

Omnyra

Initial Problem Statement

Easy access to DNA synthesis and weak buyer checks let bad actors slip through and make dangerous biological agents.

Final Problem Statement

Existing safeguards miss AI-generated threats and the government lacks visibility into today's bioengineering capabilities.

130 Interviews



Kari Montoya, FBI
Problem Sponsor



Nelson Layfield, FBI
Government Mentor



Sal Badillo-Rios, DIU
Government Mentor



Laura Clapper, MD
Business Sponsor



Mark Clapper, MD
Business Sponsor

Our Team: A Mix of Computer Science & Biology



Emilin Mathew

BS in Computer
Science & Biology



Taralyn Nguyen

BS in Computer
Science & Management



Stefan Thottunkal

MD/MS in Community
Health and Prevention
Research



Varsha Saravanan

BS & MS in Computer
Science



Highs, Lows, and Lightbulbs...

Week 1-2

Week 3-4

Week 5-6

Week 7-8

Week 9-10

Initial Discovery

What's Most Pressing?

Map Beneficiaries + Get out of the Building!

Design, Iterate and Explore Deployment

So much to learn, can't wait!

But who actually CARES?
We're overwhelmed

The FBI and DNA Synthesis Companies are invested. Let's test our MVPs!

Much feedback to process! Let's continue learning and iterating



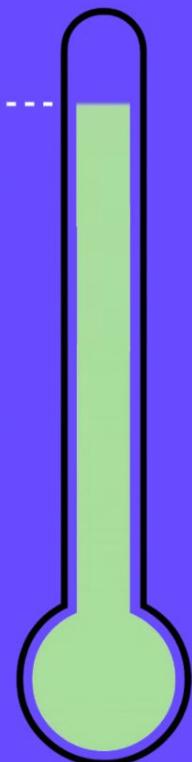
We've connected the dots. Let's dream bigger and continue our journey...

Week 1-2

21 Interviews in...

Emotion Meter

Excited -----



Understanding Problem Space

Suspicious Order



Biosynthetic Company



Bioweapon Built



Catastrophic Outbreak



**Some companies assume
every customer is safe.
That assumption could be
deadly.**

*"It's not our job to verify
customers' orders."*

– U.S. DNA Synthesis Company

We Interviewed Every Major U.S. Competitor in Biosecurity Screening

1 Customer Screening Tool



5 Sequence Screening Tools



IBBIS



SecureDNA

BATTELLE

We mapped the field.
Every tool follows the
same outdated playbook.

The screenshot shows the 'Enter Query Sequence' section with fields for 'Enter accession number(s), gi(s), or FASTA sequence(s)' and 'Or, upload file'. It also includes a 'Job Title' field and a checkbox for 'Align two or more sequences'. Below this is the 'Choose Search Set' section, which includes a 'Database' dropdown set to 'Standard databases (nr etc.)', an 'Organism' dropdown set to 'Core nucleotide database (core_nt)', and various optional filters like 'Exclude' and 'Entrez Query'.

Existing Tools Have Little Defense Against Modern Threats

VSSQCVNLTRTQ

VS

VSSQCVNLTRTQ

Direct Match

Detected

VSSMMMNLLTRTQ

VS

VSSQCVNLTRTQ

Minor Changes

Maybe Detected

ATTQCVNLTTACT

VS

VSSQCVNLTRTQ

Large Rewrite

Not Detected

ATTCDWVNMWQ

VS

VSSQCVNLTRTQ

Entirely New Threat

Not Detected

Week 3-4

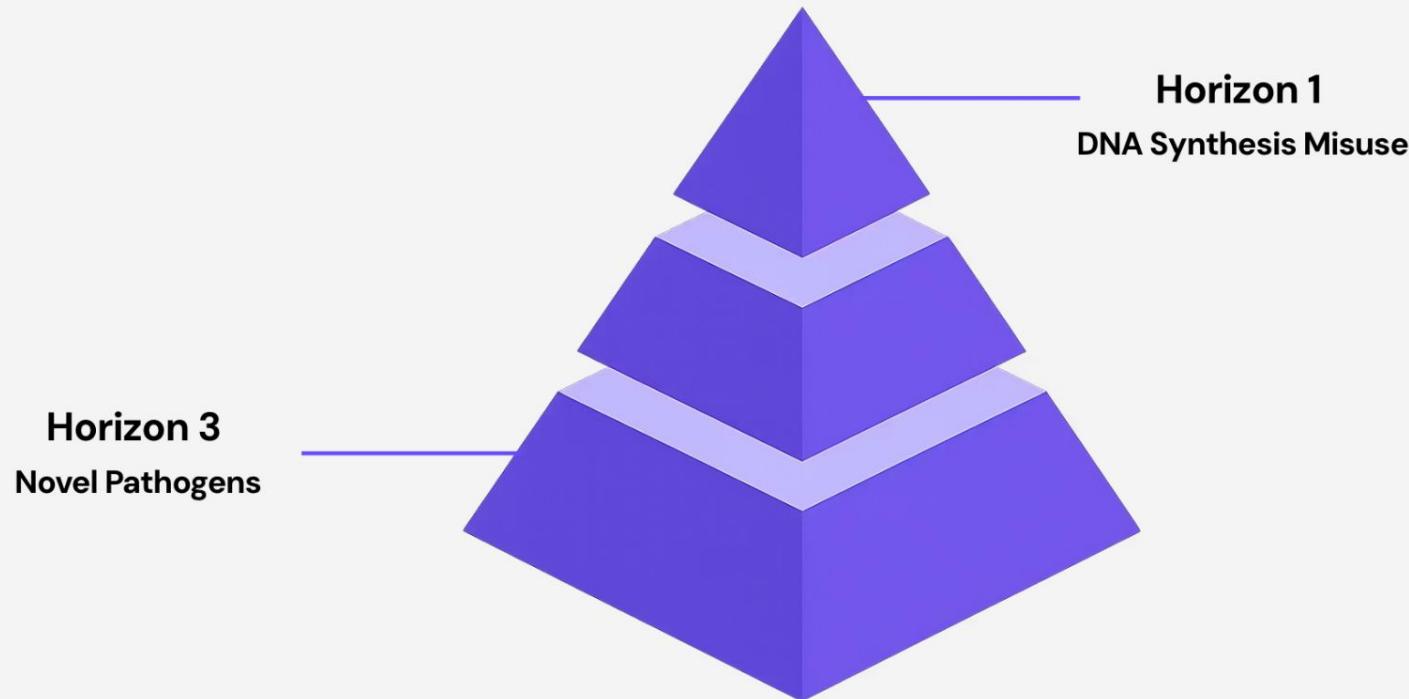
50 Interviews in...

What's Most Pressing?

Emotion Meter



We Started With Active and Strategic Threats



We Noticed Conflicting Perspectives

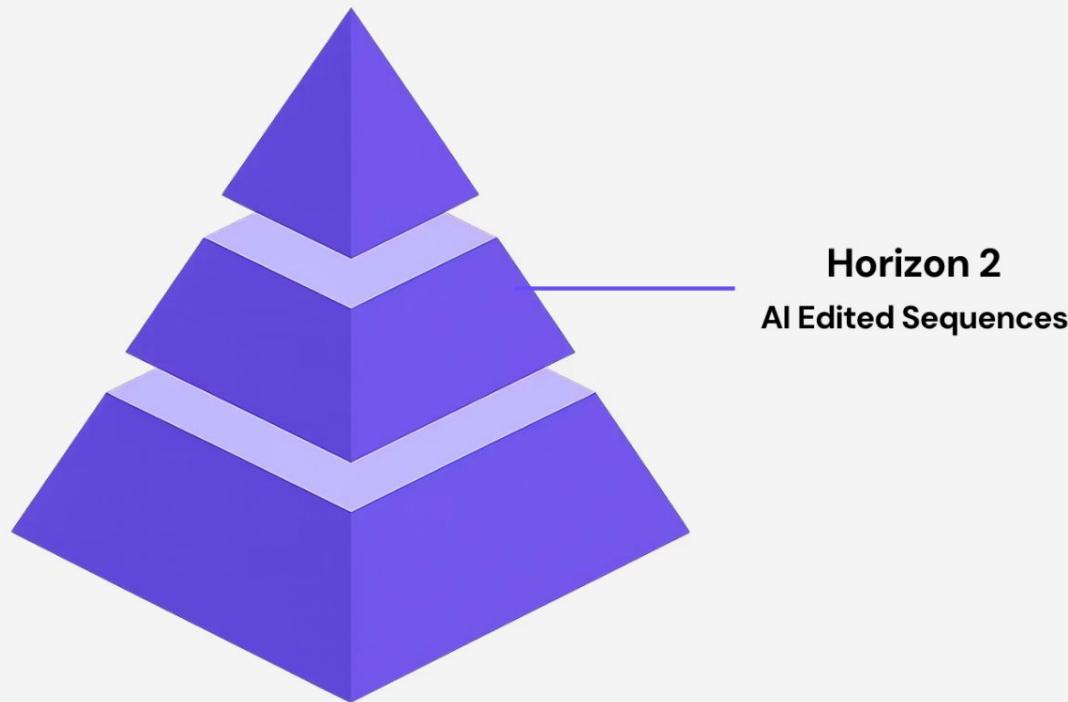
"We do not see novel pathogenic orders often – it is not a pressing threat."

– Chief Security Officer of U.S. DNA Synthesis Company

"95% of threats the HQ deals with are engineered in some capacity."

– Intelligence Analyst at FBI Headquarters

But, We Were Still Missing Something Critical



**AI-Edited Pathogens
are more PRESSING
than anticipated.**

**Current Safeguards are
likely to FAIL yet very
few are talking about it.**

We Received Early Support!



National Institute
of Health



Aclid &
SecureDNA



Twist Biosciences



National Security
Commission for
Emerging
Biotechnology

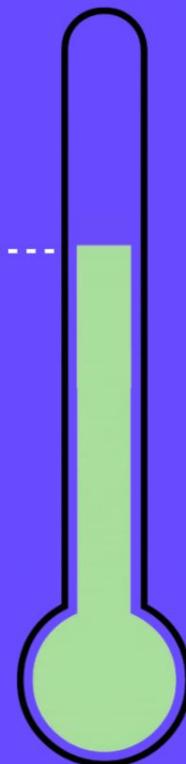
Week 5–6

78 Interviews in...

Does anyone else care? + Get
Outside the Building!

Emotion Meter

Inspired -----



At First, We Missed the Full Picture

Bad Actor



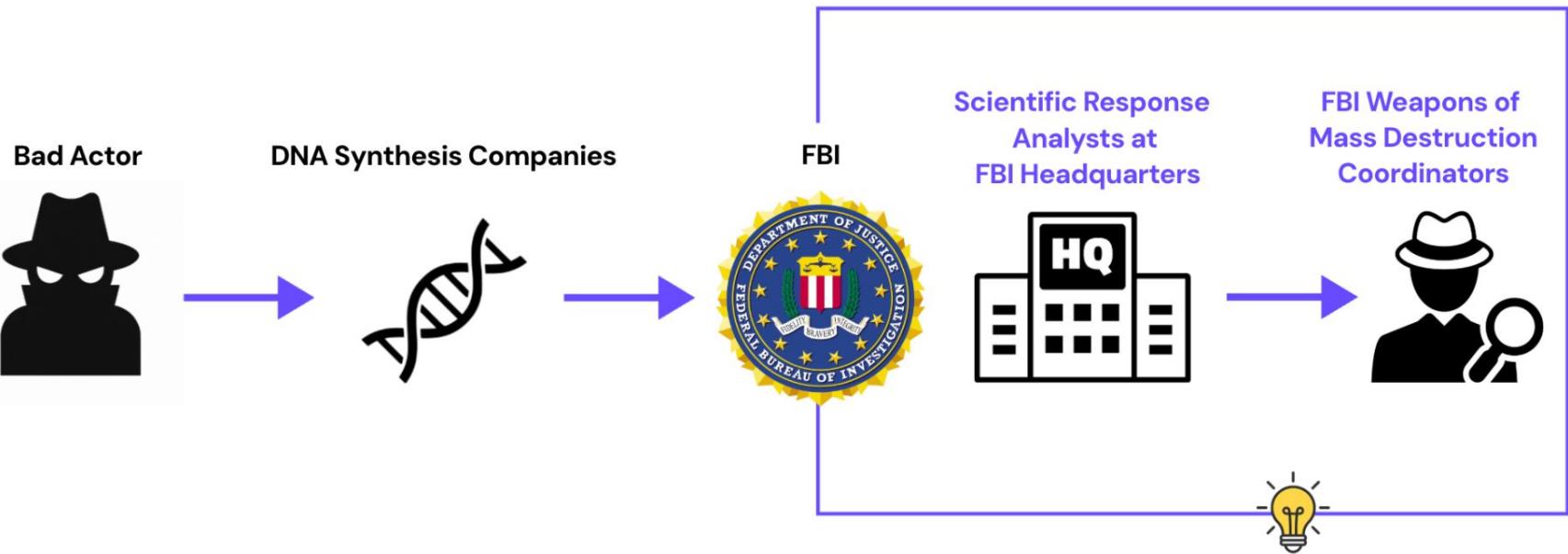
DNA Synthesis Companies



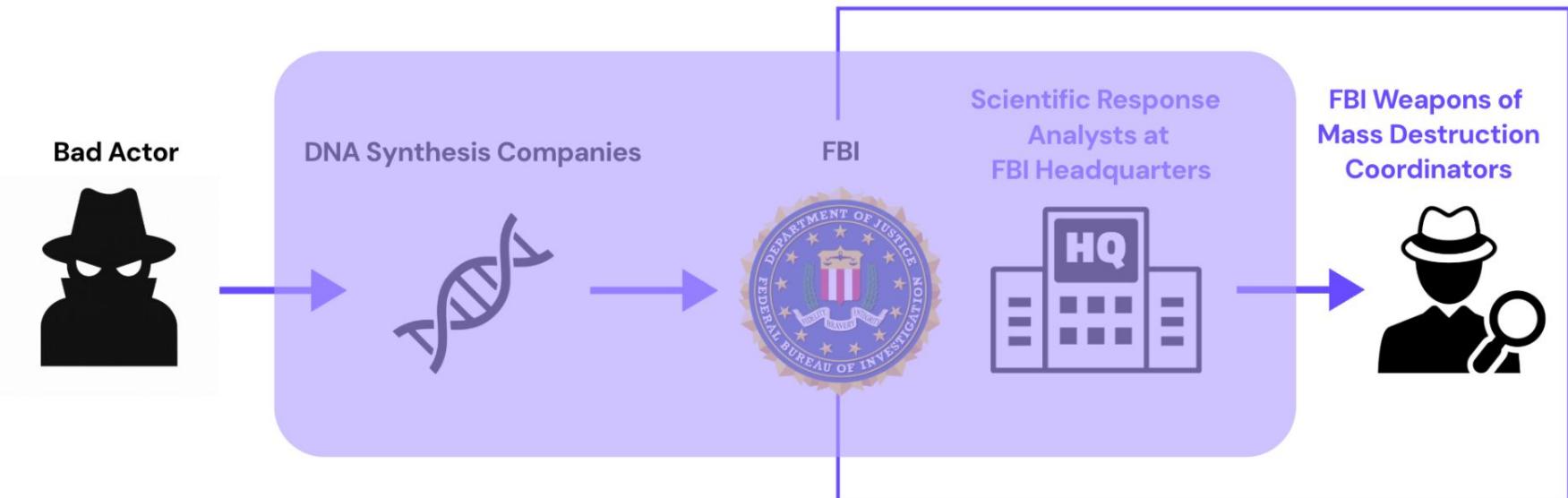
FBI



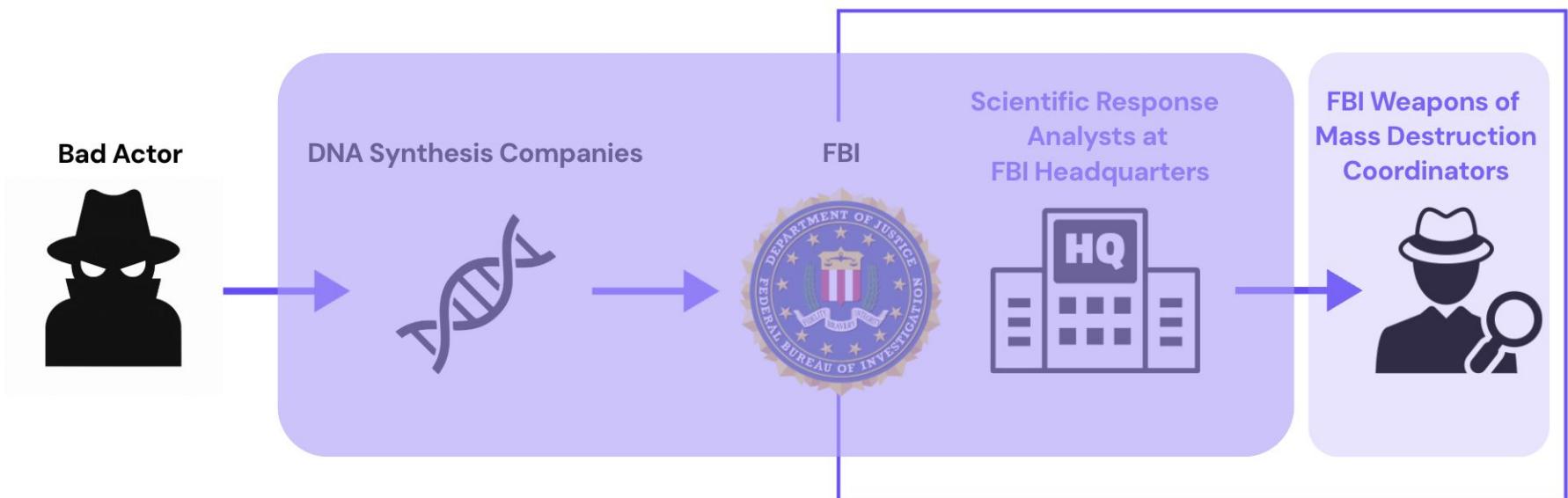
Missing Piece: Clarifying the FBI Workflow



Pinpointing the Primary Beneficiaries



Reframing WMD Coordinators as Secondary Beneficiaries



We Got Out of the Building

→ in person connections

→ real world context

→ unexpected opportunities



**Dr. Drew Endy's
Lab**



**Lawrence Berkeley
National Laboratory**



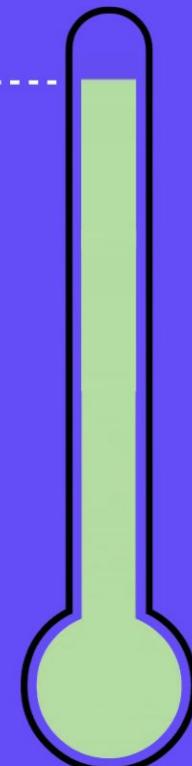
**SynBioBeta
Conference**

Week 7-8

108 Interviews in...

Emotion Meter

Growth Minded -----



Build, Validate, and Iterate

We're Building a Technical Moat: The First AI-Native Biosecurity Stack



1 – Synthetic Pathogen Database

Approach	Value Added
Function Preserving Framework	Simulates real-world evasion tactics to find what legacy tools fail to catch



2 – AI Classifier

Pipeline	Value Added
Analyst Ready Report	<ul style="list-style-type: none">Confidence scorePredicted function or family
Classifier Layer	Predict functional risk (toxin vs non-toxin)
Pretrained Models	Use protein LMs to extract function from sequence.

Testing Interface: AI-Native Pathogen Detection For Industry



OMNYRA

Omnyra is an AI-driven platform designed to detect synthetic biological sequences that evade traditional homology-based screening tools. We offer streamlined FBI reporting options based on flagged risk levels. Our team is actively evaluating various sequence encoders, fine-tuning strategies, dataset curation pipelines, and embedding-based detection methods. Check out our demo to learn more about our vision!

FASTA input

```
>OMNYRA_SYNTHETIC_01 AI-edited analog of Variola virus strain India-1967 [Synthetic]
ATGGAGGATTAAACATATTCCGGCACACAAAAGAAAATATGAGATACATA
AAAGTTTGAAGATTTAA
ATCTAGAGATCTTATTATTTACAGAAAATACAGGTAGGATAAGATACTTT
ATTCTTTAATTTTATT
ATTGAATAATTTGTTTAAAGGTAAAGTGTTTATGATGTTCTAAAACGATGT
TTTCAAACTAGAGAAA
TCCTCTATTTTATTTATTTAACTTGTCAAGAATAAGGATGGGATTATTTATAGA
```

Submit

Natural Matches **AI-Edited Variants**

Synthetic Functional Analog
0–50 bp 51–100 bp 101–150 bp

⚠️ Pathogen Detected: Synthetic analog of *Variola virus*. Confidence level: High

View Threat Analysis Report



Threat Analysis Report

Threat Interval
0–150 bp

Virulence Score
High

Explore reporting options:

Flagged Blocked **Report to FBI**

[View all flagged and blocked orders](#)

Related variants in GenBank:
NC_001611.1 AY243312.1 AY243313.1 AY243314.1 AY243315.1 AY243316.1



We're building something that doesn't currently exist but is needed.

Our Screening Tool Received Positive Feedback And Interest

Open to collaborating if Omnyra excel in speed, accuracy, and/or cost.

– Two Major Screening Tools in Market

... Companies will appreciate the inbuilt ability to report to FBI when threats emerge.

– Postdoc at Engineering Biology Research Consortium

How Do These Insights Inform a FBI-Facing Tool

**Solve Bottleneck in
Threat Reporting
at FBI Headquarters**



**Seamlessly Integrate
with Existing Pipeline**

We Designed The First SynBio Threat Triage Tool For The FBI

FASTA Input

```
>OMNYRA_SYNTHETIC_01 AI-edited analog of Variola virus  
strain India-1967 [Synthetic]  
ATGGAGGATTATAACATATTGGCACACAAAAGAAATAATGAAGATACATA  
AAGTTGAGAATTTAA  
ATCTAGAGATATCTATTATTACAGAAAATACAGGTAGGATAAGATACTTT  
ATTTCTTAATTTTATT  
ATTGAATAATTGTTATAAGGTAAAGTGTATTGATGTTCTAAACGATGT  
TTTAAATTCACACAA
```

Submit

Natural Matches **AI-Edited Variants**

Synthetic Functional Analog

0–50 bp	51–100 bp	101–200 bp
		

⚠ Pathogen Detected: Synthetic analog of *Variola virus*. Confidence level:
High

View Threat Analysis

Threat Analysis Report

Threat Interval: 0–150 bp
Virulence Score: High
Explore reporting options:

Launch Investigation **View Full Report**

Related variants in GenBank:
AY999001.1 AY999002.1 AY999003.1

Launch Investigation

Method of Investigation:
e.g. Contact San Francisco WMD Coordinator (Kari Montoya)

Threat Priority Level:
Select Priority

Notes:
Add any relevant context or comments...

Send Report

**They Just Dropped The Mandate.
We Already Built The Tool.**



45 47

↳ PRESIDENTIAL ACTIONS

IMPROVING THE SAFETY AND SECURITY OF BIOLOGICAL RESEARCH

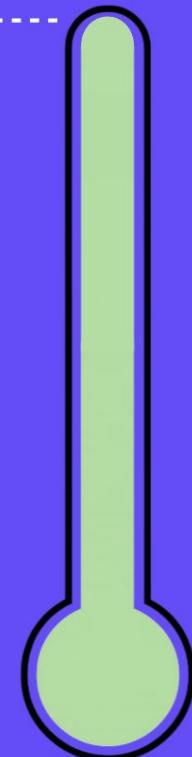
Executive Orders

May 5, 2025

Week 9–10

130 Interviews in total

Emotion Meter
Fired Up -----



Deployment + Post Class Journey...

Positioning to Define the Dual-Use Future

Where Our Existing Tech Goes Next

DIU Commercialization Summer Fellowship

FBI Pilot

Inform EO policy via OSTP conversations with our domain insights

Collaborate with screening providers

Strategic Extensions

Gene function annotation

Deployable battlefield biosensors

Generative protein design platforms

Predictive drug discovery framework

Our Technology and Investability Readiness Levels = 4



**Completed scoping
research to prove feasibility**



**Prototyped minimum fidelity
MVP – proving it can detect
sequences with high AI edits**

