



Request for Information - Protein Sequencing for Human Identification

Solicitation Number: IARPA-RFI-16-01

Agency: Office of the Director of National Intelligence
Office: Intelligence Advanced Research Projects Activity

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Synopsis

Request for Information (RFI): Protein Sequencing for Human Identification

The Intelligence Advanced Research Projects Activity (IARPA) is seeking information on using protein to obtain information regarding human identification in the absence of deoxyribonucleic acid (DNA). This request for information (RFI) is issued solely for information gathering and planning purposes; this RFI does not constitute a formal solicitation for proposals. The following sections of this announcement contain details of the scope of technical efforts of interest, along with instructions for the submission of responses.

Background & Scope

DNA is used frequently for human identification in a variety of scenarios, e.g., criminal investigations, missing persons cases, identifying human remains. However, DNA often is found in very low quantities, as part of a greater complex mixture containing DNA from several contributors, and/or is severely degraded, all of which complicate analysis. IARPA is interested in alternative approaches to human identification that utilize proteins, rather than DNA. The primary sources of such proteins include hair and other keratinized epithelial cells, although the scope is not limited to them. Within this topic, areas of interest include:

- Analysis of proteins from the proteome, specifically of variations in the polypeptide sequences
- Statistical calculations and algorithms designed to identify the most meaningful variations
- Alignment and analysis tools for proteome comparisons
- Methodologies to identify individual contributors from a mixture of 2 or more persons
- Development of a panel of polypeptide variations to be used in a “kit”
- Test plans which include the acquisition of human samples, ground truth data, and the confirmation of all polypeptide variations

Responses to this RFI should answer any or all of the following questions:

1. What tools are currently available for protein sequence analysis? How accurate are these tools in their sequencing (what is the resolution in terms of residues), and how do they compare to each other?
2. What tools and separation techniques are required for isolating proteins from a mixture? What are the requirements for further separation to isolate similar proteins as it relates to protein sequencing?
3. Aside from the redundancy of the DNA in encoding certain amino acids, what are other limitations of this approach? What are the time frames (realized or estimated) of using protein sequences versus

DNA sequences? What has been done in terms of validation studies for protein sequencing with respect to human identification?

4. Describe the potential for protein sequencing to resolve mixtures of 2 or more contributors. What are the strengths and weaknesses compared to DNA methods? What specialized analytical tools (that do not currently exist) might be required for mixture analysis versus single-source samples?
5. What databases currently exist that annotate how frequently an amino variation is seen in a given protein? What databases, if any, currently exist that contain protein sequence variations? If none exist, what are the requirements necessary to establish a robust protein identification database? If they do exist, how can they be effectively leveraged for this application? Should a new database be constructed?
6. What are appropriate test and evaluation ground truth data, training data, and metrics to measure the performance protein sequence-based identification models? Are there good test cases for which data and analyses are available?

Preparation Instructions to Respondents

IARPA requests that respondents submit ideas related to this topic for use by the Government in formulating a potential program. IARPA requests that submittals briefly and clearly describe the potential approach or concept, outline critical technical issues/obstacles, describe how the approach may address those issues/obstacles and comment on the expected performance and robustness of the proposed approach. If appropriate, respondents may also choose to provide a non-proprietary rough order of magnitude (ROM) estimate regarding what such approaches might require in terms of funding and other resources for one or more years. This announcement contains all of the information required to submit a response. No additional forms, kits, or other materials are needed.

IARPA appreciates responses from all capable and qualified sources from within and outside of the US. Because IARPA is interested in an integrated approach, responses from teams with complementary areas of expertise are encouraged.

Responses have the following formatting requirements:

1. A one page cover sheet that identifies the title, organization(s), respondent's technical and administrative points of contact - including names, addresses, phone and fax numbers, and email addresses of all co-authors, and clearly indicating its association with RFI-16-01;
2. A substantive, focused, one-half page executive summary;
3. A description (limited to 5 pages in minimum 12 point Times New Roman font, appropriate for single-sided, single-spaced 8.5 by 11 inch paper, with 1-inch margins) of the technical challenges and suggested approach(es);
4. A list of citations (any significant claims or reports of success must be accompanied by citations);
5. Optionally, a single overview briefing chart graphically depicting the key ideas.

Submission Instructions to Respondents

Responses to this RFI are due no later than 4:00 p.m., Eastern Time, on March 4, 2016. All submissions must be electronically submitted to dni-iarpa-rfi-16-01@iarpa.gov as a PDF document. Inquiries to this RFI must be submitted to dni-iarpa-rfi-16-01@iarpa.gov. Do not send questions with proprietary content. No telephone inquiries will be accepted.

Disclaimers and Important Notes

This is an RFI issued solely for information and planning purposes and does not constitute a solicitation. Respondents are advised that IARPA is under no obligation to acknowledge receipt of the information received, or provide feedback to respondents with respect to any information submitted under this RFI.

Responses to this notice are not offers and cannot be accepted by the Government to form a binding contract. Respondents are solely responsible for all expenses associated with responding to this RFI. IARPA will not provide reimbursement for costs incurred in responding to this RFI. It is the respondent's responsibility to ensure that the submitted material has been approved for public release by the information owner.

The Government does not intend to award a contract on the basis of this RFI or to otherwise pay for the information solicited, nor is the Government obligated to issue a solicitation based on responses received. Neither proprietary nor classified concepts or information should be included in the submittal. Input on technical aspects of the responses may be solicited by IARPA from non-Government consultants/experts who are bound by appropriate non-disclosure requirements.

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