## Proteos Proposers’ Agenda

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Speaker</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:00 – 9:15am</td>
<td>Logistics, Proposer’s Day Goals</td>
<td>Kristen Jordan</td>
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<tr>
<td></td>
<td></td>
<td>Program Manager, IARPA</td>
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<tr>
<td>9:15 – 9:30am</td>
<td>IARPA Overview</td>
<td>Jason Matheny</td>
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<td>Director, IARPA</td>
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<tr>
<td>9:30 – 10:00am</td>
<td>Proteos Technical and BAA Overview</td>
<td>Kristen Jordan</td>
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<td>Program Manager, IARPA</td>
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<td>10:00 – 10:30am</td>
<td>Break</td>
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<td>10:30 – 11:00am</td>
<td>Proteos T&amp;E Approaches</td>
<td>Deon Anex,</td>
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<td>Program Manager, LLNL</td>
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<td>11:00 – 11:20am</td>
<td>Doing Business with IARPA</td>
<td>Acquisition Team, IARPA</td>
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<tr>
<td>11:20 – 11:50pm</td>
<td>Break</td>
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<td>11:50 – 12:20pm</td>
<td>Proteos Questions &amp; Answers</td>
<td>Kristen Jordan</td>
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<td>Program Manager, IARPA</td>
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<tr>
<td>12:20 – 3:00pm</td>
<td>Poster Session, Networking, and Teaming Discussions</td>
<td>Attendees</td>
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<td>(No Government)</td>
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Announcements / Facilities

- Restrooms
- Please put your cell phones in silent mode
- Lunch is on your own
Disclaimer

- This Proposers’ Day Conference is provided solely for information and planning purposes.

- The Proposers’ Day Conference does not constitute a formal solicitation for proposals or proposal abstracts.

- Nothing said at Proposers’ Day changes the requirements set forth in a Broad Agency Announcement (BAA).
Proposer’s Day Goals

- Familiarize participants with IARPA’s interest in development of novel protein-based identification capabilities
- Familiarize participants with IARPA’s mission and how to do business with IARPA
- Provide answers to participants’ questions
- Foster discussion of synergistic capabilities among potential program participants, i.e., facilitate teaming
  - Take a chance – someone might have a missing piece of your puzzle
Important Points

- Proposers’ Day slides will be posted on IARPA.gov
- Please save questions for the end, write on notecards
- Posters are available for browsing during breaks/lunch
- Government will not be present during the poster/teaming session
- Discussions with PM allowed until BAA release
  - Once BAA is published, questions can only be submitted and answered in writing via the BAA guidance
- Name/email list of Proposers’ Day participants provided to the group with permission
IARPA Overview

Jason Matheny
Director, IARPA
IARPA Mission and Method

IARPA’s mission is to envision and lead high-risk, high-payoff research that delivers innovative technology for future overwhelming intelligence advantage

- Bring the best minds to bear on our problems
  - Full and open competition to the greatest possible extent, funding scientists and engineers in academia and industry, through contracts, grants, OTs, and prize challenges
  - World-class, rotational Program Managers

- 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 start to finish
  - Run from three to five years
  - Publish peer-reviewed results and data, to the greatest possible extent
IARPA’s Customers

Central Intelligence Agency  Defense Intelligence Agency

Department of State  National Security Agency

Department of Energy  National Geospatial-Intelligence Agency

Department of the Treasury  National Reconnaissance Office

Drug Enforcement Administration  Army

Federal Bureau of Investigation  Navy

Department of Homeland Security  Air Force

Coast Guard  Marine Corps

Drug Enforcement Administration

Department of the Treasury

Drug Enforcement Administration
IARPA Highlights

“One of the government’s most creative agencies.”

– David Brooks, NYT

Best known for quantum computing, superconducting computer tournaments; but our portfolio is diverse -- math, CS, physics, neuroscience, linguistics, political science, cognitive psychology, Zika.”

Research highlights include:

- White House BRAIN Initiative, National Strategic Computing Initiative
- Nobel Prize for Physics
- Science “Breakthrough of the Year”
- MacArthur “Genius”
- 2,000+ journal articles
- >70% of completed research transitioned to USG partners
Current IARPA Research

Collection
- Amon-Hen (space SA)
- FELIX (syn bio)
- FunGCAT (syn bio)
- Ithildin (chem detection)
- HFGeo (HF geolocation)
- MAEGLIN (CBRN)
- MOSAIC (pattern of life)
- Odin (biometrics)
- Proteos (human ID)
- SILMARILS (chem)
- SLiCE (RF tracking)
- UnderWatch (undersea)
- Seedlings and Studies

Analysis
- Aladdin (video search)
- Babel (speech recognition)
- CORE3D (3D modeling)
- DIVA (surveillance video)
- Finder (geolocate images)
- Janus (facial recog)
- KRNS (neuroimaging)
- MATERIAL (translation)
- SHARP (training)
- Seedlings and Studies

Computing
- C3 (cryogenic computing)
- HECTOR (encryption)
- LogiQ (quantum)
- MICrONS (neuromorphic)
- QEO (quantum)
- RAVEN (chip analysis)
- SuperTools (cryogenic)
- TIC (chip security)
- VirtUE (cloud security)
- Seedlings and Studies

Anticipatory Intel
- CAUSE (cyber I&W)
- CREATE (crowdsourcing)
- FUSE (S&T intel)
- Hybrid Forecasting (I&W)
- Mercury (SIGINT I&W)
- SCITE (insider threats)
- Seedlings and Studies

Prize Challenges
- Nail-to-Nail Fingerprinting
- Unconstrained Face Recognition
- Functional Map of the World
- MORGOTH’S CROWN
How to engage with IARPA

- **Website:** www.IARPA.gov
  - Reach out to us, especially the IARPA PMs. Contact information on the website.
  - Schedule a visit if you are in the DC area or invite us to visit you.

- **Opportunities to Engage:**
  - **Research Programs**
    - Multi-year research funding opportunities on specific topics
    - Proposers’ Days provide opportunities to learn what is coming, and to influence programs
  - **IARPA-Wide BAA “Seedlings”**
    - Typically a 9-12 month study; you can submit your research proposal at any time
    - Strongly encouraged: informal discussion with a PM before proposal submission
  - **Prize Challenges**
    - No proposals required
    - Submit solutions to our problems; if your solutions are the best, you receive a cash prize and bragging rights
  - **Requests for Information (RFIs) and Workshops**
    - Provide input while IARPA is planning new programs
Proteos Overview

- The Proteos Program seeks to develop novel approaches for human identification and the ability to correlate an individual with objects, events, and locations based on polymorphisms in amino acids in proteins.

- Protein-based methodologies could be for cases and scenarios where traditional forensic DNA analysis methods are precluded or not sufficiently informative – mixtures, partial profiles, degraded DNA, or no DNA available.

- Proteos will focus on shed skin cells (touch samples).

- Explore the relationship between polymorphisms in the skin proteome of genetically variable peptides (GVPs) and their underlying non-synonymous single nucleotide polymorphisms (SNPs).
**Goal:** Develop a protein-based methodology to augment DNA human identification and correlation capabilities and overcome challenges associated with DNA forensic analysis.
Challenges with DNA

- DNA for forensic purpose can be degraded, present in a complex mixture, or at concentrations too low for a meaningful result.
- DNA is found in low quantities or degraded.
- DNA is often found as part of a complex mixtures from several contributors.

Trace and/or degraded sample

Partial DNA profile

Missing info at these loci

Unknown number of contributors in complex mixed samples

Human ID cannot be determined
Challenges with DNA

<table>
<thead>
<tr>
<th>Reference</th>
<th>Sample challenges</th>
</tr>
</thead>
<tbody>
<tr>
<td>NIST study (E. Butts, 2012)</td>
<td>~70-85% of initial DNA sample is lost during the extraction process</td>
</tr>
<tr>
<td>DNA from firearms and cartridge casings (S. Nunn, J For Sci 2013, 58 (3): 601-608)</td>
<td>28% single source profiles (mostly partial), 30% mixtures and 43 % negative for DNA</td>
</tr>
<tr>
<td>Center for Forensic Science, University of Technology (J. Raymond et al., For Sci Int: Genetics 4 (2009) 26–33)</td>
<td>An STR profile was not obtained in 48% of cases, mixture was observed in 20% and partial (&lt;12) was obtained in 18%</td>
</tr>
<tr>
<td>Leiden University Medical Center study (P. Dieltjes et al., Int J Legal Med 2011, 125:597-602)</td>
<td>Average success rate for obtaining any type of DNA result, including partial and mixed profiles, was only 7% for ammunition-related items</td>
</tr>
</tbody>
</table>
Current Research

- G.J. Parker et al., *PLOS One* (2016)
  - LLNL proof-of-concept study using hair proteins
  - Correlated changes in exomic DNA (nsSNPs) with genetically variable peptides (GVPs)

Differences in protein sequence reflect variation in DNA for an individualized signature
Protein-based Proof-of-Concept

Hair shaft proteins → Identification of Genetically Variant Peptides (GVP) → GVP List

Individual protein-based signature

G.J. Parker et al., PLOS One (2016).
Identification of Rare SNPs and corresponding GVPs

Target or reference DNA

Identification of Rare SNPs and corresponding GVPs

Pure/complex mixed sample proteins

Detection of Rare GVPs in sample
Key BAA Highlights

- Offeror team must address all of program requirements within the two thrust areas; no partial proposals, such as development of specific component technology, will be accepted.
- The Government anticipates that proposals submitted under this BAA will be unclassified.
- Multiple awards are expected.
- Government T&E team will be LLNL.
Program Overview

- Discovery and characterization of GVPs in skin proteome (touch samples)

- Discovery of nsSNPs in DNA to predict rare GVPs
  - Rare SNPs present in < 0.1% of the general population

- Performers will develop and optimize an extraction protocol for both protein and DNA from touch samples

- Demonstrate the ability to distinguish contributors from complex samples
  - Mixed contributors at different concentrations
  - Various surfaces, interferences, varying environmental conditions
Two Technical Thrust Areas

- Technical Thrust 1 – GVP discovery
  - Develop common and rare GVP discovery/identification pipelines

- Technical Thrust 2 – extraction protocol development
  - Develop and optimize protein and DNA extraction protocol for touch samples
  - Goal is to recover both protein and DNA in quantity and quality for GVP and STR analysis
Program Structure

- **Phase 1/Thrust 1** - Common GVP discovery
  
  **Phase 1A (9 months):** Develop Common GVP Panel
  
  | Discover maximum # of common GVPs | Validate GVP discovery | Optimize total protein recovery | Provide list of skin proteins identified |
  |
  
  **Phase 1B (3 months):** Common GVP Panel Evaluation
  
  | Minimize false positives | Calculate random match probability |
  |

- **Phase 1A:** Performers will discover common GVPs using their in-house skin samples, 25 samples of a single biogeographic origin

- **Phase 1B:** Performers will recover GVP profiles from 25 Government-provided cell suspension samples
## Program Structure

- **Phase 1/Thrust 2** – Protein and DNA extraction protocol

### Phase 1A (9 months): Protein and DNA Extraction Protocol Development

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Phase Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protein coverage by proteomic analysis</td>
<td>% protein recovery</td>
</tr>
</tbody>
</table>

### Phase 1B (3 months): Protocol Evaluation

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Phase Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calculate random match probability</td>
<td>% protein recovery</td>
</tr>
</tbody>
</table>

- **Phase 1A**: Performers will develop a dual protein/DNA extraction and processing protocol suitable for GVP identification and STR analysis using their own skin samples

- **Phase 1B**: Performers will recover GVP profiles and DNA from Government-provide touch samples deposited on a glass surface at n=3 concentrations
Program Structure

- **Phase 2/Thrust 1** – Rare GVP discovery

**Phase 2A (9 months): Rare GVP Discovery**
- Calculate random match probability
- Rare GVPs supported by data (e.g. MSMS spectra)

**Phase 2B (3 months): Rare GVP Panel Evaluation**
- False positive rate
- True positive rate
- Rare GVPs supported by data (e.g. MSMS spectra)
- Identification of each target individual
- GVP panel identification prediction power

- **Phase 2A**: Performers will predict rare GVPs from Government-provided exomic sequence data from 25 individuals of a single biogeographic origin
- **Phase 2B**: Performers will deduce a single contributor using rare GVP marker(s) within a mixture of Government-provided touch samples deposited on glass substrates
# Program Structure

**Phase 2/Thrust 2 – Protein and DNA extraction protocol**

<table>
<thead>
<tr>
<th>Phase 2A (9 months): Extraction Protocol Optimization</th>
</tr>
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<tbody>
<tr>
<td>GVP reproducibility</td>
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</table>

<table>
<thead>
<tr>
<th>Phase 2B (3 months): Optimized Protocol Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common GVP reproducible detection</td>
</tr>
<tr>
<td>% DNA and protein recovery</td>
</tr>
<tr>
<td>Calculate random match probability</td>
</tr>
<tr>
<td>STR analysis</td>
</tr>
</tbody>
</table>

- **Phase 2A**: Performers will recover relevant GVPs using in-house skin samples from brass shell casings, polypropylene, and common desktop-material coupons for protocol optimization.

- **Phase 2B**: Performers will recover GVP profiles and DNA from Government-provided touch samples deposited in a controlled manner on brass, polypropylene, and desktop surface materials at n=3 concentrations.
Program Structure

- **Phase 3/Thrusters 1 & 2** – Operational scenarios evaluation

<table>
<thead>
<tr>
<th>Phase 3 (6 months): Operational Scenarios Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>False positive rate</td>
</tr>
</tbody>
</table>

- Optimized protein and DNA extraction protocols and GVP panel identification workflow will be tested against multiple surfaces, mixed contributors, different environmental conditions (humidity, heat), interferences, and varying times post deposition on Government-provided samples.

- Performers will be evaluated on the ability to successfully conclude a match between the reference GVP panel predicted from the genetic sequence reference data and the proteins extracted from mixed contributor touch samples.
## Anticipated Metrics for Phase 1/Thrust 1 – Common GVP

<table>
<thead>
<tr>
<th>Phase 1</th>
<th>Metrics</th>
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</thead>
<tbody>
<tr>
<td><strong>Phase 1A: Common GVP Discovery</strong></td>
<td>- A GVP panel consisting of &gt; 60 unique GVPs with allele frequencies &gt;1%</td>
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<td></td>
<td>- GVP panel shall include at least 10 proteins with at least 50% coverage and with peptides detected in 100% of samples</td>
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<tr>
<td><strong>Phase 1B: Common GVP Evaluation</strong></td>
<td>- Random match probability $\leq 10^{-6}$</td>
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<td></td>
<td>- False positive rate $\leq 5%$ for markers</td>
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</table>
## Anticipated Metrics for Phase 1/Thrust 2 – Extraction Protocol

<table>
<thead>
<tr>
<th>Phase 1</th>
<th>Metrics</th>
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</thead>
</table>
| **Phase 1A: Extraction Protocol Development** | - Protein coverage such that a total of > 15,000 amino acids are covered by proteomic analysis  
- Recovery > 80% for protein deposited on glass surfaces  
- Recovery of sufficient DNA to obtain 13 STR loci using standard techniques |
| **Phase 1B: Extraction Protocol Evaluation**  | - Random match probability better than $10^{-5}$ from detected common GVPs from Government-provided glass surface samples  
- Recovery > 90% of protein  
- 13 STR loci from Government-provided samples |
## Anticipated Metrics for Phase 2/Thrust 1 – Rare GVP

<table>
<thead>
<tr>
<th>Phase 2</th>
<th>Metrics</th>
</tr>
</thead>
</table>
| **Phase 2A: Rare GVP Discovery** | • Predicted random match probability $\leq 10^{-9}$ for rare GVP panel  
• Rare GVPs supported by MSMS spectra with match factor to theoretical spectra $\geq 800$ (or other appropriate supporting data) |
| **Phase 2B: Rare GVP Evaluation** | • False positive rate $\leq 2\%$ for markers  
• True positive rate $> 80\%$ for markers  
• Rare GVPs supported by MSMS spectra with match factor to theoretical spectra $\geq 900$ (or other appropriate supporting data)  
• Correct identification of each target individual in samples where present with 0% false positive rate and $\leq 15\%$ false negative |
## Anticipated Metrics for Phase 2/Thrust 2 – Extraction Protocol

<table>
<thead>
<tr>
<th>Phase 2</th>
<th>Metrics</th>
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</thead>
<tbody>
<tr>
<td><strong>Phase 2A: Extraction Protocol Optimization</strong></td>
<td>• Reproducibility of GVP detection from triplicate extractions (brass, plastic, and desktop surfaces)</td>
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</tbody>
</table>
| **Phase 2B: Optimized Protocol Evaluation** | • Reproducible detection of 90% of common GVPs from triplicate extractions (brass, plastic, and desktop surfaces)  
• Recovery > 90% of deposited DNA and protein from Government-provided brass, plastic, and desktop surfaces  
• Random match probability better than $10^{-5}$ from detected common GVPs from Government-provided brass, plastic, and desktop surfaces  
• Consistent STR profile of 13 loci from Government-provided brass, plastic, and desktop surfaces in all samples |
## Anticipated Metrics for Phase 3 Operational Scenarios Evaluation

<table>
<thead>
<tr>
<th>Phase 3: Operational Scenarios Evaluation</th>
<th>Metrics</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>For samples with interferences, environmental stress, low sample quantity and/or challenging surfaces:</td>
</tr>
<tr>
<td></td>
<td>• False positive rate (\leq 2%) for rare GVP profile</td>
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<tr>
<td></td>
<td>• True positive rate (\geq 80%)</td>
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<tr>
<td></td>
<td>• Rare GVPs supported by MSMS spectra with match factor to theoretical spectra (\geq 900) (or other appropriate supporting data)</td>
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<tr>
<td></td>
<td>• Correct identification of each target individual in mixed contributor samples where present with 0% false positive rate and (\leq 5%) false negative</td>
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**Milestones and Waypoints**

- **Milestones** are Government-defined progress metrics that must be met by the end of each phase.

- **Waypoints** are offeror-defined, task-driven intermediate steps towards a milestone.
  - Depending on an offeror’s specific approach, progress towards a milestone is not expected to be linear in all areas.
  - Waypoints are how the offeror clearly explains to the Government the quantitative and timely progress that must be made for their overall concept to meet the end-of-phase Milestones – performance against these waypoints is reviewed throughout program.

- **Site visits**

- **PI meetings**

- **Monthly technical reports**
## Anticipated Program Schedule

<table>
<thead>
<tr>
<th>Pre-program</th>
<th>CY2017</th>
<th>CY2018</th>
<th>CY2019</th>
<th>CY2020</th>
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<tbody>
<tr>
<td>New Start Pitch</td>
<td>3/31</td>
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<tr>
<td>Proposers’ Day</td>
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<td>7/25</td>
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<tr>
<td>BAA released</td>
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<td>8/25</td>
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<tr>
<td>Proposals due</td>
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<td>10/20</td>
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<tr>
<td>Source selection</td>
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<tr>
<td><strong>Proteos Program</strong></td>
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<tr>
<td>Kick-off</td>
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<tr>
<td>Phase 1 (Thrusts 1&amp;2)</td>
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<tr>
<td>Phase 2 (Thrusts 1&amp;2)</td>
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<tr>
<td>Phase 3 (Thrusts 1&amp;2)</td>
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<tr>
<td>Transition</td>
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<tr>
<td>Program reviews/site visits</td>
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<tr>
<td><strong>T&amp;E</strong></td>
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<tr>
<td>Phase 1</td>
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<td>Phase 2</td>
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<td>Phase 3</td>
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# Anticipated Deliverables

<table>
<thead>
<tr>
<th>Month</th>
<th>Deliverable</th>
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<tbody>
<tr>
<td>1</td>
<td>IRB approvals</td>
</tr>
<tr>
<td>10</td>
<td>Phase 1A (Thrust 1): A list of proteins in the skin proteome and the protein coverage, a panel of identified common GVPs that can be used for identification meeting the T&amp;E Metrics, the discovery protocol used, as well as the methodology used for validation</td>
</tr>
<tr>
<td>10</td>
<td>Phase 1A (Thrust 2): Developed extraction/purification protocol for both DNA and proteins from skin cells</td>
</tr>
<tr>
<td>13</td>
<td>Phase 1B (Thrust 1): Results of the common GVP evaluation including the list of detected GVPs, supporting data, and calculated random match probabilities</td>
</tr>
<tr>
<td>13</td>
<td>Phase 1B (Thrust 2): Results of the developed extraction/purification protocol evaluation to recover GVP and DNA from Government-provided samples</td>
</tr>
<tr>
<td>21</td>
<td>Phase 2A (Thrust 1): A panel of identified rare GVPs with frequency, the corresponding nsSNPs, and supporting data for each of the 25 samples</td>
</tr>
<tr>
<td>21</td>
<td>Phase 2A (Thrust 2): Optimized extraction/purification protocol for both DNA and proteins from skin cells for single and multiple contributor rare GVP samples</td>
</tr>
<tr>
<td>25</td>
<td>Phase 2B (Thrust 1): Results of the rare GVP evaluation including the list of detected GVPs, supporting data, and calculated random match probabilities.</td>
</tr>
<tr>
<td>25</td>
<td>Phase 2B (Thrust 2): Results of the developed extraction/purification protocol evaluation to recover GVP and DNA from Government-provided samples</td>
</tr>
<tr>
<td>31</td>
<td>Final report including the optimized and validated protocol for processing of protein- and DNA-containing samples for operational specifications required for technology transfer</td>
</tr>
<tr>
<td>Monthly</td>
<td>Monthly technical and financial report due to Government</td>
</tr>
</tbody>
</table>
## Test and Evaluation Strategy:
Evaluate Accomplishments in Each Thrust Area

<table>
<thead>
<tr>
<th>Thrust 1: GVP Panel Discovery</th>
<th>Thrust 2: Sample Preparation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 1</td>
<td>Phase 1</td>
</tr>
<tr>
<td>1A</td>
<td>1B</td>
</tr>
<tr>
<td>Common GVPs</td>
<td>Development</td>
</tr>
<tr>
<td>Testing</td>
<td>Testing</td>
</tr>
<tr>
<td>Phase 2</td>
<td>Phase 2</td>
</tr>
<tr>
<td>2A</td>
<td>2B</td>
</tr>
<tr>
<td>Rare GVPs</td>
<td>Development</td>
</tr>
<tr>
<td>Testing</td>
<td>Testing</td>
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<tr>
<td>Phase 3</td>
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<td>Operational Testing</td>
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</tbody>
</table>

### GVP Panel Discovery
- Characterize skin proteome
- Discover GVPs in skin samples
- Develop identity panel and statistics

### Sample Preparation
- Extract skin proteins from realistic samples
- Preserve DNA evidence

### Operational Testing
- Evaluate sample collection and identification in operationally relevant scenarios
- Challenge developed methods with increasing difficulty
Metrics for Protein Coverage

- Protein coverage defines “space” for finding protein markers (GVPs)
- Coverage varies for the proteins detected
- Total number of amino acids covered provides a useful metric
Metrics for Data Quality

- Existence of a rare GVP is predicted by genomic data
- Rare GVPs need to be supported by high quality data
- Example:
  - Match factor (0-1000) reflects overlap between observed spectrum and theoretical or library spectrum
Thrust 1: GVP Panel Discovery

- Focus on development of identity panels
- Not sample-limited
- Common versus R are
  - Common GPV: >1%
  - Rare GPV: < 0.1%
- Key metrics
  - Protein coverage
  - Number of GVPs
  - Random match probabilities
  - Accuracy of identification
- Samples
  - 1A and 2A: Performer-acquired
  - 1B and 2B: Provided by T&E team

<table>
<thead>
<tr>
<th>Thrust 1 Phase</th>
<th>Metrics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1A: Common GVP Discovery</strong></td>
<td>• A GVP panel consisting of &gt; 60 unique GVPs with allele frequencies &gt;1%</td>
</tr>
<tr>
<td></td>
<td>• GVP panel shall include at least 10 proteins with at least 50% coverage and with peptides detected in 100% of samples</td>
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<tr>
<td><strong>1B: Common GVP Evaluation</strong></td>
<td>• Random match probability ≤ 10^-6</td>
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<tr>
<td></td>
<td>• False positive rate ≤ 5% for markers</td>
</tr>
<tr>
<td><strong>2A: Rare GVP Discovery</strong></td>
<td>• Predicted random match probability ≤ 10^-9 for rare GVP panel</td>
</tr>
<tr>
<td></td>
<td>• Rare GVPs supported by high-quality data (e.g. high match factor for MSMS)</td>
</tr>
<tr>
<td><strong>2B: Rare GVP Evaluation</strong></td>
<td>• Markers:</td>
</tr>
<tr>
<td></td>
<td>– False positive rate ≤ 2%</td>
</tr>
<tr>
<td></td>
<td>– True positive rate &gt; 80%</td>
</tr>
<tr>
<td></td>
<td>• Individual identification:</td>
</tr>
<tr>
<td></td>
<td>– False positive rate of 0%</td>
</tr>
<tr>
<td></td>
<td>– False negative rate of ≤ 15%</td>
</tr>
<tr>
<td></td>
<td>• Rare GVPs supported by high-quality data</td>
</tr>
</tbody>
</table>
Thrust 2: Extraction Protocol

- Focus on protein and DNA recovery
  - Optimize protein recovery without compromising DNA evidence

- Variety of surfaces

- Key metrics
  - Protein recovery
  - Quality of STR profiles
  - Random match probabilities

- Samples
  - Provided by T&E team

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<table>
<thead>
<tr>
<th>Thrust 2 Phase</th>
<th>Metrics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1A: Development of Extraction Protocol</strong></td>
<td>• Protein coverage such that &gt;15,000 amino acids are covered by proteomic analysis</td>
</tr>
<tr>
<td></td>
<td>• Recovery &gt; 80% for protein deposited on glass</td>
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<tr>
<td></td>
<td>• Recovery of sufficient DNA to obtain 13 loci STR profiles using standard techniques</td>
</tr>
<tr>
<td><strong>1B: Evaluation of Extraction Protocol</strong></td>
<td>• Random match probability ≤10⁻⁵ from detected common GVPs from glass surfaces</td>
</tr>
<tr>
<td></td>
<td>• Recovery &gt; 90% of protein</td>
</tr>
<tr>
<td></td>
<td>• STR profile (13 loci, 10 ng deposited DNA)</td>
</tr>
<tr>
<td><strong>2A: Optimization of Extraction Protocol</strong></td>
<td>• Reproducibility of GVP detection from triplicate extractions (brass, plastic, and desktop surfaces)</td>
</tr>
<tr>
<td><strong>2B: Evaluation of Optimized Protocol</strong></td>
<td>• From brass, plastic, and desktop surfaces:</td>
</tr>
<tr>
<td></td>
<td>- Reproducible detection of 90% of common GVPs from triplicate extractions</td>
</tr>
<tr>
<td></td>
<td>- Recovery &gt; 90% of deposited DNA and protein</td>
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<tr>
<td></td>
<td>- Random match probability ≤10⁻⁵ (common GVPs)</td>
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<td></td>
<td>- Consistent STR profile of 13 loci, 1 ng DNA</td>
</tr>
</tbody>
</table>
Phase 3: Operational Testing

- Focus on tests and evaluations for transition partners

- Progressively increasing challenges
  - Environmental (heat, humidity, light exposure …)
  - Sample quantity
  - Sample complexity (multiple contributors, confounding contaminants…)
  - Surfaces (compatibility, porosity…)

### Thrust 1/2 Phase

#### 3: Operational Scenarios Evaluation

### Metrics

For samples with interferences, environmental stress, low sample quantity and/or challenging surfaces:

- False positive rate \( \leq 2\% \) for rare GVP profile
- True positive rate \( \geq 80\% \)
- Rare GVPs supported by MSMS spectra with match factor to theoretical spectra \( \geq 900 \) (or other appropriate supporting data)
- Correct identification of each target individual in mixed contributor samples where present with 0% false positive rate and \( \leq 5\% \) false negative
Doing Business with IARPA
Acquisition Team, IARPA

Office of the Director of National Intelligence
IARPA
BE THE FUTURE
# Proteos Proposers’ Agenda

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Speaker</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:00 – 9:15am</td>
<td>Logistics, Proposer’s Day Goals</td>
<td>Kristen Jordan</td>
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<tr>
<td></td>
<td></td>
<td>Program Manager, IARPA</td>
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<tr>
<td>9:15 – 9:30am</td>
<td>IARPA Overview</td>
<td>Jason Matheny</td>
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<td>Director, IARPA</td>
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<tr>
<td>9:30 – 10:00am</td>
<td>Proteos Technical and BAA Overview</td>
<td>Kristen Jordan</td>
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<td></td>
<td>Program Manager, IARPA</td>
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<tr>
<td>10:00 – 10:30am</td>
<td>Break</td>
<td>Deon Anex</td>
</tr>
<tr>
<td>10:30 – 11:00am</td>
<td>Proteos T&amp;E Approaches</td>
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<tr>
<td>11:00 – 11:20am</td>
<td>Doing Business with IARPA</td>
<td>Acquisition Team</td>
</tr>
<tr>
<td>11:20 – 11:50pm</td>
<td>Break</td>
<td>Deon Anex</td>
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<tr>
<td>11:50 – 12:20pm</td>
<td>Proteos Questions &amp; Answers</td>
<td>Kristen Jordan</td>
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<tr>
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<td></td>
<td>Program Manager, IARPA</td>
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<tr>
<td>12:20 – 3:00pm</td>
<td>Poster Session, Networking, and Teaming Discussions</td>
<td>Attendees</td>
</tr>
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<td></td>
<td>(No Government)</td>
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</tbody>
</table>
Doing Business with IARPA – Recurring Questions

- Read IARPA FAQs
  - Eligibility info
  - Intellectual property
  - Pre-publication review
  - Preparing the proposal

- Electronic Proposal Delivery
  - [https://iarpa-ideas.gov](https://iarpa-ideas.gov)

- Organizational Conflicts of Interest
Responding to Q&As

- Streamlining the Award Process
  - Accounting system
  - Key personnel

- IARPA Funds Applied Research

- RECOMMENDATION: Please read the entire BAA

- Send your questions as soon as possible
  - Proteos BAA: dni-iarpa-baa-17-03@iarpa.gov
  - Write questions as clearly as possible
  - Do NOT include proprietary information
Eligible Applicants

- Collaborative efforts/teaming strongly encouraged
  - Content, communications, networking, and team formation are the responsibility of Proposers
Ineligible Organizations

Other Government Agencies, Federally Funded Research and Development Centers (FFRDCs), University Affiliated Research Centers (UARCs), and any organizations that have a special relationship with the Government, including access to privileged and/or proprietary information, or access to Government equipment or real property, are not eligible to submit proposals under this BAA or participate as team members under proposals submitted by eligible entities.
Intellectual Property (IP)

- Unless otherwise requested, Government rights for data first produced under IARPA contracts will be **UNLIMITED**

- At a minimum, IARPA requires **Government Purpose Rights (GPR)** for data developed with mixed funding

- **Exception to GPR**
  - State in the proposal any restrictions on deliverables relating to existing materials (data, software, tools, etc.)
Pre-Publication Review

- Funded Applied Research efforts, IARPA encourages:
  - Publication for Peer Review of **UNCLASSIFIED** research

- Prior to public release of any work submitted for publication, the Performer will:
  - Provide courtesy copies to the IARPA PM and Contracting Officer Representative (COR/COTR)
  - Ensure shared understanding of applied research implications between IARPA and Performers
Preparing the Proposal

- Note restrictions on proposal submissions
  - Interested Offerors must register electronically IAW instructions on: https://iarpa-ideas.gov
  - Interested Offerors are strongly encouraged to register in IDEAS at least 1 week prior to proposal “Due Date”
  - Offerors must ensure the version submitted to IDEAS is the “Final Version”

- BAA to be released is established to answer most questions; Check FBO.gov for BAA announcement, amendments, Q&As

- BAA – Read Evaluation Criteria carefully
  - e.g. “The technical approach is credible and includes a clear assessment of primary risks and a means to address them”
Preparing the Proposal

- Read IARPA’s Organizational Conflict of Interest (OCI) policy: http://www.iarpa.gov/index.php/working-with-iarpa/iarpas-approach-to-oci

- See also eligibility restrictions on use of Federally Funded Research and Development Centers, University Affiliated Research Centers, and other similar organizations that have a special relationship with the Government
  - Focus on possible OCIs of your institution as well as the personnel and subcontractors on your team
  - It specifies the non-Government (e.g., SETA, FFRDC, UARC, etc.) support we will be using. If you have a potential or perceived conflict, request a waiver as soon as possible
Organizational Conflict of Interest (OCI)

- If a prospective offeror, or any of its proposed subcontractor teammates, believes that a potential conflict of interest exists or may exist (whether organizational or otherwise), the offeror should promptly raise the issue with IARPA and submit a waiver request by e-mail to the mailbox address for this BAA at dni-iarpa-baa-17-03@iarpa.gov

- A potential conflict of interest includes but is not limited to any instance where an offeror, or any of its proposed subcontractor teammates, is providing either scientific, engineering and technical assistance (SETA) or technical consultation to IARPA. In all cases, the offeror shall identify the contract under which the SETA or consultant support is being provided.

- Without a waiver from the IARPA Director, neither an offeror, nor its proposed subcontractor teammates, can simultaneously provide SETA support or technical consultation to IARPA and compete or perform as a Performer under this solicitation.
Streamlining the Award Process

- Cost Proposal – we only need what we ask for in BAA

- Approved accounting system needed for Cost Reimbursable contracts
  - Must be able to accumulate costs on job-order basis
  - DCAA (or cognizant auditor) must approve system

- Key Personnel
  - Expectations of time, note the Evaluation Criteria requiring relevant experience and expertise

- Following selection, Contracting Officer may request your review of subcontractor proposals
IARPA Funding

- IARPA funds **Applied Research** for the Intelligence Community (IC)
  - IARPA cannot waive the requirements of Export Administrative Regulation (EAR) or International Traffic in Arms Regulation (ITAR)
  - Not subject to DoD funding restrictions for R&D related to overhead rates

- IARPA is **not** DoD
Disclaimer

- This is Applied Research for the Intelligence Community

- Content of the Final BAA will be specific to this program
  - The Final BAA is being developed
  - Following issuance, look for Amendments and Q&As
  - There will likely be changes

- The information conveyed in this brief and discussion is for planning purposes and is subject to change prior to the release of the Final BAA
Point of Contact

Dr. Kristen Jordan
Program Manager
IARPA, Office of the Director of National Intelligence
Intelligence Advanced Research Projects Activity
Washington, DC 20511
Phone: 301-851-7720 (unsecure)

• Electronic mail: dni iarpa baa 17 03@iarpa.gov
• Subject Line: IARPA BAA 17 03

Questions? Please fill out cards.
Q & A Session
Dr. Kristen Jordan, Program Manager
Intelligence Advanced Research Projects Activity