Safe & Secure Biotechnology Platforms

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Prepared for External Audiences

ARPA-H
Customer Experience Hub
PART OF THE ARPANET–H
HEALTH INNOVATION NETWORK

Safe & Secure Biotechnology Platforms

- Draws on the ARPANET-H Network to source feedback at scale

- Deadline to provide feedback is May 17, 2024 by 11:59 p.m. EDT

- Spoke membership is not a requirement to complete

Network Survey Link

Housekeeping Items

- All Attendees are on mute and will not be able to unmute themselves
- Please use the "chat" function for technical difficulties only
- Place all Questions in the Q&A Box
- Please check your Audio Settings if you are having difficulties hearing us
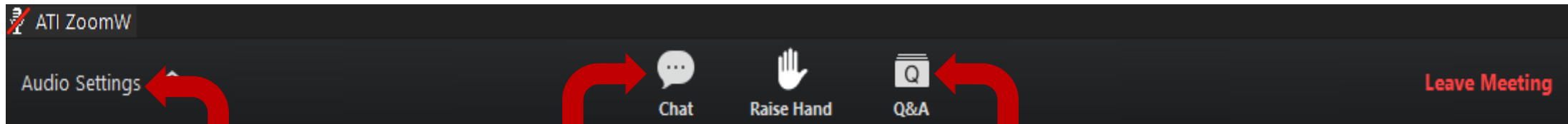
Check **Audio Settings** if you're unable to hear

Click **Chat** to ask for help

Use **Q&A** for direct questions

ARPA-H Mission

Accelerate better health outcomes for everyone.

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ARPANET-H: Hub & Spoke Network

A nationwide health innovation network connecting +585 members across the health ecosystem.

Spokes (members) of ARPANET-H:

- Help shape ARPA-H's Programs and Projects
- Support teaming and collaborating
- Gain opportunities for dialogue with ARPA-H Program Managers
- Can participate in ARPANET-H only Events
- Are eligible for nimble R&D opportunities

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Customer Experience (CX) Hub

The CX Hub focuses on ensuing future health care advancements are patient-centric and deliver improved outcomes by:

- *Aiding in the design of desirable products and services by co-creating features with end-users*
- *Engaging diverse, representative populations across ethnicity, region, and other dimensions*
- *Connecting technical experts, community leads, and research infrastructure providers*

The <u>A</u>ntigens <u>P</u>redicted for Broad Viral <u>E</u>fficacy through <u>C</u>omputational E<u>x</u>perimentation (APECx) Program

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Antigens Predicted for Broad Viral Efficacy through Computational Experimentation (APECx)

Vision: Develop the toolkit that makes broadly effective and evolution-resistant vaccines against viral pathogens possible for all

Approach: Harness cutting-edge computational methods alongside unprecedented scales of biochemical and immunological data for antigen design

Why ARPA-H? Create an accelerated vaccine development pipeline that will target whole families of viruses using groundbreaking tools not yet to be applied in vaccine R&D.

Technology Focus Areas

1. High-throughput biochemical analysis and protein function engineering
2. Antigen design and modeling pipelines for vaccine development
3. Proof-of-concept translational candidate development and clinical trials

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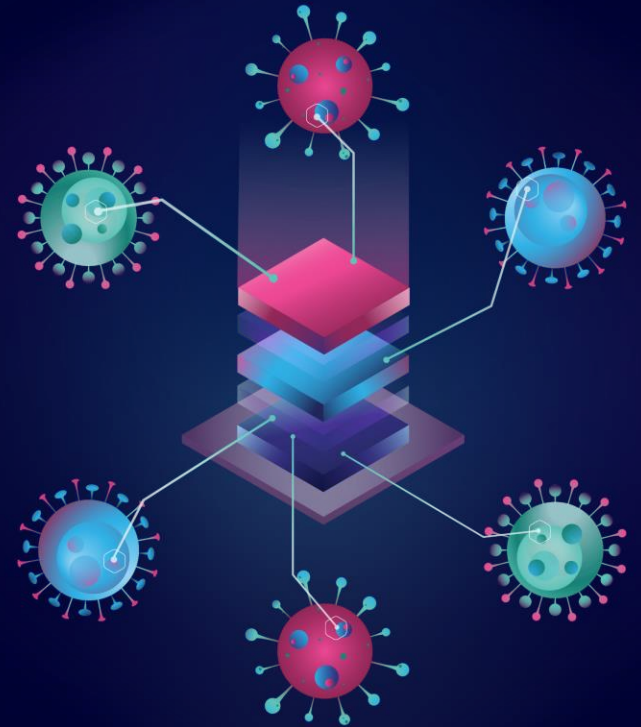
What if we could eliminate viruses as current and future health threats?
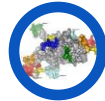
APECx PROGRAM OUTCOMES and GOALS
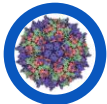
Technology Focus Areas

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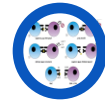
- Evolutionary Biology -Omics
- Epitope Mapping
- Experimental Structure Resolution
- HT Functional Analysis/ Immune Readout

2. Antigen design and modeling pipelines for vaccine development

- Deep ,Learning Gen AI Language model
- Predictive Immunology/ Translational Efficacy
- AlphaFold2, RoseTTAFold, ESMFold

3. Proof-of-concept translational candidate development and clinical trials

- Single B-cell, *ex vivo* immune systems, animal models
- Platform Manufacturing/ Regulatory
- Vaccine Delivery Technology

A database containing of all the data generated from all the technical areas

Toolkits such as AI/ML models for antigen design

Goal One: to understand how APECx data/toolkits can be openly accessible while balancing it with safety and security concerns stemming from their potential misuse.

Goal Two: to find solution to make APECx data & toolkits widely available and useful to the scientific communities.

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Safe & Secure Biotechnology Platforms

What if we could develop AI-driven tools for medical countermeasure (MCM) design safely and securely? What if could make AI/ML tools and large biological datasets more user-friendly?

The Problems
Balancing open access with data security and misuse prevention
Understanding how researchers would need to interface with APECx tools and datasets
Understanding the usability of biomedical MCM tools and datasets
Ensuring responsible AI development in biomedical research

The Safe & Secure Biotechnology Platforms Survey

- Identify optimal ontologies and data standards
- Understand how users need to access and interact with the APECx tools
- Balance usability/security of database
- Prioritize usability features, such as visualization and search functionality
- Understand how researchers' applications for APECx

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Potential types of data and tools APECx will generate

APECx Data by Performers

- Single cell sequencing (i.e. RNA-seq, DNA-seq)
- Phase display
- Next-generation sequencing (NGS)
- Mass spectrometry
- Flow cytometry
- Surface Plasmon Resonance (SPR)
- Enzyme-linked immunosorbent assay
- X-ray crystallography
- Cyro-electron microscopy

APECx Public data

- ViralZone
- NCBI Virus
- NCBI Viral Genomes
- RVDB
- Virxicon
- ZOVER

APECx Toolkits

- Template-based homology modeling
- Physics-based modeling
- Deep learning-based modeling
- Template-independent ab initio modeling
- ESMFold
- AlphaFold
- ProteinMPNN
- Chroma

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Frequently Asked Questions

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Q: Why is ARPA-H doing a Network Survey?

A: To engage stakeholders in the scientific community that may use APECx and give them an opportunity to shape how ARPA-H makes the potential datasets and toolkits available.

Q: What will ARPA-H do with the survey responses?

A: ARPA-H will analyze the survey responses and may incorporate them into the APECx program. It will help APECx develop their potential approach to sharing datasets and toolkits, and potentially develop the UX requirements for these toolkits and hosting systems.

The results of the survey will be summarized into a report that will be shared with all the respondents and hosted on the CX Hub website.

Q: What data will be potentially generated by the APECx program? Who will primarily use it?

A: The data is primarily intended for use by researchers from both the biotech industry and academia, particularly those focusing on vaccine development or developing AI/ML tools for vaccine design.

APECx Data by Performers	APECx Public data	APECx Toolkits
• Single cell sequencing (i.e. RNA-seq, DNA-seq) • Phase display • Next-generation sequencing (NGS) • Mass spectrometry • Flow cytometry • Surface Plasmon Resonance (SPR) • Enzyme-linked immunosorbent assay • X-ray crystallography • Cyro-electron microscopy	• ViralZone • NCBI Virus • NCBI Viral Genomes • RVDB • Virxicon • ZOVER	• Template-based homology modeling • Physics-based modeling • Deep learning-based modeling • Template-independent ab initio modeling • ESMFold • AlphaFold • ProteinMPNN • Chroma

Q: What are the rules for sharing potential data from the APECx program, including who can access it, and where it will be stored?

A: Performers selected from APECx must agree to openly share the data acquired during the program. Any member of the scientific community should have easy access to the data, possibly through registration on a repository website. The specific repository will be chosen with input from the ARPA-H Program Manager.

What is a Network Survey?

Seeks feedback from end-users and key stakeholders in the community to inform the technical and funding approach to ARPA-H program concepts.

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Network Survey

Seeks to hear from key stakeholders:

Usability	Researchers who will use the potential data and toolkits created by APECx	*Q:* How would you use the APECx Toolkit? What built-in visualizations do you need?
Management	Admins with expertise managing applications and integrating datasets	*Q:* What are minimal ontologies? How would you standardize and integrate the datasets?
Security	Developers who have host data platforms which prioritizes both access and security.	*Q:* What are best practices for user and data authentication? How do you balance access and security?

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**Thank you for joining the CX Hub's Information Session about
Safe & Secure Biotechnology Platforms.**

We want to hear from you!
Complete the survey:

For questions email: SafeSecureBio@arpa-h.gov

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Q&A

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Other ways to join the ARPA-H Network

Become a Spoke

Join the ARPANET-H as a Spoke of the Customer Experience Hub to get access to PM Chats, Network Activations, Partnership Opportunities, and Spoke-only events!

Become a Program Manager

ARPA-H is seeking to hire Program Managers that will bring well-defined problems to ARPA-H and build the teams to solve them.

Sign up for Vitals Newsletter

Sign up for the bi-weekly ARPA-H Newsletter to stay informed about new ARPA-H program, initiatives, and opportunities!

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