University Consortium for Applied Hypersonics

Workforce Development

This Briefing is UNCLASSIFIED

Dan E Marren
Support Contractor, OUSD TRMC & JHTO
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Vision

• **JHTO WFD Mission:** Attract, develop, and maintain a skilled technical workforce to support DoD Hypersonics
  - Attract STEM students into hypersonic-related fields
  - Develop a clearable, knowledgeable workforce
  - Maintain an agile and adaptive workforce
Backdrop

• The DoD is reaching forward to develop solutions to warfighting challenges using vehicle configurations relying on advanced hypersonic technologies.

• Requires a more sophisticated approach to design, evaluation and development than their high-speed predecessors.
  - Science-based, physics-rich tools become commonplace in development
  - Evaluation becomes seamless and representative
  - Industry and Manufacturing are adept and nimble to react to changing missions
Hypersonic Strategic Vision

Knowledge capable of evaluating tomorrows realization of today's hypersonic demonstrators, the ability to prosecute future missions through Infrastructure, skills and methods.

Today

Prepare Infrastructure

- Replication (Comprehension of Physics)
- Manufacturing (Rapid Prototype)
- Information (synthesis of data)

- Techniques (Global, non-intrusive)
- Use of Models (S&T, RDT&E, Industry)
- Relationships

- Systems that mature 60-70’s technology
- Hard models, discreet instruments, environments close to flight replication

Prepare Skills and Tools

- Restore systems and hone technical skills to lead change
- Improve Skills and Methods to Prepare for a future different from today
- Apply Skills and Methods To Enable Vision Systems

Near

Mid

Far

Horizon

- Flexible-use models, global, non-intrusive instruments, flight replicated environments

- Systems built with 2020+ technology
Houston, we have a problem
The Aerospace Workforce is stressed

Today’s Aerospace Workforce – in decline
- Create an interagency task force to develop a national strategy on aerospace workforce to attract public attention to importance and opportunities in aerospace industry

Tomorrow’s Aerospace Workforce – unprepared
- Establish lifelong learning and individualized instruction as key elements of educational reform

Math, Science and Technology Education – failing
- Make long term investments in math and science education

These congressionally directed products set the goals, objectives, and timelines for hypersonic R&D
2010 Strategic Plan for DoD T&E Resources
Hypersonics T&E Capability Focus Area Workforce Recommendation

- Improve access to ground test facilities by the research community
- Connect students with researchers, and researchers with program managers
- Create an exciting learning environment.
- Bring government, industry, and universities together to help build a new cadre of hypersonics Workforce

Workforce Demographics Observations
- 47.1% are over the age of 50
- 28.7% have less than 10 years of experience
- 22.5% have advanced degrees (MS/PhD)
- 43.4% are technician
- 65.3% are paid by an industry employer
Developing the Hypersonic Talent Pipeline

**JHTO WFD Mission:**
Attract, develop, and maintain a skilled technical workforce to support DoD Hypersonics

A Framework will be developed that will meet the following **Goals:**

- **Attract** STEM students into hypersonic-related fields of study
- **Develop** a clearable, knowledgeable workforce ranging from technicians to PhD personnel
- **Maintain** an agile and adaptive workforce that meets current / future government needs

"As much as emerging technologies will define future conflict, **the war for talent will likely play the central role** in the outcome of long-term technological competition." - CNBC @Work, March 22 2019

"But recruiting them is not easy. They want diversity, cool culture, mentorship, and the chance to work on meaningful projects."

**STEM Talent Needs**
- Lowest overall student representation
- Largest influx of international students
- Lowest unemployment rates

**Hypersonics Has Unique Interdisciplinary Needs Within A Competitive STEM Market**
Workforce Development Key Elements

- Promote recruitment, training, and retention best practices across DoD and Industrial base
- Flexible and innovation-focused program aligned to 6 technical focus areas
- Develop career pathways and promote awareness of hypersonics careers at all levels (trades to PhD)
- Collaborative cross flow of information
- Develop clear definitions, metrics and assessments for workforce readiness
- Leverage existing workforce & military to accelerate development
- Assess WFD programs to promote continuous improvement
What are the Skills we Need?

• Define the Skills
  - Technical Skills – Math, Physics, Chemistry, advanced subject matter
  - Related Skills – Project management, budgeting, communication

• Since application in 20 years is an unknown – Mature skills that are required regardless of application
  - Discover – Figure out truth through proving/disproving hypothesis
  - Apply – make use of methods/technology in a practical way
  - Re-design – Fail, discover why and improve
  - Convey – present results, sway opinion, and “sell” ideas

• Design with analysis, validate tools with data
• Test across multiple organizations and disciplines, “The 3M’s”
• Integrate knowledge, “fail” learn and succeed.
Grand Challenges

• Enterprise-level Grand Challenges will be created to involve Industry, Manufacturing, RDT&E and others.

• Challenges must represent important physics required for success of future hypersonic programs.

• Multi-disciplinary, multi-organizational challenges require significant partnering and use of infrastructure/tools;
  - **Scalability of Systems and Components** - Scaling for improved features and mission effectiveness
  - **Intelligent Systems** - Making systems aware, intelligent, independent, and capable
  - **Robust Operation** - Making systems function anytime anywhere in any environment
  - **Agile and Efficient Development** - Making systems work without several design cycles... Improving Evaluation

• Challenge campaigns act as a draw for self-interested organizations to come together around areas of common interest with National Impact.
Organize UCAH for Lifetime Learning
Research and Educational Content Across the Spectrum

- Science
- Evaluation
- Developers
- Maintainers
- Research & Technology
- Programs
- Manufacturers
- Warfighters

Projects
- Core Projects
- Challenge Projects
- Grand Challenges
- Next Gen Projects
- Materials
- Environments/Phenom
- GNC
- Applied Aero
- Propulsion
- Energetics
- Vehicle Miniaturization
- Robust Design
- Intelligent Systems
- Efficient Development

Organizations
- ACADEMIA
- FFRDC/UARC
- NASA
- DARPA
- Service Research Lab’s
- Test Complex’s
- SPO’s
- Primes & subcontractors
- Commands

Skills
- Prepare new folks with building block skills
- Transfer Knowledge from SME’s to New Practitioners
- Develop new staff into Next Gen SME’s
- Develop Effectiveness and Efficiency
- Instill and Maintain Warfighter Focus

Content
- Curricula / Coursework
- Short Courses
- Requirements and Acquisition Education
- Symposia/ Conferences / Workshops
- Best Practices – Lessons Learned
Workforce Underpins our Enterprise

Science & Education

Universities

S&T Core Projects

Experiments

Next Gen Projects

Acquisition

Hypersonic Workforce

Industrial Base

Developers

Industry can test methods and development process

Manufacturers

Manufacturers can validate process and products against relevant requirements

Government and Gov’t Affiliated Agency FFRDC/UARC
The Role of UCAH Members Workforce Strategy

- UCAH is Designed to:
  - Committees to Provide Outreach and Workforce
  - Develop a Workforce Development Plan
  - Host Career Fairs
  - Develop Internships and employment advertising
  - Deliver Coordinated Hypersonic Curricula and Short Courses
Successful technology transition will require enhanced workforce skills.

The UCAH is charged with reinvigorating the Hypersonic workforce across the spectrum. Our hypersonic workforce, while still the best in the world, will be unfamiliar with methods, techniques for the challenge ahead.

Developing an impactful workforce will require
- “The Pipeline” – a steady stream of raw material
- “The Content” – a rich blend of knowledge appropriate at each level
- “The Experience” – Opportunities to test our knowledge, fail and overcome

Identifying collaboration opportunities, tool development, and a plan to integrate our workforce from STEAM, through college and internships for development into the industrial workforce will be critical.

We have this golden opportunity to apply everything we know about what makes people work best and focus it toward the realization of the future of Hypersonics!
University Consortium for Applied Hypersonics (U-CAH)

In a desert of dwindling skills, the UCAH stands ready to reinvigorate the Hypersonic Workforce and transition promising technology to the Warfighter.