OFFICE OF THE DIRECTOR OF NATIONAL INTELLIGENCE

Intelligence Advanced Research Projects Activity (IARPA)
Overview for NAS RFI

July 2016

IARPA Mission and Method

IARPA's mission is to invest in high-risk/high-payoff research that has the potential to provide the U.S. with an overwhelming intelligence advantage over our future adversaries

- Bring the best minds to bear on our problems
  - Full and open competition to the greatest possible extent
- Define and execute research programs that:
  - Have goals that are clear, measureable, ambitious and credible
  - Employ independent and rigorous Test & Evaluation
  - Involve IC partners from inception to finish
  - Run from three to five years

Current Program Related to RFI

- Functional Genomic and Computational Assessment of Threats (Fun GCAT)
  - Improve our analytical capabilities to reduce biological threats that arise either accidentally or intentionally by curating genes based on function
  - Demonstrate effective approaches for the assessment of DNA sequences and improve current capabilities in the characterization and analysis of novel nucleic acid sequences to assess threat potential of unknowns, whether they are manmade or the products of evolution
  - Proposers' Day held 6/28
  - BAA expected to be released in FY 2016

Other Areas of Interest

- Differentiating naturally occurring from lab based organisms

Deliverables

- Functional screening methodology adaptable to any data source
  - Approaches to analyze unknowns
  - Applicable to various sources of sequence data
  - Improved modelling of structure/function of unknown genes
- Improved capability to address unknown threats
  - Computational models that inform new/emerging threats
    - Systems: bacterial, toxin, viral, host response, etc.
    - Test data provided by T&E performer
- Framework for a functionally annotated db derived from integration of data allowing DNA sequence screening and improved prediction of unknowns

Overlap with RFI areas of interest

a. Comparators. Research addressing the nature and extent to which comparisons of future modified organisms, or communities of modified organisms (including those associated with the human microbiome), can be made to wild-type organisms or communities of organisms, to inform problem formulation, risk characterization, and post-market monitoring and surveillance. Include research to address scenarios where there are no 'present-day' analogues to the modified organisms.

h. Modeling. Research on the use of conceptual models (e.g., in the problem formulation step of risk assessments), physical models (e.g., human organs on a chip, mesocoms), and computational models to help inform risk-based hypotheses in assessments, to direct collection of additional data to reduce uncertainties in assessments, or to provide definitive findings or predictions in risk characterization.

b. Non-target Gene Effects and Phenotypic Characterization. Research addressing techniques to assess the nature and extent of effects on non-target genes and unintended phenotypes; understanding phenotypic functions of new traits and how the environment influences expression of the functions; phenotypic characteristics most relevant to near-term perturbations vs long-term consequences in humans, other organisms, communities or ecosystems.

d. Fitness, Genetic Stability and Lateral Gene Transfer. Research addressing approaches to assess gene persistence and stability of genetic material across generations; potential for genes to transfer to unrelated species with increased consistency and reliability.

e. Control of Organismal Traits. Research addressing intrinsic and external control measures designed to meet specified levels of risk mitigation for intentional or accidental releases.

c. Impacts on Non-target Organisms. Research addressing exposure of future biotechnology products to humans and other non-target organisms and resultant toxicity (including allergenic responses). Research addressing changes in non-target species' populations through indirect effects of future biotechnology products due to perturbations in trophic relationships (e.g., reductions in prey and other food sources) and habitat alteration.