

# Leveraging Biology for National Security

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Briefing prepared for:  
Conference on Innovations in Climate Resilience

March 30, 2022





## Critical Materials Onsite and On-demand

The logo for Engineered Living Materials (ELM), with the letters 'E', 'L', and 'M' in a stylized, textured font. 'E' is grey, 'L' is orange and yellow, and 'M' is purple and blue.

Engineer living building materials that grow on-site, self-repair, and respond predictably to their environment

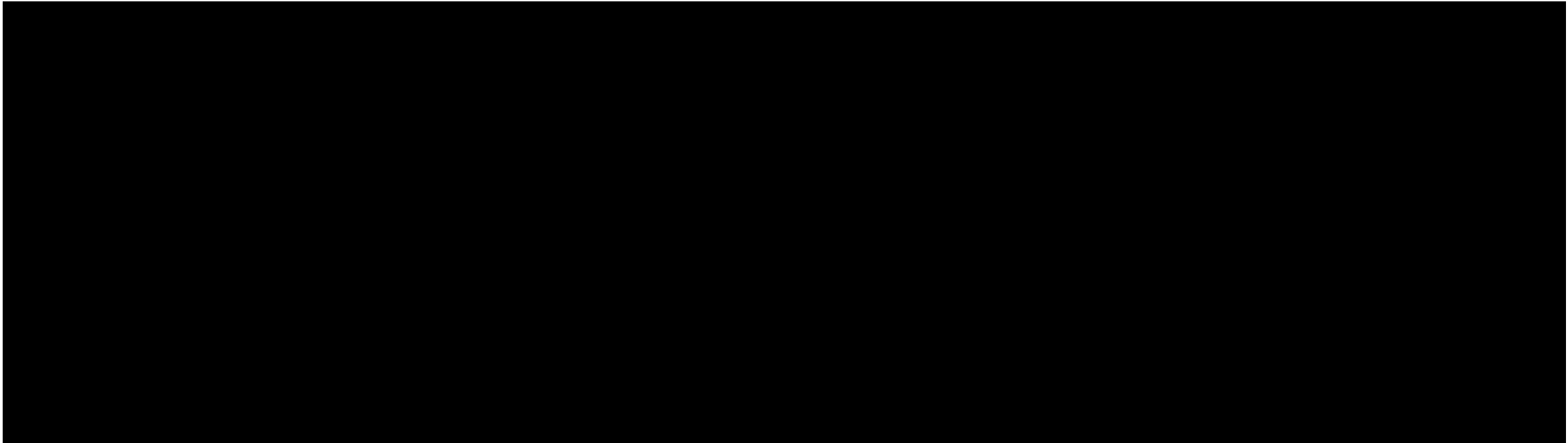
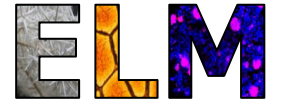
The logo for ReSource, with the word "Resource" in a stylized font. The 'R' and 'S' are blue and pixelated, while 'e', 'o', 'u', 'r', 'c', and 'e' are black. The 'o' and 'c' are enclosed in boxes with the numbers 8 and 6 respectively.

Provide the warfighter the ability to recycle and reuse otherwise wasted single-use materials

- Military capabilities and operational logistics are disrupted by changing environmental conditions requiring novel solutions.
- Through DARPA programs like ReSource and Engineered Living Materials (ELM), new technologies and initiatives are being developed to meet these demands.



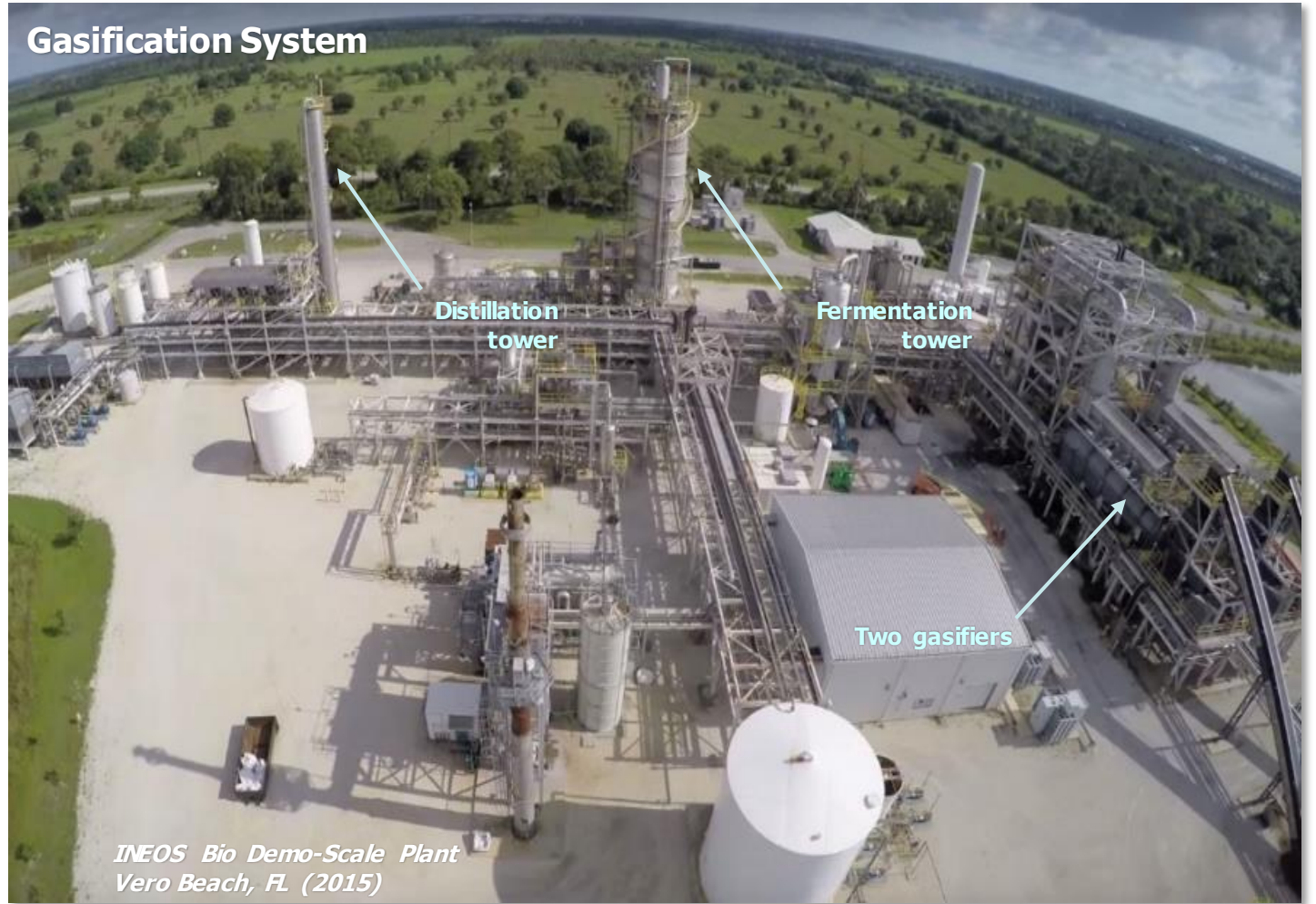
Yuma, AZ





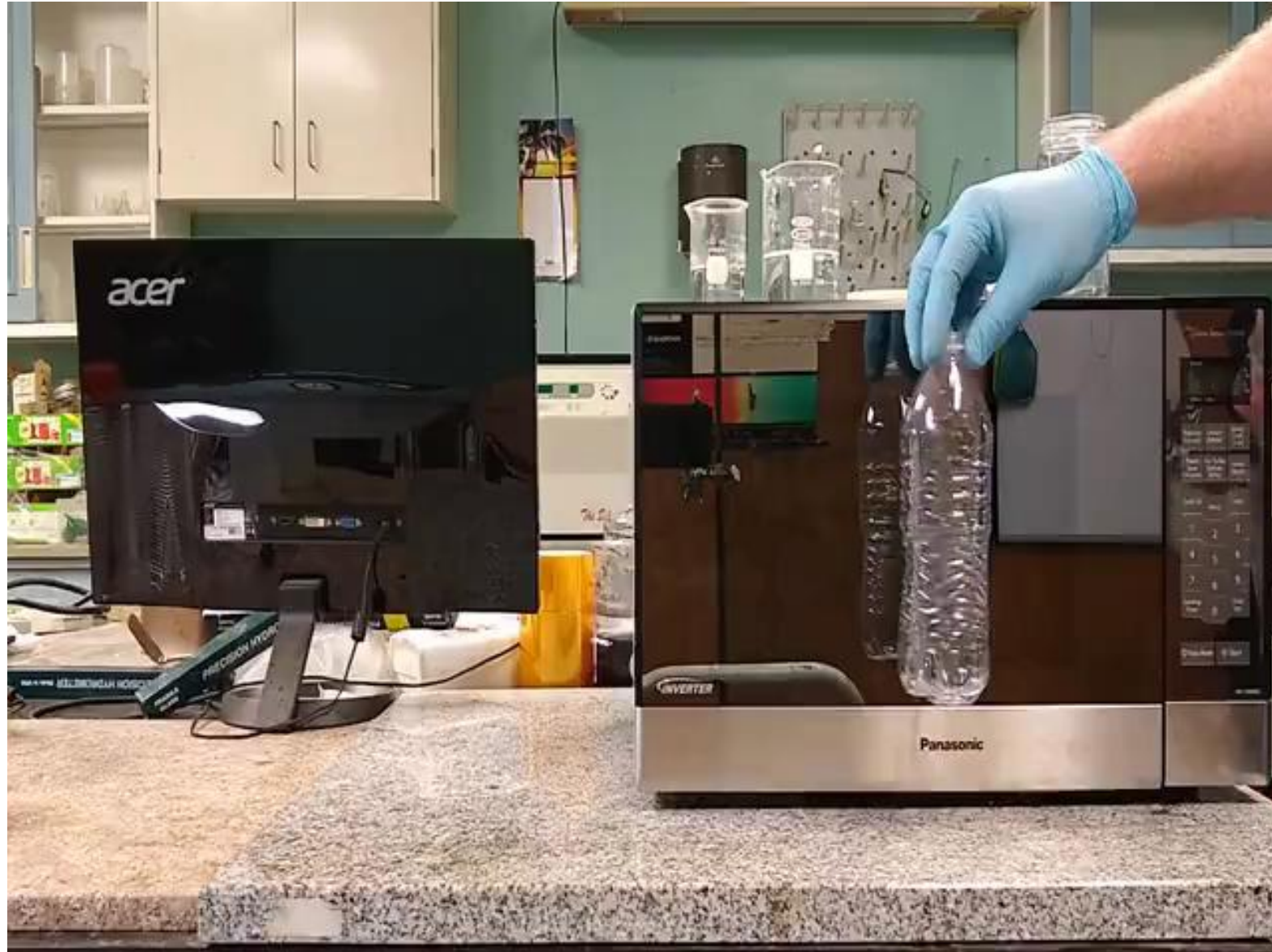


Gasification System



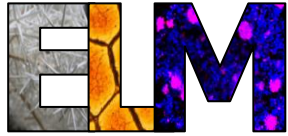
*INEOS Bio Demo-Scale Plant  
Vero Beach, FL (2015)*







# Two Programs Reduce Logistical Footprint



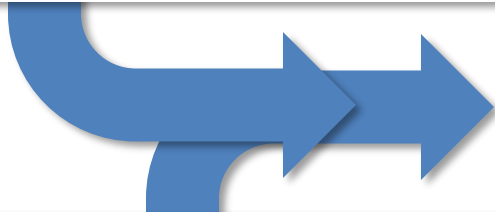
Engineered Living Materials (ELM) program

**Program Start Date:** May 2017

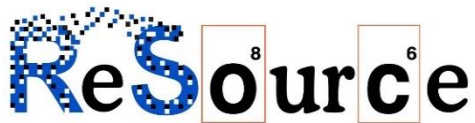
**Program End Date:** December 2021

*DARPA Embedded Entrepreneurship Initiative will continue to support ELM team technology transition within the DoD through March 24, 2023*

**Program Vision:** Engineer living building materials that grow on-site, self-repair, and respond predictably to their environment



## Small Business Innovation Research (SBIR) Spin Out



ReSource program: Plastic Wastes to Food and Products

**Program Start Date:** September 2020

**Program End Date:** August 2024

*Phase 2 (15 months) kicked off December 2021*

*Mid-Phase 2 Technical Area Integration Demonstrations set to occur May and September 2022*

**Program Vision:** Provide a versatile, operationally relevant system that converts single-use resources into food provisions and weapon's lubricant



# Biological materials and strategic formulations challenge programs

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- Expand the use and properties of biological materials and/or strategic formulations in a company's portfolio
- Designed to enhance the platform capability through the accomplishment of a series of readiness tests and a final ultimate challenge scenario
- Proposers are provided a description of each scenario with a set of known criteria to prepare their biological materials and/or strategic formulations accordingly
- Not all aspects of the readiness tests and challenge are provided
- Purposeful removal of certain details is meant to push proposers to mature their technology beyond a known set of parameters and thus encourage adaptability





# Biological materials for use in DoD onsite construction scenarios



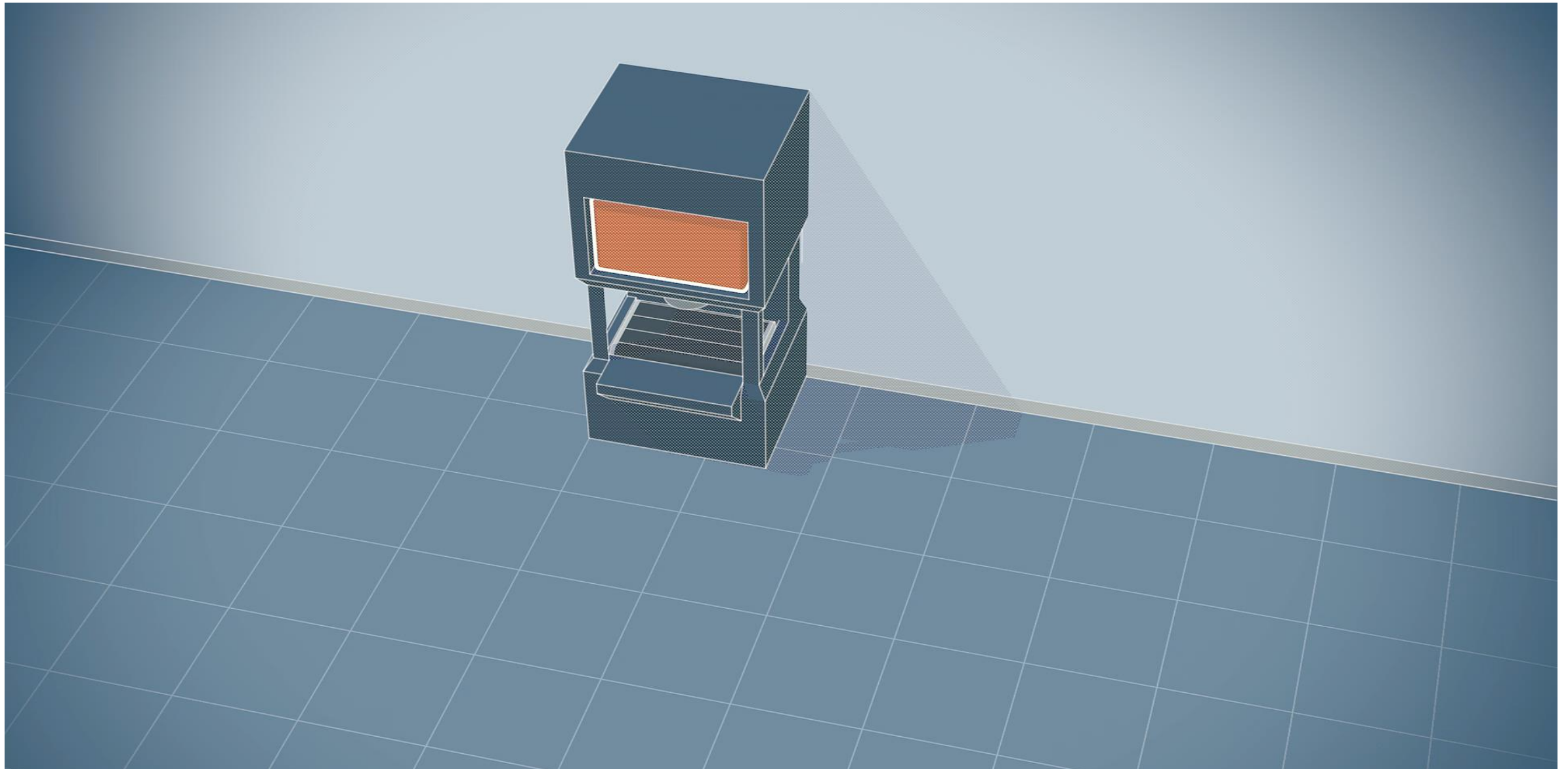


# Surface hardening for transition zones in semiaquatic environments





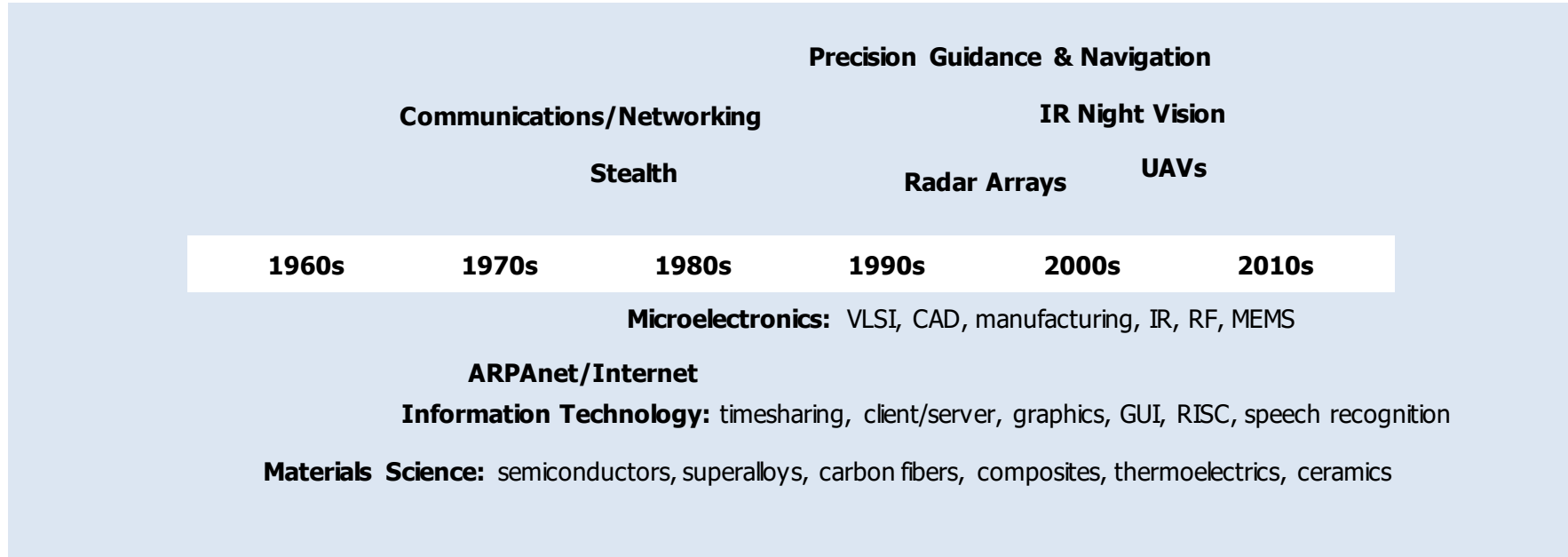
# Consumable, palatable food rations at-scale





# DARPA's mission

## Breakthrough Technologies for National Security



New capabilities require a healthy ecosystem across Service S&T, universities, and industry

**DARPA's role: pivotal early investments that change what's possible**



# How to structure a conversation with a Program Manager



DARPA operates on the principle that generating big rewards requires taking big risks. But how does the Agency determine what risks are worth taking?

George H. Heilmeier, a former DARPA director (1975-1977), crafted a set of questions known as the "Heilmeier Catechism" to help Agency officials think through and evaluate proposed research programs.

1. What are you trying to do?
2. How is it done today, and what are the limits of current practice?
3. What is new in your approach and why do you think it will be successful?
4. Who cares? If you are successful, what difference will it make?
5. What are the risks?
6. How much will it cost?
7. How long will it take?
8. What are the mid-term and final "exams" to check for success?





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