



FELIX

FINDING ENGINEERING-LINKED INDICATORS

INTELLIGENCE VALUE

The FELIX program aims to augment and improve current biodetection and biosurveillance capabilities by developing new computational and experimental tools for detection of engineered biological systems.

New biotechnologies have enabled the development of diverse biological systems, with potential benefits ranging from new vaccines to improved crops. Genome editing tools have made biological engineering more accessible, convenient, and economical. However, these tools could be misused -- accidentally or deliberately -- to adversely affect public health, the economy, and national security.

Current methods for detecting signs of biological engineering are typically costly, slow, and capable of detecting only a subset of all possible genetic

modifications. The FELIX program is developing new computational and experimental tools and methods to improve and augment existing detection capabilities. Designed to work across a range of biological organisms that may be found in complex, multi-species environments, FELIX tools and methods can provide early alerts to the presence of engineered organisms and help expedite appropriate responses, thereby avoiding adverse consequences. The program's achievements since its inception in June 2018 include:

- Proof-of-concept living biosensors to detect engineering markers
- Detection of engineering signatures at the single-cell level
- Detection of known signatures in a 1:100,000 ratio of target: background species
- Extensive training data sets for machine learning algorithms

PRIME PERFORMERS

- Broad Institute of the Massachusetts Institute of Technology and Harvard University
- Ginkgo Bioworks Inc.
- Harvard University Wyss Institute
- Noblis Inc.
- The Charles Stark Draper Laboratory Inc.

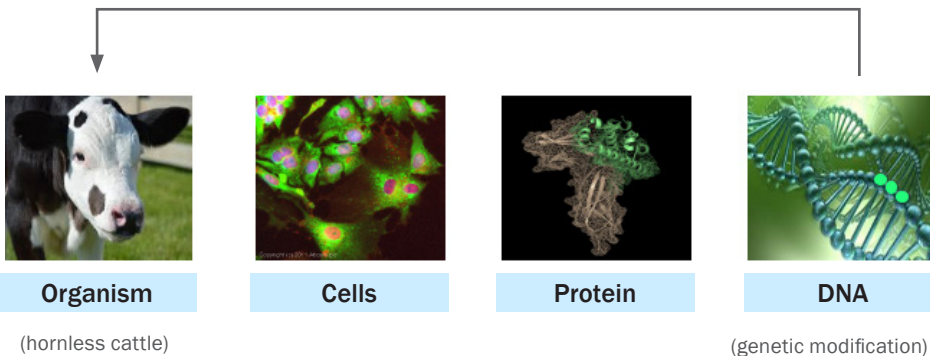
- Raytheon BBN Technologies Corporation

TESTING AND EVALUATION PARTNERS

- Argonne National Laboratory
- Lawrence Berkeley National Laboratory
- Pacific Northwest National Laboratory
- United States Department of Agriculture-National Wildlife Research Center

KEYWORDS

- Biological detection
- Biological engineering
- Biodefense
- Bioinformatics
- Biosecurity
- Biosurveillance



FELIX aims to make it easy to detect engineering signatures in arbitrary biological samples and reduce sample-to-answer times from weeks to hours. We are developing experimental and computational tools to enable rapid targeted detection of engineering signatures in mixed samples, accelerate analysis workflows, and further extend capabilities. If FELIX succeeds, we will have tools to enable widespread persistent biosurveillance at ports and other locations of interest.



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