and transitioning, when appropriate.</p>	<p>Visuals</p> <p>Add a graphic or image that is representative of your research or capabilities.</p> 																						
<p>Resources & Capabilities</p> <ul style="list-style-type: none"> List any specific capabilities or resources you propose to allocate to your efforts on the TAs and/or CCAs of interest to you. These capabilities may include but are not limited to: experimental facilities; computational and data sciences (e.g., hardware, codes, algorithms, AI); ground test equipment; wind tunnels and diagnostics; and flight test resources. 	<p>Additional Contributions to Consortium Missions</p> <p>This consortium is a multifaceted endeavor intended to not only advance the boundaries of applied hypersonics science and technology, but to strengthen the nation through collaboration, outreach, education, and workforce development. Please briefly describe here any specific ideas you have for:</p> <ul style="list-style-type: none"> - Collaborating with consortium colleagues within and outside your university; - Strengthening and expanding the U.S. hypersonics workforce; - Educational initiatives for: (a) university students; and (b) the broader hypersonics community (e.g., short courses for Government and industry personnel). 																						
<p>Technical Area (TA):</p> <table border="0"> <tr> <td>TA1</td><td><input type="checkbox"/></td> <td>TA2</td><td><input type="checkbox"/></td> <td>TA3</td><td><input type="checkbox"/></td> <td>TA4</td><td><input type="checkbox"/></td> <td>TA5</td><td><input type="checkbox"/></td> <td>TA6</td><td><input type="checkbox"/></td> </tr> </table> <p>Cross-Functional Teams :</p> <table border="0"> <tr> <td>CFT1</td><td><input type="checkbox"/></td> <td>CFT2</td><td><input type="checkbox"/></td> <td>CFT3</td><td><input type="checkbox"/></td> <td>CFT4</td><td><input type="checkbox"/></td> <td>CFT5</td><td><input type="checkbox"/></td> </tr> </table>	TA1	<input type="checkbox"/>	TA2	<input type="checkbox"/>	TA3	<input type="checkbox"/>	TA4	<input type="checkbox"/>	TA5	<input type="checkbox"/>	TA6	<input type="checkbox"/>	CFT1	<input type="checkbox"/>	CFT2	<input type="checkbox"/>	CFT3	<input type="checkbox"/>	CFT4	<input type="checkbox"/>	CFT5	<input type="checkbox"/>	<p>TA1: Materials, Structures, & Thermal Protection Systems • TA2: Guidance, Navigation, & Control (GNC) • TA3: Air-Breathing Propulsion • TA4: Hypersonic Environments & Phenomenology • TA5: Applied Aerodynamics/Hypersonic Systems • TA6: Lethality & Energetics</p> <p>CFT1: Physical, Information & Design Sciences • CFT2: Advanced Projects & Prototypes • CFT3: Systems Engineering, Test & Evaluation • CFT4: Manufacturability • CFT5: Outreach & Workforce Development</p>
TA1	<input type="checkbox"/>	TA2	<input type="checkbox"/>	TA3	<input type="checkbox"/>	TA4	<input type="checkbox"/>	TA5	<input type="checkbox"/>	TA6	<input type="checkbox"/>												
CFT1	<input type="checkbox"/>	CFT2	<input type="checkbox"/>	CFT3	<input type="checkbox"/>	CFT4	<input type="checkbox"/>	CFT5	<input type="checkbox"/>														

Research Engagement

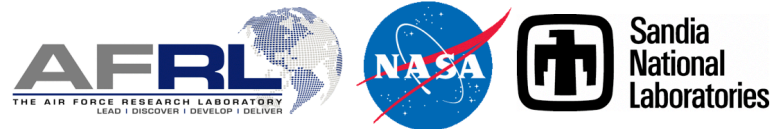


UNIVERSITY CONSORTIUM
FOR APPLIED HYPERSONICS



Task: Coordinate research priorities with JHTO S&T Roadmapping

- Create an updated and expanded national hypersonics foundational research roadmap
- Disseminate JHTO priorities to inform UCAH membership



JHTO Partner

NHFRP Review

July 21, 2011

POCs
Air Force O
Dr. James Pitt
NASA
Sa



Key Points of Contact:

W. Harris

G. Candler

R. Bowersox

<https://hypersonics.tamu.edu>

Ucah-TA@tamu.edu





UNIVERSITY CONSORTIUM FOR APPLIED HYPERSONICS



Dr. Graham Candler
University of Minnesota



Texas A&M Engineering
Experiment Station

Cross-Functional Teams



UNIVERSITY CONSORTIUM
FOR APPLIED HYPERSONICS



- Hypersonics is highly multi-disciplinary
 - Hypersonic aero is a relatively well-established field
 - Other areas are not: expand into other areas, introduce to 6.2+
- Coordinate across technical areas
 - Bridge between fields, break the language barrier
 - Make connections between UCAH researchers
- Communicate between UCAH, JHTO, industry, labs
 - Problems that need to be solved beyond basic research
 - Capabilities and interests of UCAH



Texas A&M Engineering
Experiment Station

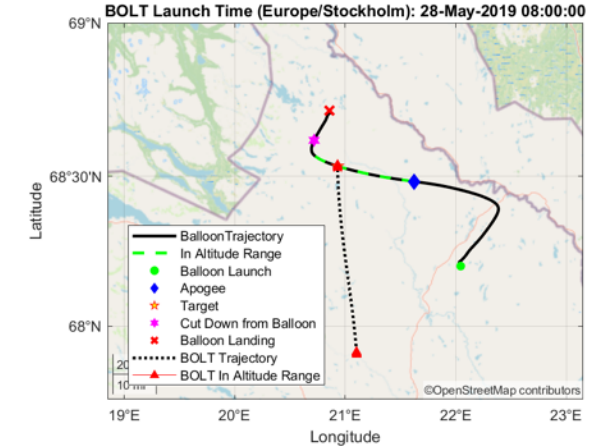
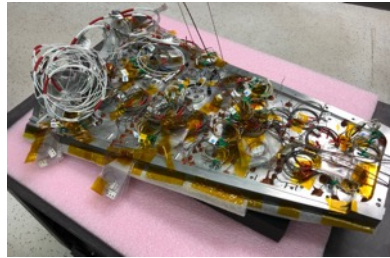
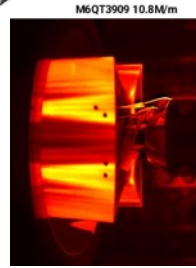
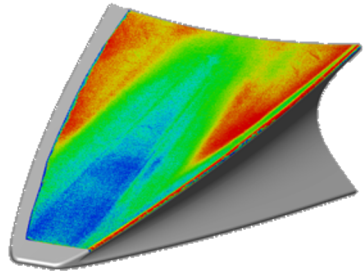
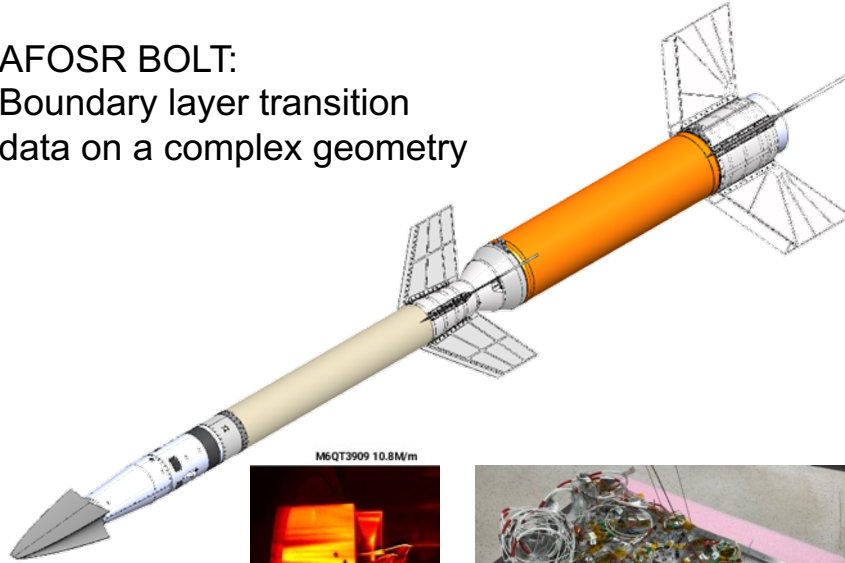
Teaming Example: BOLT



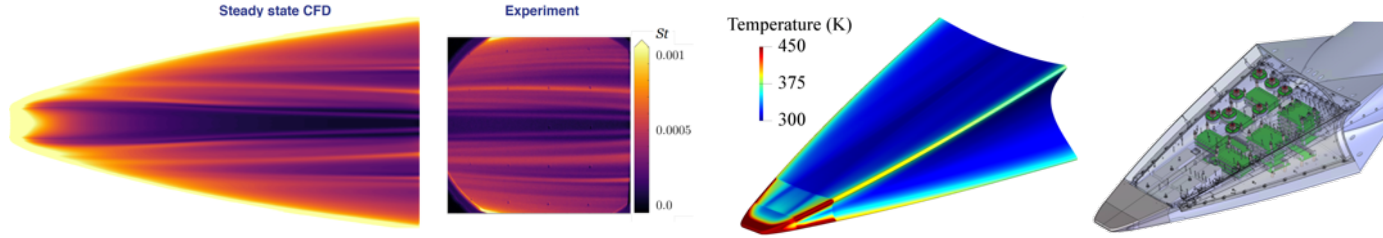
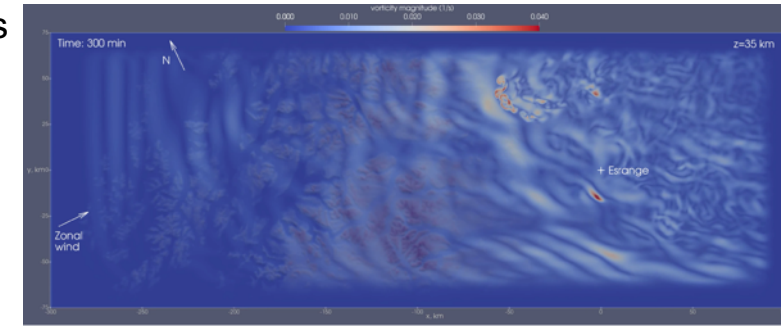
UNIVERSITY CONSORTIUM
FOR APPLIED HYPERSONICS



AFOSR BOLT:
Boundary layer transition
data on a complex geometry



AFOSR MURI:
In-situ measurements
of the atmosphere at
Esrange, Sweden



Integrated Remote and In Situ Sensing (IRISS) UNIVERSITY OF COLORADO BOULDER
EMBRY-RIDDLE Aeronautical University DAYTONA BEACH, FLORIDA



Texas A&M Engineering
Experiment Station

Challenge Projects



UNIVERSITY CONSORTIUM
FOR APPLIED HYPERSONICS



- Next Generation and Challenge Projects:
 - Will require significant teaming across UCAH
 - Potentially beyond the scale of BOLT
 - Address multi-disciplinary challenges
 - Non-traditional fields to advance applied hypersonics
- Many challenging issues to be addressed at 6.2+
 - Equally or more difficult than basic research
 - Potential for basic research to have an impact on real problems
- Ideas? Contact me at: UCAH-CFT@tamu.edu



Texas A&M Engineering
Experiment Station

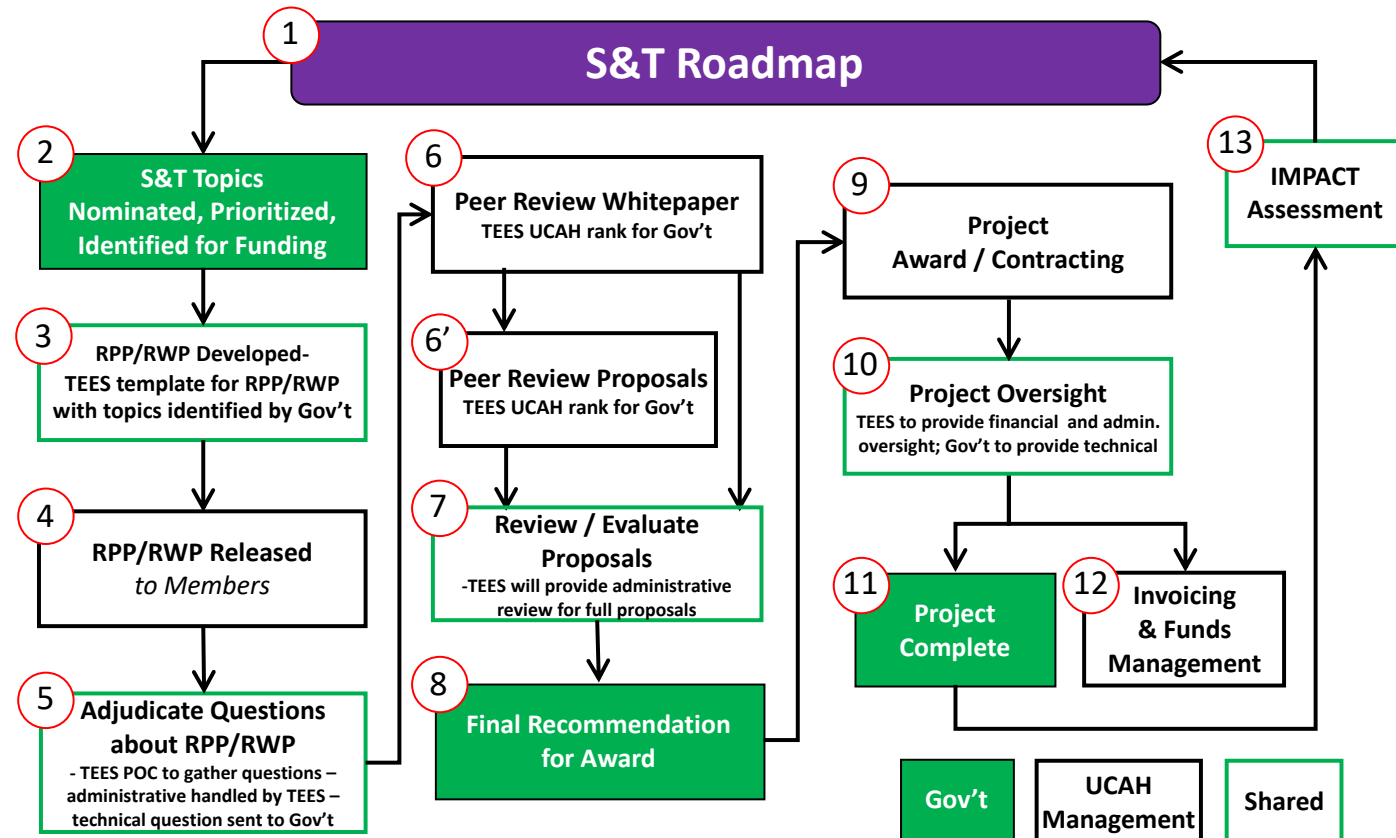
Prototype Research Proposal Process



UNIVERSITY CONSORTIUM
FOR APPLIED HYPERSONICS



- Fairness in proposal evaluation
 - Government makes the decisions
- Avoid conflicts of interest
 - TEES manages the process and interfaces with the government
- UCAH engagement in process
 - Peer reviews and assessment



Texas A&M Engineering
Experiment Station



UNIVERSITY CONSORTIUM FOR APPLIED HYPERSONICS



TEES Management

Mr. John Crawford
TEES Chief Financial Officer



Texas A&M Engineering
Experiment Station

Management Team



UNIVERSITY CONSORTIUM
FOR APPLIED HYPERSONICS



- TEES Consortium Management Team
 - TEES CFO – John Crawford
 - TEES Consortia Operations – Rebecca Marianno
 - TEES Contracting Office – Mark Andrews
 - TEES Ethics and Compliance Office – Lisa Akin
 - TEES Fiscal – Andy Hinton
 - TEES Communications – Marilyn Martell
 - TEES Events – Dedra Nevill
 - TAMUS Security Office – Kevin Gamache
- Questions? ucah@tamu.edu



- Consortium Membership Agreements (CMA's)
 - Each participant must complete “Request for Participation” in consortium
 - https://it-lf-ecmf2.ads.tamu.edu/Forms/UCAH_Consortium_Member_Appln
 - RWP Questions and Answers
- Prepping for 1st Round of Proposal Submissions and Awards
 - Setting up each member institution’s University Authorized Organizational Representative (AOR) Account
 - Send to UCAH@tamu.edu – name, email, university name, title, phone #



- TEES Consortium Program Coordinators
 - Each member institution will be assigned one
 - Member point of contact for proposal submission and post-award management
 - Assist member in ensuring proposal guidelines are followed
 - Assist member with meeting award deliverables and reporting requirements
 - Assist member with transfer of awarded project funding

Contracting Process



UNIVERSITY CONSORTIUM
FOR APPLIED HYPERSONICS



- Currently working on membership agreements w/ university members
 - Flow through terms and conditions from the consortium OTA
- Will begin working with industry partners and other non-university entities on Affiliate Agreements
- Project sub-agreements for awarded projects
 - Funding based on project milestones
- Non-disclosure agreements (NDA's)
- NDA and conflict of interest (COI) certification for white paper/proposal reviewers



UNIVERSITY CONSORTIUM FOR APPLIED HYPERSONICS



Schedule of Events

Dr. Rodney Bowersox
Texas A&M University



Texas A&M Engineering
Experiment Station

Schedule of Events



UNIVERSITY CONSORTIUM
FOR APPLIED HYPERSONICS



- **Industry Days** will be held to facilitate communication between consortium members, industry, national labs and the government.
 - We anticipate 2 consortium industry days per year
- **Project Industry Days** will be held to facilitate communication between consortium members, industry, national labs and the government.
 - After the first year, we will engage the IAB and FNLAB to coordinate Project Industry Days to be hosted by industry and/or national labs.
- **Career and Internship Fairs** will be held to support workforce development for students and faculty from consortium member universities, industry, national laboratories and the government.
- **Program Reviews** will be held once a year for sponsored projects to report out on research progress.

Dates will be posted on the website

A screenshot of the website for the University Consortium for Applied Hypersonics. The page features a dark blue header with navigation links: ABOUT US, MEMBERSHIP, EMPLOYMENT, CONTACT US, and NEWS. Below the header is a section titled 'Upcoming Events'. A search bar with the placeholder text 'Keyword' and a 'FIND EVENTS' button is visible. The main content area displays an event for 'December 2020'. The event title is 'University Consortium for Applied Hypersonics Industry Day', with the date and time 'December 2 @ 12:00 pm - 4:00 pm'. The description reads: 'Please join us for the inaugural University Consortium for Applied Hypersonics Industry Day to be held virtually on Wednesday, December 2, 2020, from noon until 4:00 p.m. CT. The consortium was developed to promote collaborative, cross-disciplinary research into hypersonic-related problems, to help transition ready technologies to operational capabilities, and to enhance development of the nation's hypersonics workforce.' A link 'Find out more »' is provided at the bottom of the event listing.

Planned RPP Announcement



UNIVERSITY CONSORTIUM
FOR APPLIED HYPERSONICS



- FY21: TEES/JHTO-RPP-2020-001 (Current)
- FY21: TEES/JHTO-RPP-2021-001 (Spring 2021)
- FY22: TEES/JHTO-RPP-2021-002 (Fall 2021)
- FY23: TEES/JHTO-RPP-2022-001 (Fall 2022)
- FY24: TEES/JHTO-RPP-2023-001 (Fall 2023)
- FY25: TEES/JHTO-RPP-2024-001 (Fall 2024)



UNIVERSITY CONSORTIUM
FOR APPLIED HYPERSONICS

TEES/JHTO- RPP-2020-001

University Consortium for Applied Hyperersonics:

PROJECT CALL

RWP/RPP NUMBERS: TEES/JHTO-RPP-2020-001

Project Call Release Date	November 17, 2020
RWP/RPP Questions Cutoff	December 2, 2020
Phase 1: White Paper Submission Deadline	December 14, 2020 (5:00 PM CST)
Notification of White Paper Evaluations	January 18, 2021
Phase 2: Prototype Proposal Submission Deadline	February 22, 2021 (5:00 PM CST)
Award Notifications	March 29, 2021
Projected Project Start Date	August 1, 2021
Period of Performance	Up to 3 Years
Funding Award Ceiling	Up to \$500,000 / year



Texas A&M Engineering
Experiment Station



- Outreach and Workforce Development Committee (D. Marren, J. Schmisser, C. Scott)
 - TEES POC: Dr. Cindy Lawley, Assistant Vice Chancellor for Academic and Outreach Programs, Assistant Agency Director for Workforce Development, TEES (ucah@tamu.edu)
- Our approach includes deliberate recruitment and outreach, new educational initiatives in hypersonics, and determined outreach.
 - Develop an Outreach and Workforce Development Plan
 - Annual survey and report on workforce needs and internship opportunities, within industry, the National Laboratories, and DoD
 - Establish biennial career and internship fair
 - Post internship and employment opportunities on UCAH website (at no cost)
 - **Send us your advertisements**

UTSI faculty teaching a hypersonics course to 300 LM engineers (2019)



Curricula Development for a Robust Hypersonic Workforce



UNIVERSITY CONSORTIUM
FOR APPLIED HYPERSONICS



JHTO 2020 New Start (J. Schmisser, UTSI)



4 Core Objectives:

1. **Coordinate a multi-disciplinary M.S. curriculum** emphasizing the six critical technical areas
2. Organize and possibly expand existing **short courses and certificate programs**
3. Organize and expand **educational material and internship opportunities for undergraduate students**
4. Examine the current **policies and environment** that influence the hypersonic WD pipeline

We need your help!

3 Surveys will be released via the UCAH website in early 2021:

- *Stakeholders*
- *Students & Recent Grads*
- *Academic Partners*

Capturing the great ideas that already exist in the community will ensure we deliver the best future workforce possible

- *We welcome your input!*



UNIVERSITY CONSORTIUM FOR APPLIED HYPERSONICS



Mr. Dan Marren
TRMC and JHTO



Texas A&M Engineering
Experiment Station