Hybridizing Biology and Robotics through Integration for Deployable Systems (HyBRIDS) Webinar

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Advanced Research Concepts (ARC)
Opportunity Overview
DARPA-EA-25-02-02

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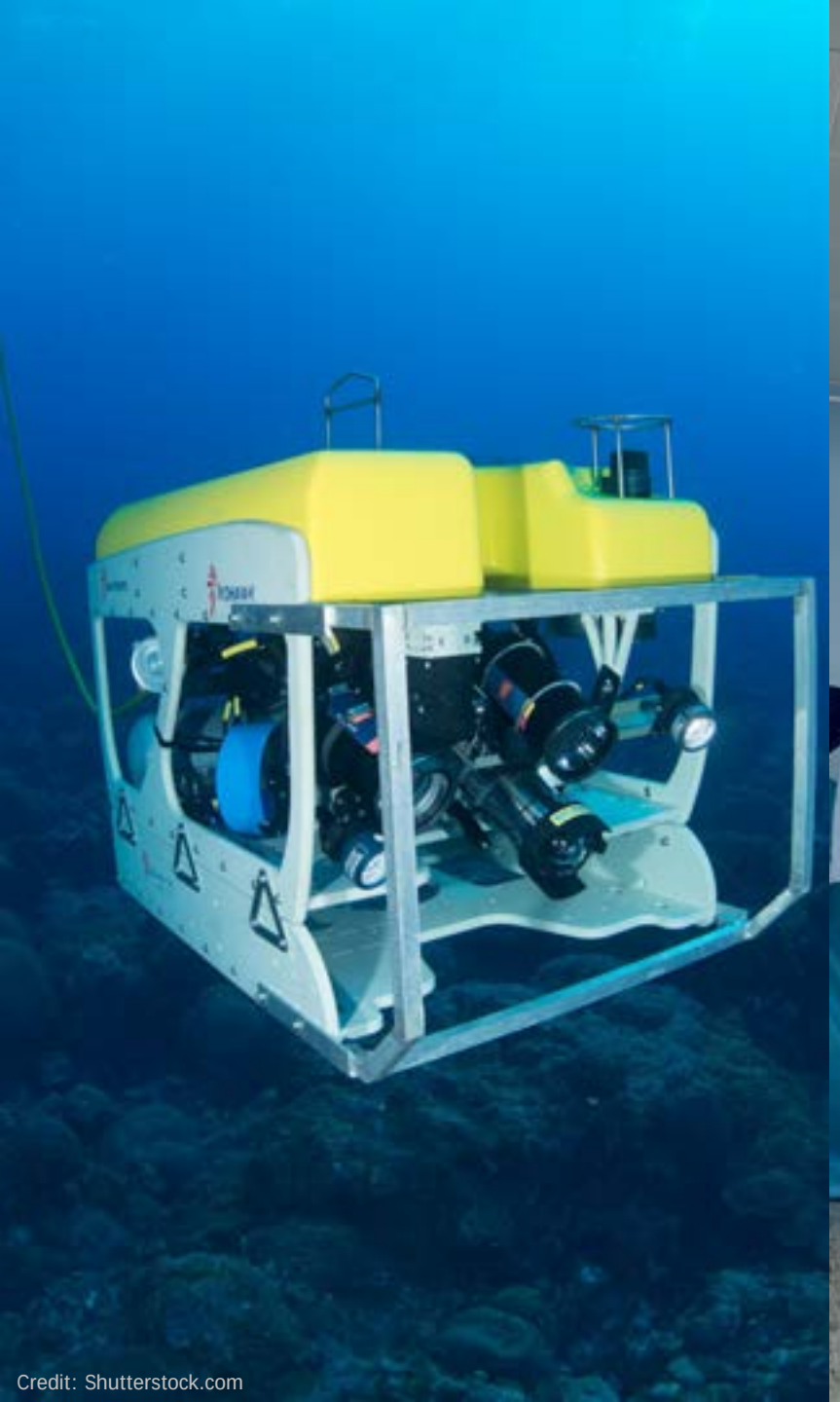

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Biohybrid Robotics Merges Benefits of Biological and Synthetic Systems

Biological → Synthetic

Adaptive

Responsive

Resilient

Self-healing

Self-replicating

Biodegradable

Sensitive

Efficiency, resiliency, and adaptability of biological systems

Controllability and programmability of designed systems

Controllable

Precise

Designable

Powerful

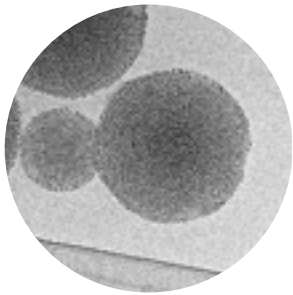
Consistent

Useful

Predictable

Biohybrid Robotics

Disparity between living and synthetic system performance highlights opportunity



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Moving Beyond Mimicry and Inspiration

Biomimetic — Imitating natural biological designs or processes in engineering or invention

Bioinspired — Inspired by or based on biological structures or processes

Biohybrid — Containing or composed of both biological and non-biological components

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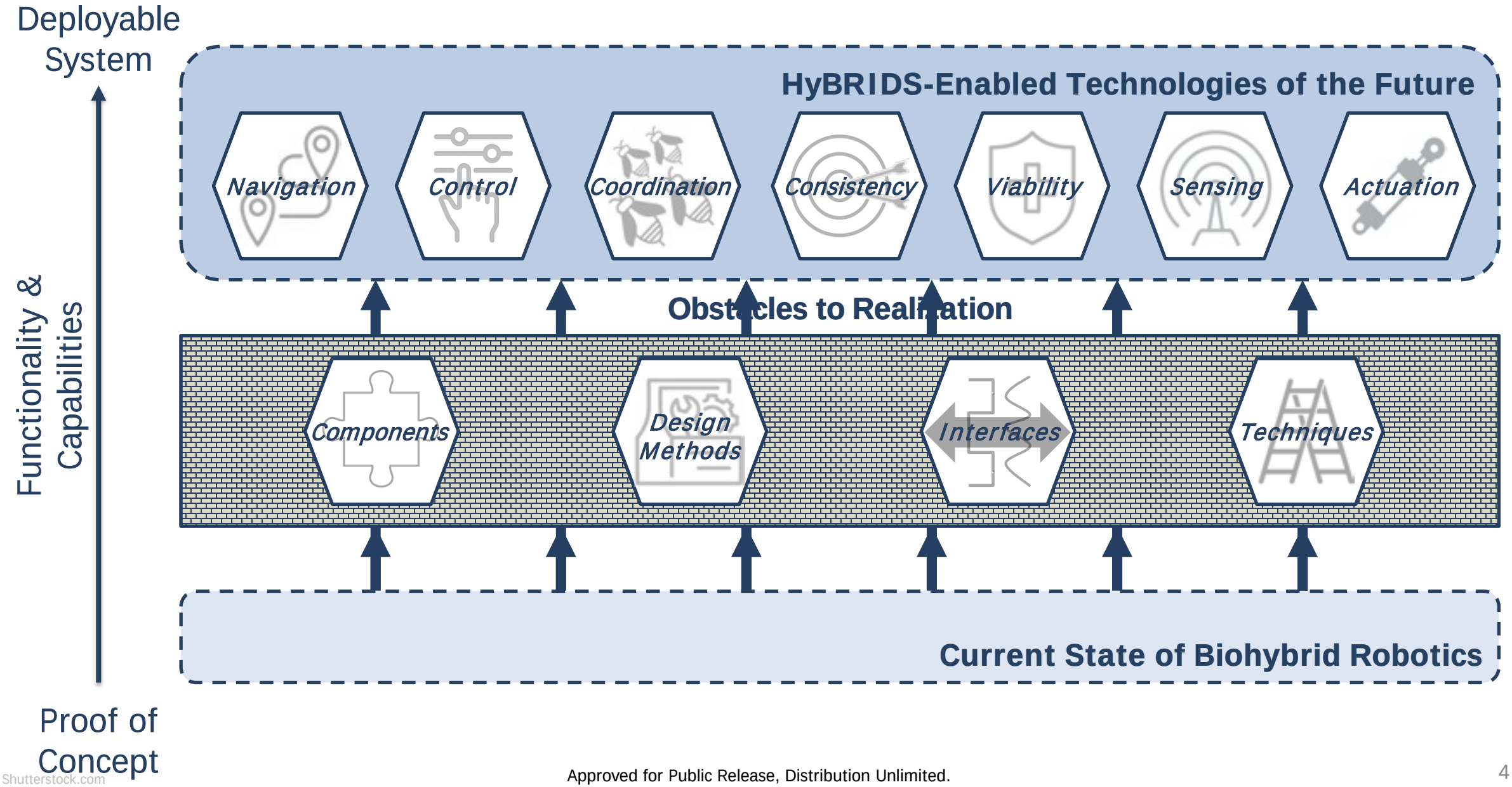
Turning Proofs of Concept into Deployable Systems



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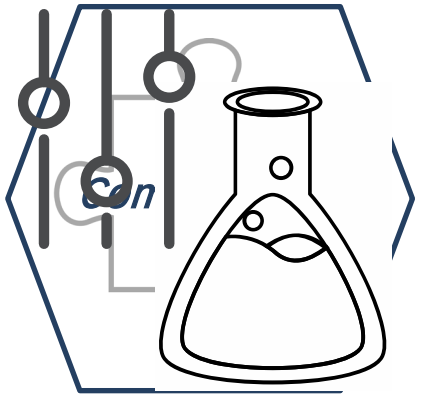
Seeking Abstracts that Address Obstacles to Realization

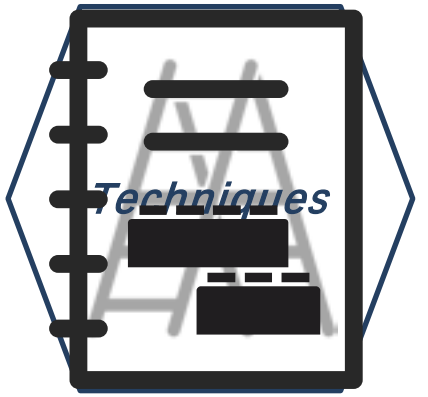
ARC Question: How can synthetic and biological components be integrated to enable biohybrid platforms that outperform traditional robotic systems?



Modify Materials to Enhance Integration

Analyze and Predict Properties and Performance

Systematically Characterize Interfaces



Elicit Properties with Repeatable Strategies

Potential areas of focus

- Relationship between system- and component-level performance
- Maintaining operational integrity
- Quantitatively measuring characteristics and performance over time
- Resilient interfaces that transmit information, energy, load, and material

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Requirements for Successful Abstracts

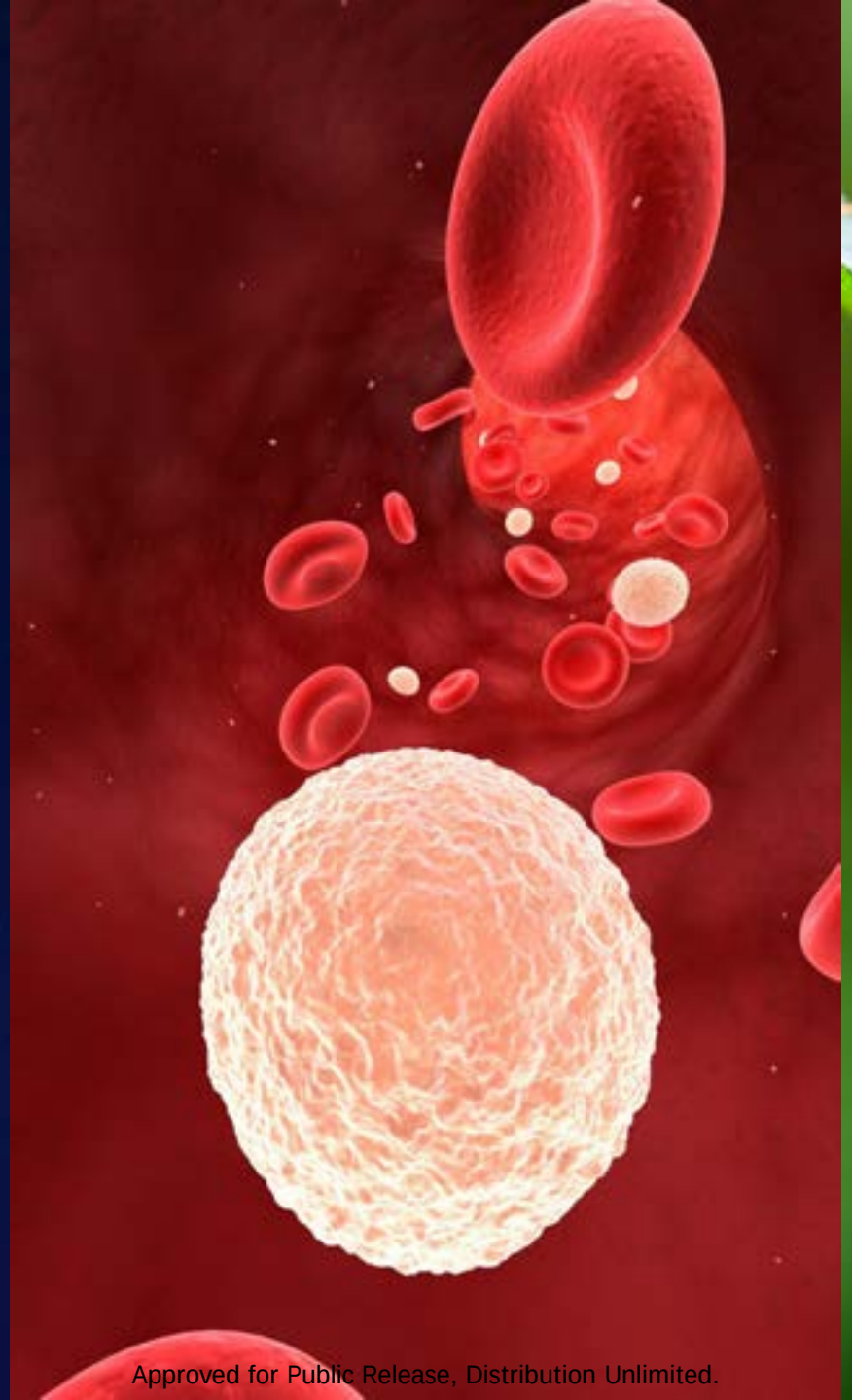
- **Analytical framework** contextualizing the proposed idea:
  - Identify addressed obstacle(s) and potential application and deployment environment
  - Quantify relevant performance of current systems in relevant application domain
  - Justify through clear quantitative calculations how, and to what extent, concept could exceed performance of existing alternatives

- Explain **which regimes**, and along which **dimensions of performance**, proposed biohybrid system could demonstrably **outperform** fully synthetic ones

Out of Scope

- Fully synthetic systems (including bioinspired and biomimetic systems)
- Incremental enhancements to existing functionalities or individual components
- Human subjects research or animal use

See Section II.B of DARPA-EA-25-02-02 for abstract instructions



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