



University Consortium for Applied Hypersonics

Workforce Development

This Briefing is **UNCLASSIFIED**

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Vision

- *JHTO WFD Mission:*

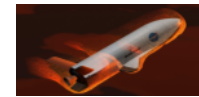
Attract, develop, and maintain a skilled technical workforce to support DoD Hypersonics

- **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



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Hypersonic Strategic Vision



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

Today

Systems that mature 60-70's technology



Hard models, discreet instruments, environments close to flight replication

Prepare Infrastructure

Replication
(Comprehension of Physics)

Industry
(Nimble and Ready)

Manufacturing
(Rapid Prototype)

Information
(synthesis of data)

Near
Restore systems and hone technical skills to lead change

Mid
Improve Skills and Methods to Prepare for a future different from today

Far
Apply Skills and Methods To Enable Vision Systems

Techniques
(Global, non-intrusive)

Use of Models

Relationships
(S&T, RDT&E, Industry)

Preparing Skills and Tools

Horizon

Systems built with 2020+ technology



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

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Houston, we have a problem

The Aerospace Workforce is stressed



Workforce: Launch The Future



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

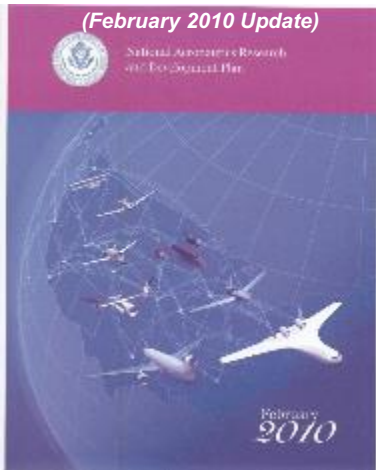
- Establish lifelong learning and individualized instruction as key elements of educational reform

Math, Science and Technology Education – failing

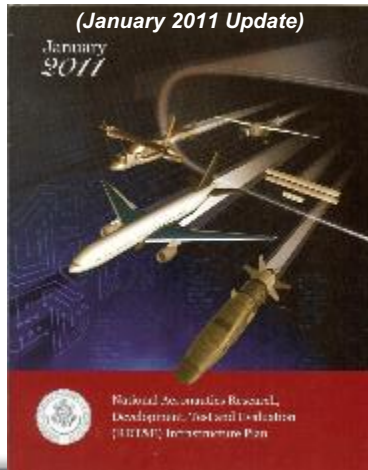
- Make long term investments in math and science education

White House Aerospace Commission Follow-On Activities

National Aeronautics R&D Plan (February 2010 Update)



National Aeronautics RDT&E Infrastructure Plan (January 2011 Update)



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

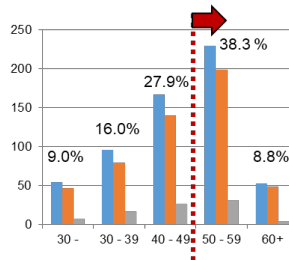
2010 Strategic Plan for DoD T&E Resources

Hypersonic Highlighted As One of the T&E Capability Focus Areas

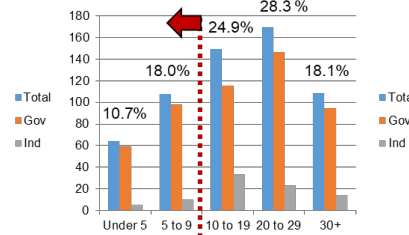
Workforce Demographics Observations

- 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

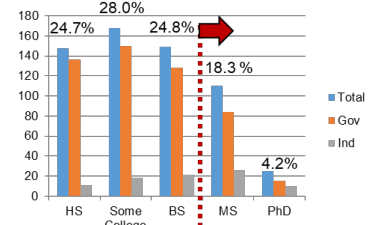
Age Distribution



Experience Distribution

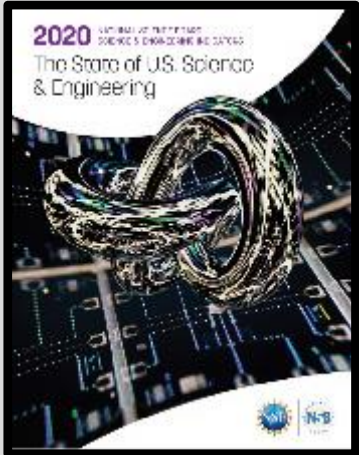


Education Distribution



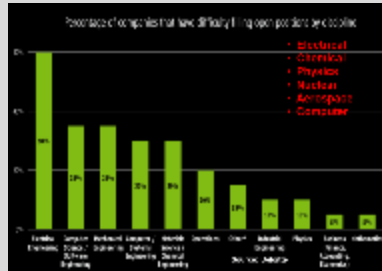


Developing the Hypersonic Talent Pipeline



STEM Talent Needs

- Lowest overall student representation
- Largest influx of international students
- Lowest unemployment rates



It's all about giving Gen-Z 'the full package'

Hypersonics Has Unique Interdisciplinary Needs Within A Competitive STEM Market

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

-CNBC @Work, March 22 2019

"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.



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:**

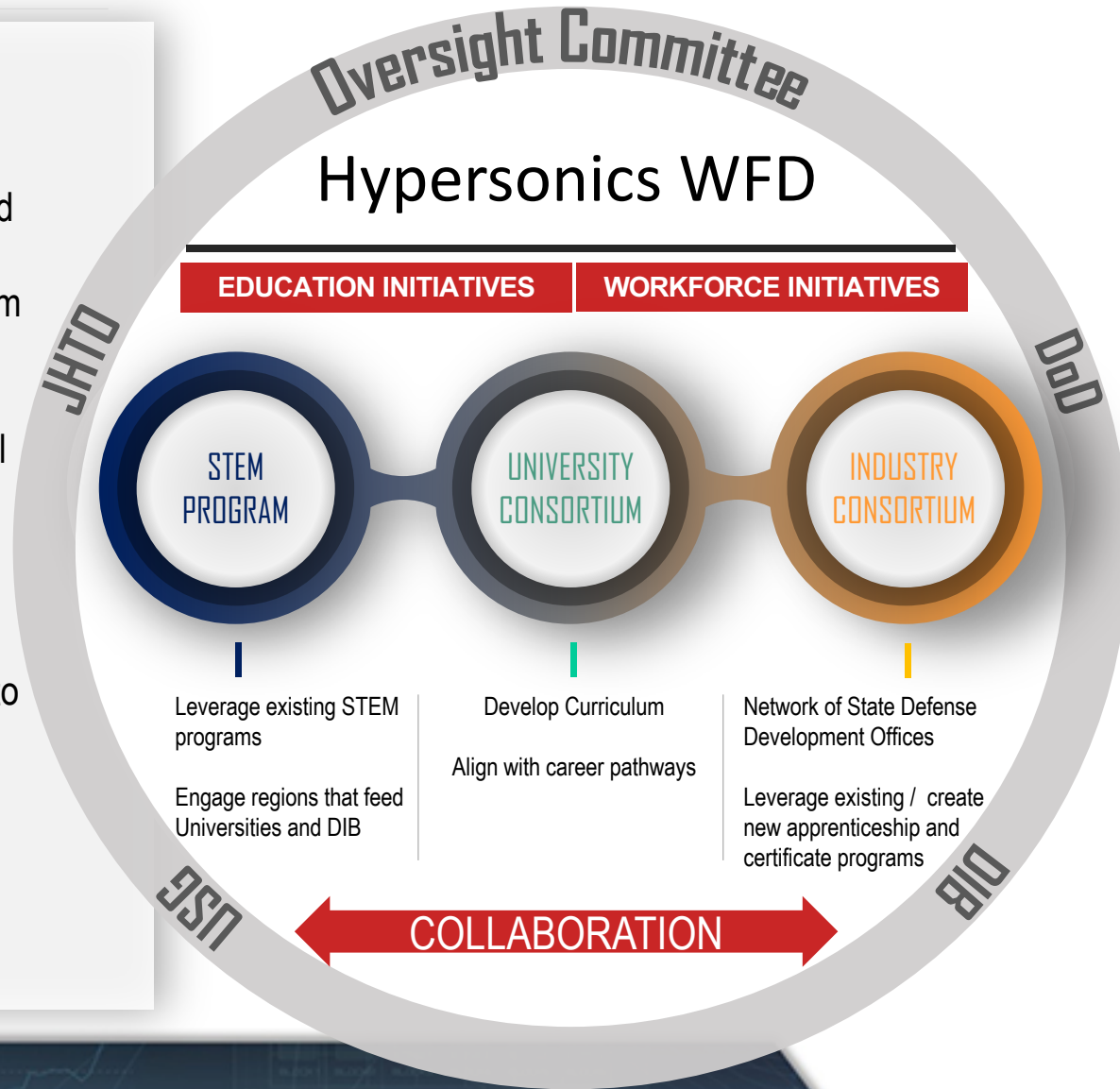
- **Attract** STEM students into hypersonic-related fields of study
- **Develop** a clearable, knowledgeable workforce ranging from technicians to PhD personnel
- **Maintain** an agile and adaptive workforce that meets current / future government needs



Strategic Framework

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.



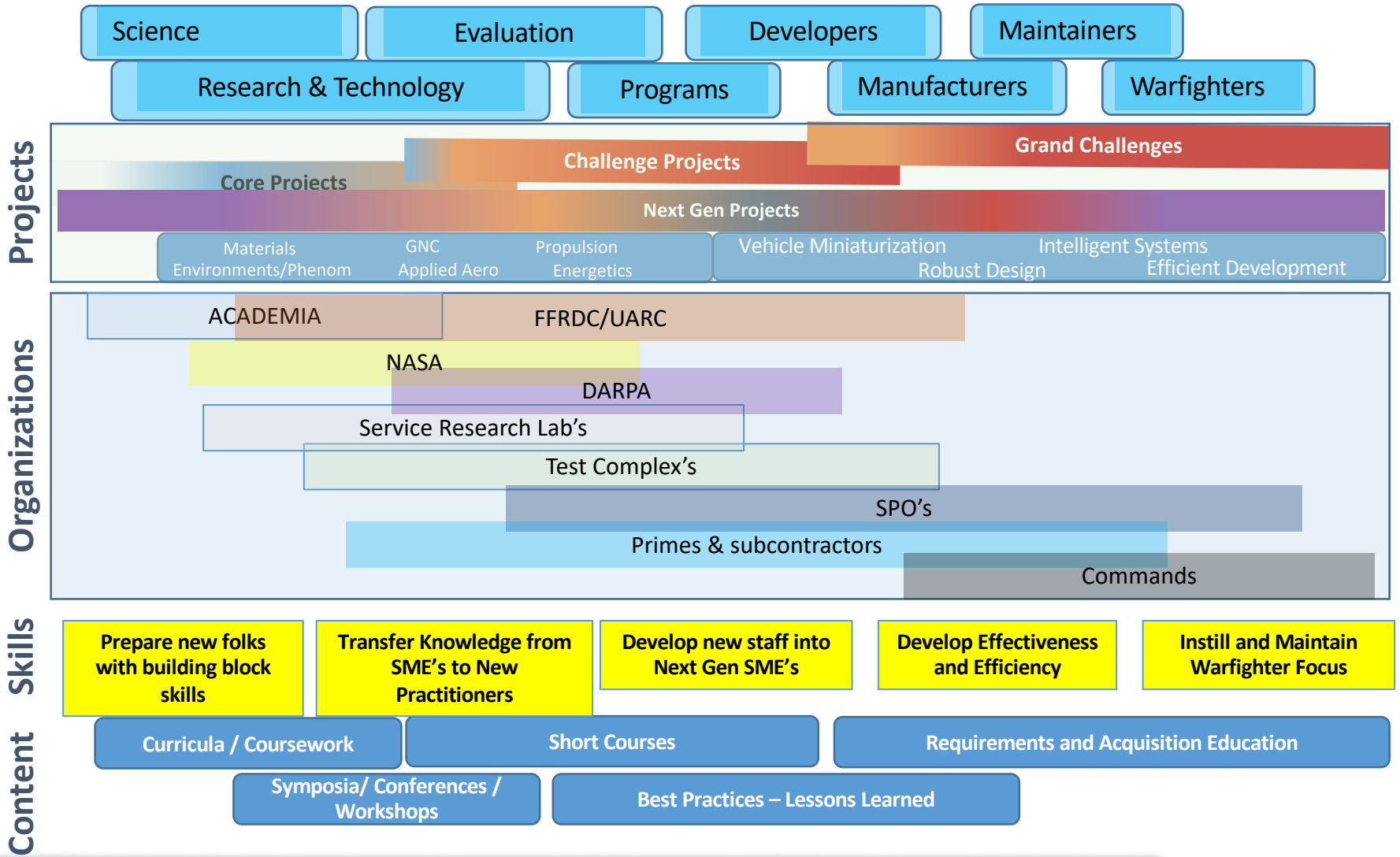
Grand Challenges

- 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.



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Organize UCAH for Lifetime Learning Research and Educational Content Across the Spectrum



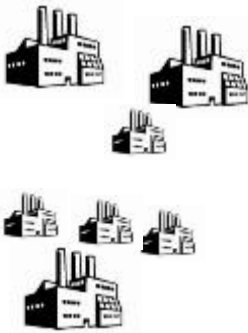
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Workforce Underpins our Enterprise

**Government and
Gov't Affiliated
Service Agency
FFRDC/UARC
Science & Education**

Universities



Acquisition

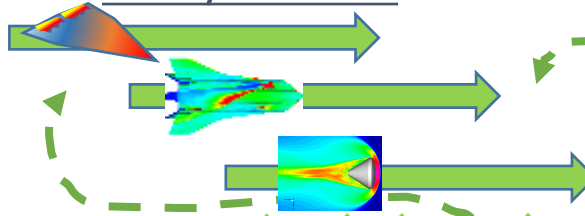


Programs



S&T / RDT&E

Challenges



Experiments

S&T Core Projects



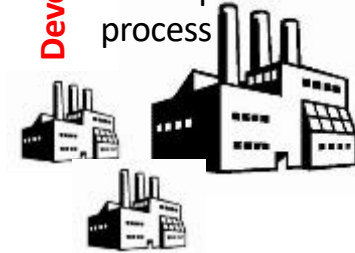
Next Gen Projects



Industrial Base

Developers

Industry can test methods and development process



Manufacturers

Manufacturers can validate process and products against relevant requirements





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**



Summary

- 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!



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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

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DoD Research and Engineering Enterprise

Creating the Technologies of the Future Fight



DoD Research and Engineering Enterprise

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