TEI-REX Proposers' Day Agenda		
Time (EDT)	**Event/Org**	**Lead Speaker**
9:00 AM – 10:00 AM	**WebEx Meeting Opens**	
10:00 AM – 10:15 AM	Welcome, Logistics, Proposers' Day Goals	Dr. Michael Patterson, Program Manager, IARPA
10:15 AM – 10:30 AM	IARPA Overview	Mr. Robert Rahmer, Director, IARPA Office of Analysis
10:30 AM – 11:15 AM	TEI-REX Program Overview	Dr. Michael Patterson, Program Manager, IARPA
11:15 AM – 11:35 PM	Contracting through Army Research Office	ARO Representative
11:35 AM – 1:00 PM	**Break - Questions must be submitted by 12:00 PM, use this time to engage with other participants**	
1:00 PM – 2:00 PM	Answer Selected Technical Questions	Dr. Michael Patterson, Program Manager, IARPA
2:00 PM – 2:05 PM	Introduction to Lightning Talks	Dr. Michael Patterson, Program Manager, IARPA
2:05 PM – 2:10 PM	Radiological Research Accelerator Facility, Columbia University	Dr. Guy Garty
2:12 PM – 2:17 PM	Nuclear Engineering Department - North Carolina State University	Dr. Robert Bruce Hayes
2:19 PM – 2:24 PM	Signature Science and The University of Texas at Austin	Dr. Curt Hewitt
2:26 PM – 2:31 PM	Johns Hopkins School of Medicine	Dr. Yun Chen
2:33 PM – 2:38 PM	ASELL	Dr. Michael Ehret
2:40 PM – 2:45 PM	University of Washington and Spectragen Informatics	Dr. Michael MacCoss
2:45 PM – 2:50 PM	Proposers' Day Closeout	Dr. Michael Patterson, Program Manager, IARPA

Welcome to the TEI-REX Proposers' Day!

- Thank you for your interest in this program and participating in this event
- To assure a clear broadcast stream, audio and video are disabled for meeting participants
- Comments and questions can be submitted to the IARPA or ARO team via the WebEx "Q&A" tool only
- Questions submitted to the alias (TEI-REX_ProposersDay@iarpa.gov) prior to this meeting and during this presentation, and corresponding answers, may be posted in writing online

Disclaimers

- This presentation is provided solely for information and planning purposes
- The Proposers' Day does not constitute a formal solicitation for proposals or proposal abstracts
- Nothing said at Proposers' Day changes the requirements set forth in a BAA
- **The BAA language supersedes anything presented or said by IARPA or ARO at the Proposers' Day**
- This meeting is being recorded and will be posted for public viewing
- For those viewing the recording, email aliases and POCs may be dated, please refer to IARPA.gov for updated information

Proposers' Day Goals

1. Familiarize participants with IARPA's interest in the TEI-REX program and solicit questions and feedback
2. Foster discussion of complementary capabilities among potential program participants, i.e., TEAMING
   - Teaming information can be found at the following address: **https://www.iarpa.gov/index.php/research-programs/tei-rex**
   - An attendance list, with contact information of participants who approved of sharing will be distributed soon
   - The chat feature is enabled for participants to plan future discussions associated with teaming
   - Teaming interests, capability summaries, and lightning talk slides will be posted publicly on the TEI-REX IARPA webpage until the BAA submission period closes

Please ask questions and provide feedback, this is your chance to alter the course of events.
Please talk with others, find great team members.

Teaming

- Participants are encouraged to find partners and collaborators, someone might have a missing piece of your puzzle.
- Lightning talks will take place following the Program presentations.
- Collaborating and capability summaries will be accepted, with minimal review only for appropriateness, and made available to the public.
  - Teaming documents and summaries can be submitted until the BAA closes, submit to TEI-REX_ProposersDay@iarpa.gov.
  - If you would prefer your information not be shared, not including a recording of this meeting as it will not be modified or removed, email TEI-REX_ProposersDay@iarpa.gov.

Feedback and Questions

- Questions can be submitted until 12:00 pm EDT.
- There will be a break after the contracting presentation at 11:35 am EDT.
- Responses to selected questions will be broadcast at 1:00 pm EDT, so please don't log out or close your WebEx connection.
  - All programmatic and contractual questions will be captured but will not be answered in this session
- Feedback (but not questions) about the draft technical section may be submitted to the IARPA email at TEI-REX_ProposersDay@iarpa.gov.
  - A new alias will be established for when the full BAA is released
- After this Proposers' Day, IARPA will review all the feedback received for a final BAA, to be posted on beta.SAM.gov and Grants.gov.

Agenda

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Agenda – Lightning Talks

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2:45 PM – 2:50 PM	IARPA Proposers' Day Closeout	Dr. Michael Patterson

IARPA Overview

Mr. Robert Rahmer, Director Office of Analysis Research
Intelligence Advanced Research Projects Activity

Intelligence Advanced Research Projects Activity

IARPA

Creating Advantage through Research and Technology

Office of the Director of National Intelligence

IARPA Mission

IARPA envisions and leads *high-risk, high-payoff research* that delivers innovative technology *for future overwhelming intelligence advantage*

- Our problems are complex and multidisciplinary
- We emphasize technical excellence & technical truth

IARPA Method

- **Bring the best minds to bear on our problems**
  - Full and open competition to the greatest possible extent
  - World-class, rotational Program Managers
- **Define and execute research programs that:**
  - Have goals that are clear, ambitious, credible and measureable
  - Run from three to five years
  - Publish peer-reviewed results and data, to the greatest possible extent
  - Employ independent and rigorous Test & Evaluation
  - Involve IC partners from start to finish
  - Transition new capabilities to intelligence community partners

IARPA R&D

- Technical and programmatic excellence are required
- Each program has a clearly defined and measurable end-goal
  - Intermediate milestones to measure progress are also required
  - Every program has a beginning and an end
- This approach, coupled with rotational PM positions, ensures
  - IARPA does not “institutionalize“ programs
  - Fresh ideas and perspectives are always coming in
  - Status quo is always questioned
  - Only the best ideas are pursued, and only the best performers are funded

IARPA Snapshot

IARPA's research portfolio is diverse, including math, physics, chemistry, biology, microelectronics, neuroscience, linguistics, political science, cognitive psychology, and more.

- 70% of completed research transitions to U.S. Government partners
- 3,000+ journal articles published
- IARPA funded researchers have been awarded the Nobel Prize in Physics for quantum computing research, a MacArthur Fellowship, and a Bell prize
- IARPA serves on National Science and Technology Council (NSTC) committees and actively engages with the White House BRAIN Initiative, National Strategic Computing Initiative, and the NSTC Select Committee on Artificial Intelligence, the NSTC Subcommittee on Quantum Information Science (SCQIS), and NSTC Subcommittee on Economic and Security Implications of Quantum Science (ESIX)

How to Engage with IARPA

ENGAGE WITH US

Throughout our website you can learn more about engaging with us on our highly innovative work that is having a positive impact in the Intelligence Community and society in general.

iarpa.gov | 301-243-1995

dni-iarpa-info@iarpa.gov

- Reach out to our Program Managers.
- Schedule a visit if you are in the DC area or invite us to visit you

Open BAAs

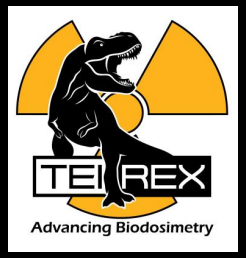
Broad Agency Announcements (BAAs) solicit research proposals for specific programs. Learn more about current BAA opportunities and ways to get involved...

Requests For Information

Requests for Information (RFIs) are designed to gather more information on an idea in an area in which our program managers are not fully informed...

Seedlings

Seedlings are typically 9 – 12 month research efforts that are less than $1M in cost. They are intended to address highly innovative ideas and concepts within...



Targeted Evaluation of Ionizing Radiation Exposure (TEI-REX) Program

Michael Patterson | Program Manager | Proposers' Day, 29 September 2021

Intelligence Advanced Research Projects Activity

IARPA

Creating Advantage through Research and Technology

Technical Slides Disclaimer

- All images, references, and articles are included as illustrative examples only
- ODNI, IARPA, and ARO do not endorse any product or company referenced within
- Changes have occurred since the draft technical document was released and additional changes may occur in the final released BAA

TEI-REX Problem Statement

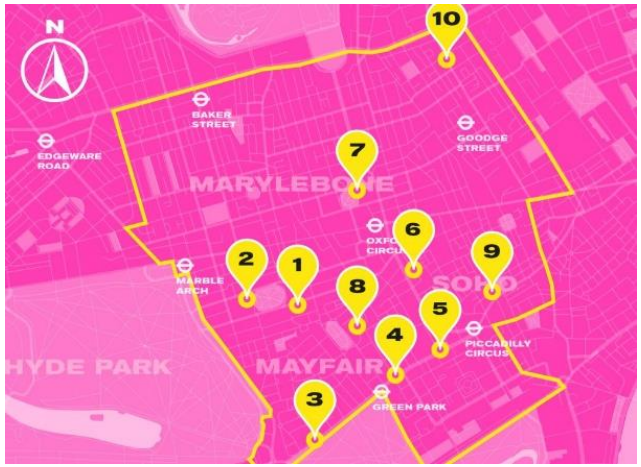
The Intelligence Community (IC) requires new capabilities to identify exposure events associated with lower-dose ionizing radiation which can also expand the overall knowledge of the exposure environment.

- TEI-REX will improve efforts:
  - Investigation of intentional or accidental exposures
  - Protection of IC, uniformed service, and other USG personnel
  - Biodosimetry in remote locations with limited supply chain
  - Counter-proliferation of radiological materials
- Limitations of current approaches:
  - Focus predominately on identifying high dose exposures
  - Reliant upon transient and/or extrapolated biomarkers
  - Require invasive, and often serial, sample collection

Challenging Scenario – Investigation

- Alexander Litvinenko was poisoned via ingestion with polonium-210.
- Investigators took 22 days to confirm the poisoning.
- Attempts to ID radionuclide poisoning using a Geiger counter around Alexander failed.
- Results from urine analysis using a gamma spectrometer were nearly overlooked.
- Biodosimetry capabilities enabling analysis, at the surface of an individual and not just for radionuclides, could have assisted in this investigation.

The Guardian, 2016



Old Vic Theatre, 2019

Limitations associated with biodosimetry and bioassay approaches delayed investigator capability to identify suspects, locations of interest, and risks to the public.

Challenging Scenario– Force Protection

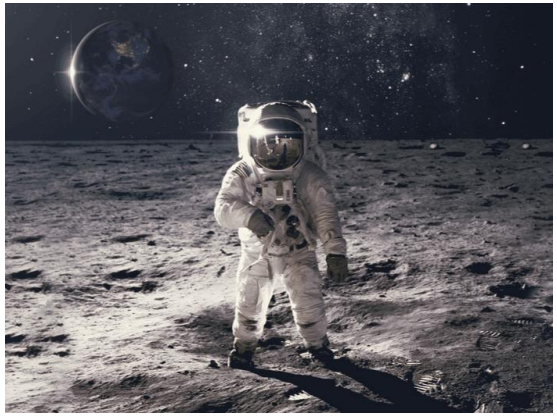
- Few military personnel carry dosimetry badges – dedicated use requires foreknowledge of need.
  - Operators often work in limited information environments.
- Extended operations in environments with low-dose exposures has the potential to reduce mission capability.
- Forward bases lack access to expertise and equipment to effectively evaluate operators for exposures.
- Easy to implement approaches which are minimally invasive and effective at lower-dose exposures can improve military readiness.

The Guardian, 2010

Novel biodosimetry approaches to support the warfighter in limited-knowledge locations can help ensure mission readiness without undue burden on existing missions.

Challenging Scenario – Remote Locations

- Astronauts risk exposure to multiple types of radiation.
- Shipping of equipment or supplies into space is challenging, acute necessities are prioritized.
- Facilities, such as the space station, have physical radiological detectors, but these may not correlate directly to individual exposure.
- Established approaches, using dosimeters or retrospective biodosimetry, are impacted by compliance and extended mission periods.



NASA.gov

Minimally invasive approaches for evaluating radiation exposure could extend the lifespan of space missions without requiring additional supply requirements while overcoming potential dosimetry issues.

How is exposure evaluation done today?

The Problem – Limitations

Approaches for retrospectively characterizing an exposure event are limited to mathematical modeling dependent upon extensive knowledge of the event, evaluation of sensors present at the time of exposure, evaluation of absorbed radionuclides, or analysis of transient biomarkers which provide limited information regarding the exposure environment.

Current Approaches:

- Mathematical modeling
  - Access to the environment
  - Knowledge of individual
  - Knowledge of event
- Personal Dosimetry
- Bioassay
- Biodosimetry

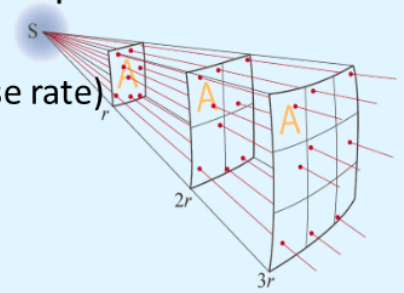
1) **Distance**: Dose rates are inversely proportional to the distance squared.

$$I = \frac{k}{r^2}$$

I : Radiation intensity (dose rate)

r : Distance

k : Constant



2) **Time**: Doses are proportional to the time of exposure provided the dose rates are the same.

(Total) dose (microsieverts) = Dose rate (microsieverts/h) × Time

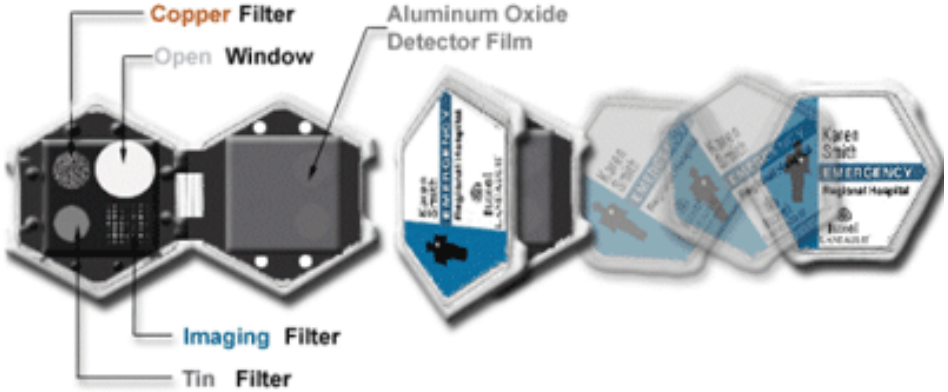
Japanese Ministry of the Environment

The Problem – Limitations

Approaches for retrospectively characterizing an exposure event are limited to mathematical modeling dependent upon extensive knowledge of the event, evaluation of sensors present at the time of exposure, evaluation of absorbed radionuclides, or analysis of transient biomarkers which provide limited information regarding the exposure environment.

Current Approaches:

- Mathematical modeling
- Personal Dosimetry
  - Access to dosimeters and need to wear
  - Supply chain to maintain
  - Exposure-dose specific equipment
  - Detect exposure at location worn
- Bioassay
- Biodosimetry



Radiation Emergency Medical Management, U.S. HHS

The Problem – Limitations

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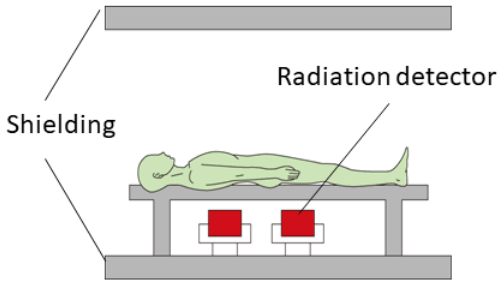
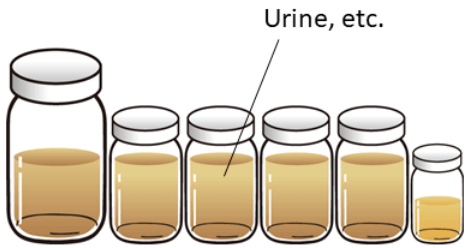
Current Approaches:

- Mathematical modeling
- Personal Dosimetry
- Bioassay
  - Out of scope
  - Invasive, obvious, and serial
  - Focused on detecting radionuclide
  - Slow
- Biodosimetry

Direct counting	Bioassay
Directly measure the human body	Indirect measurement
Need to spare time to receive direct measurements	Submit samples (urine, feces, etc.)
Mainly target materials that emit γ-rays	Able to measure all radioactive materials
Short measuring time using the apparatus	Chemical analysis takes time.
Accurate dose assessment	Large margin of error in results of dose assessment
	

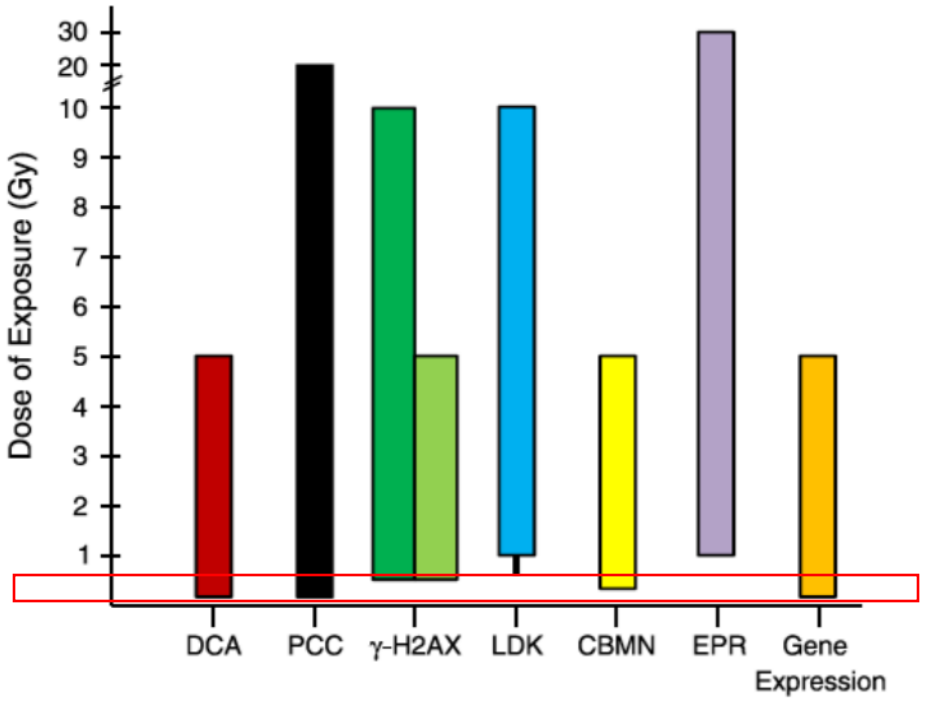
Japanese Ministry of the Environment

The Problem – Limitations

Approaches for retrospectively characterizing an exposure event are limited to mathematical modeling dependent upon extensive knowledge of the event, evaluation of sensors present at the time of exposure, evaluation of absorbed radionuclides, or analysis of transient biomarkers which provide limited information regarding the exposure environment.

Current Approaches:

- Mathematical modeling
- Personal Dosimetry
- Bioassay
- Biodosimetry
  - Invasive samples
  - Transient signatures
  - Supply-chain requirements
  - High standard deviations at low-doses
  - Limited environment characterization

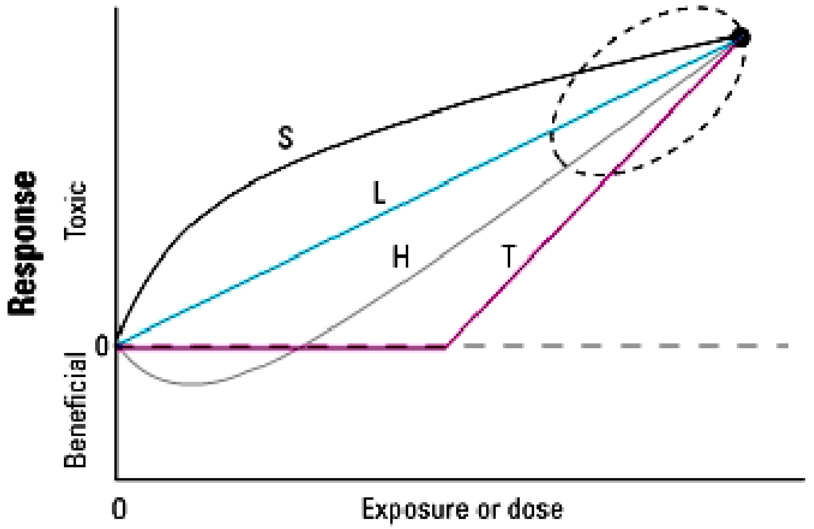


2021, remm.hhs.gov, Optimizing the Use of Biodosimetry Tools

The Problem – Assumptions

Proposers should feel comfortable addressing, technically supported, established assumptions in this community.

- TEI-REX is **NOT** focused on clinical outcomes but proposals may leverage parallel research efforts.
- The assumptions made for whole-organism, clinical outcomes may not be appropriate assumptions for cellular or molecular scale ionizing radiation exposures.
- Assumptions associated with linear, no-threshold; non-linear, no-threshold; and non-linear, threshold theories must be scientifically supported from a molecular perspective.



Australasian Physical & Engineering Sciences in Medicine, 2009

TEI-REX will focus upon molecular and physical changes, which *may* inform towards physiological and clinical impact in future research.

Overarching Limitations to Overcome

Approach	Limitations
Dicentric Chromosome Assay (DCA)	• Requires blood draw and 4-5 days for processing • Standard deviation of exposure ~0.5 Gray • 6-month period of detection
Lymphocyte Depletion Kinetic (LDK)	• Requires baseline + sequential blood collections • 9-day period of detection
miRNA targeting (miR-150-5p)	• Requires baseline + sequential blood collections • 7-day period of detection • Standard deviation of exposure ~0.5 Gray
Gene Expression Profiling	• Requires baseline + sequential blood collections • Limited period of detection
Gamma-H2AX Foci assay	• Best with near immediate blood collection • Valid for ~2 days and confounded by other forms of damage
Electron Paramagnetic Resonance (EPR)	• Reflects lifetime exposure • Requires scraping and 5-25 min analysis

New Biodosimetry Capabilities

Approach	Dose Range (Gray)	Analysis Time	Time period test is effective	Sample Type	Key Implementation Factors
DCA	0.1* – 5 0.5 – 5 (triage)	~3 days	3-6 months	Blood	-Can identify partial body exposures -Multi-day processing
LDK	0.5 - 10	~2 days	~ 9 days	Blood	-Multiple blood draws -Early baseline is best
Gamma-H2AX foci	0.5 - 10	2-6 hours	~2 days	Blood and buccal cells	-Immediate collection -Single blood draw
Gene expression profiles	0.1* – 5	9-36 hours	2-3 days	Blood, saliva, interstitial fluid	-Multiple blood draw -Baseline recommended
miRNA profiling	0.5* - 8	~2 days	1-7 days	Blood, saliva, interstitial fluid, urine, plasma, serum	-Single or multiple blood draw -Baseline recommended
TEI-REX Methods	0.1 - 10	3 hours	Immediate – variable yrs (noncumulative)	Minimally and non-invasive	-Single sample collection -Informs to environment

*standard deviations reported around 0.5 Gray

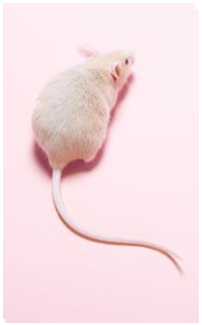
How Can We Solve the TEI-REX Challenge?

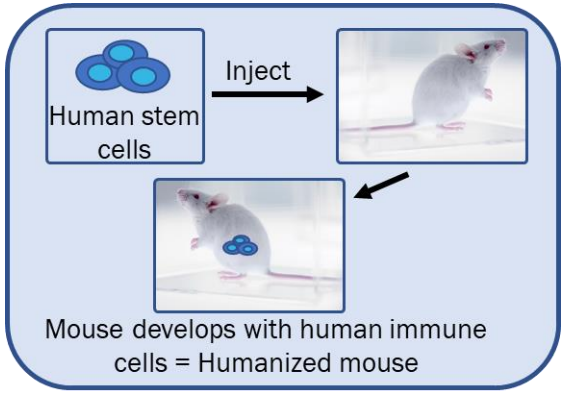
You tell us!

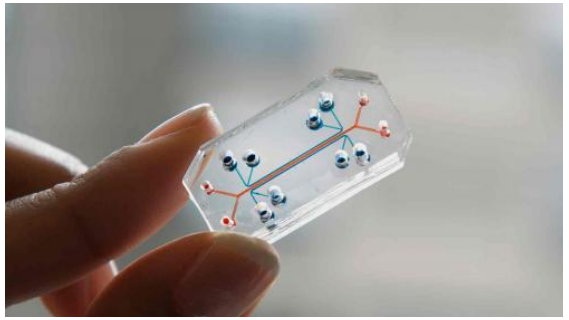
- Agnostic to research approach
- Propose what is needed to meet objectives
  - Research approach
  - Staff
  - Resources
  - Teaming plans
- Highlighting innovative, novel, and scientifically supported research and development approaches

TEI-REX Potential Approaches

- Extensible Traditional and Novel Models
  - Traditional models: cell lines, mice, pig, guinea pig, canines, NHPs
  - Non-traditional models: organs-on-a-chip, multi-layer cell cultures, humanized mice, 3-D printed cultures or follicles
- Non-traditional samples
- Robust Biomarkers
- Quantitative Analytical Platforms
- Advanced Computational Models







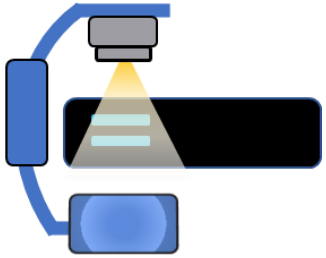
TEI-REX Potential Approaches

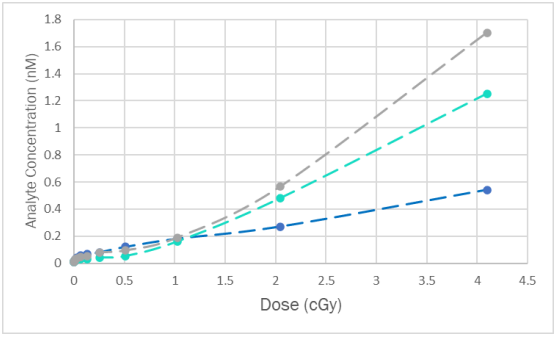
- Extensible and Novel Models
- Non-traditional samples
  - Hair
  - Skin
  - Interstitial Fluid
  - Saliva
  - Buccal and Mucosal cells
  - Sweat
  - Nails
- Robust Biomarkers
- Quantitative Analytical Platforms
- Advanced Computational Models

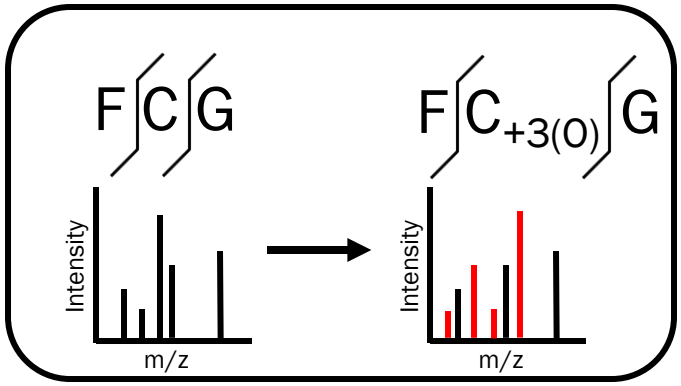
TEI-REX Potential Approaches

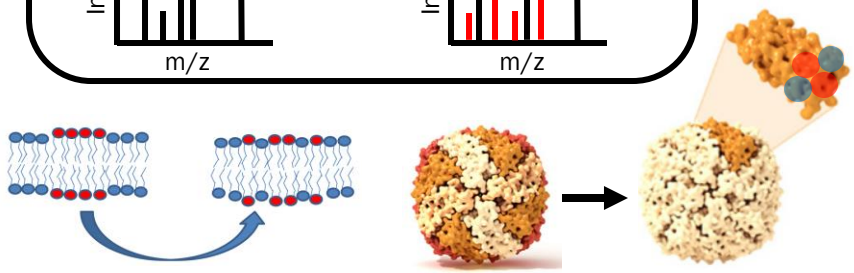
- Extensible and Novel Models
- Non-traditional samples
- Robust Biomarkers
  - Protein and peptide modifications
  - Amino acid modifications
  - Lipids
  - Structural changes
  - Modifications of microbiome
  - Metabolites
- Quantitative Analytical Platforms
- Advanced Computational Models

Irradiation Experiments → Biomarker Assay





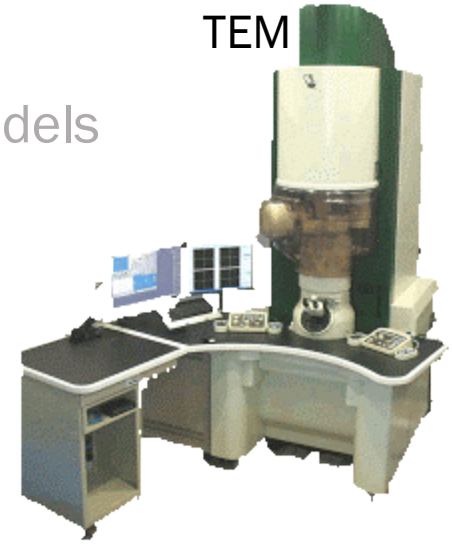




TEI-REX Potential Approaches

- Extensible and Novel Models
- Non-traditional samples
- Robust Biomarkers
- Quantitative Analytical Platforms
  - Mass Spectrometry
  - RAMAN
  - Infrared Spectrometry
  - Electron Microscopy
- Advanced Computational Models

TEM



FT-ICR MS

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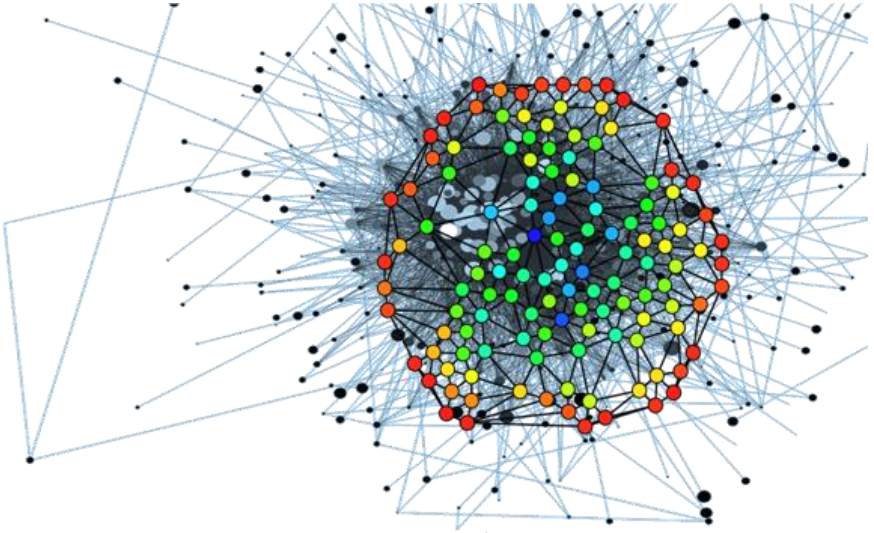
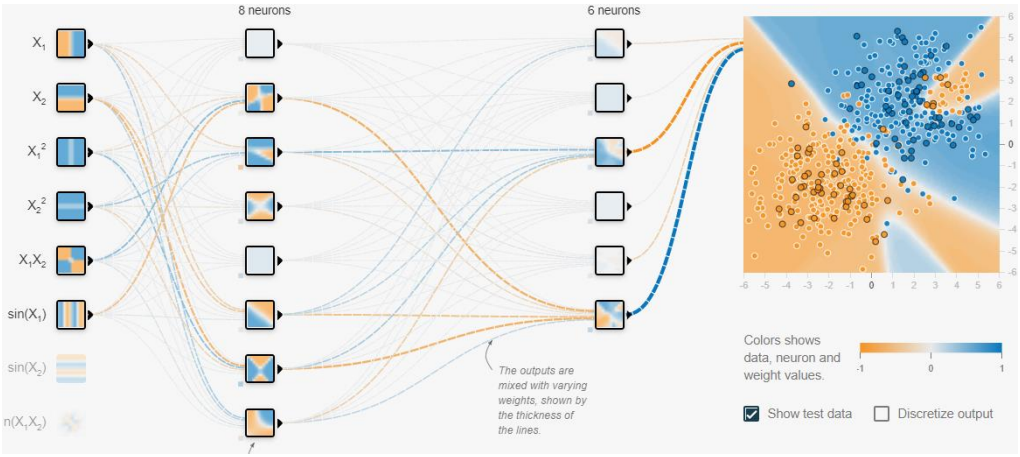
RAMAN

TEI-REX Potential Approaches

- Extensible and Novel Models
- Non-traditional samples
- Robust Biomarkers
- Quantitative Analytical Platforms
- Advanced Computational Models
  - Trained neural network models using in-house and public biomarker databases
  - Integration with established biodosimetry models, including explicitly programmed, physics-based models





How Will TEI-REX Be Successful?

- **Identify** novel biomarker signatures associated with lower-dose radiation exposure.

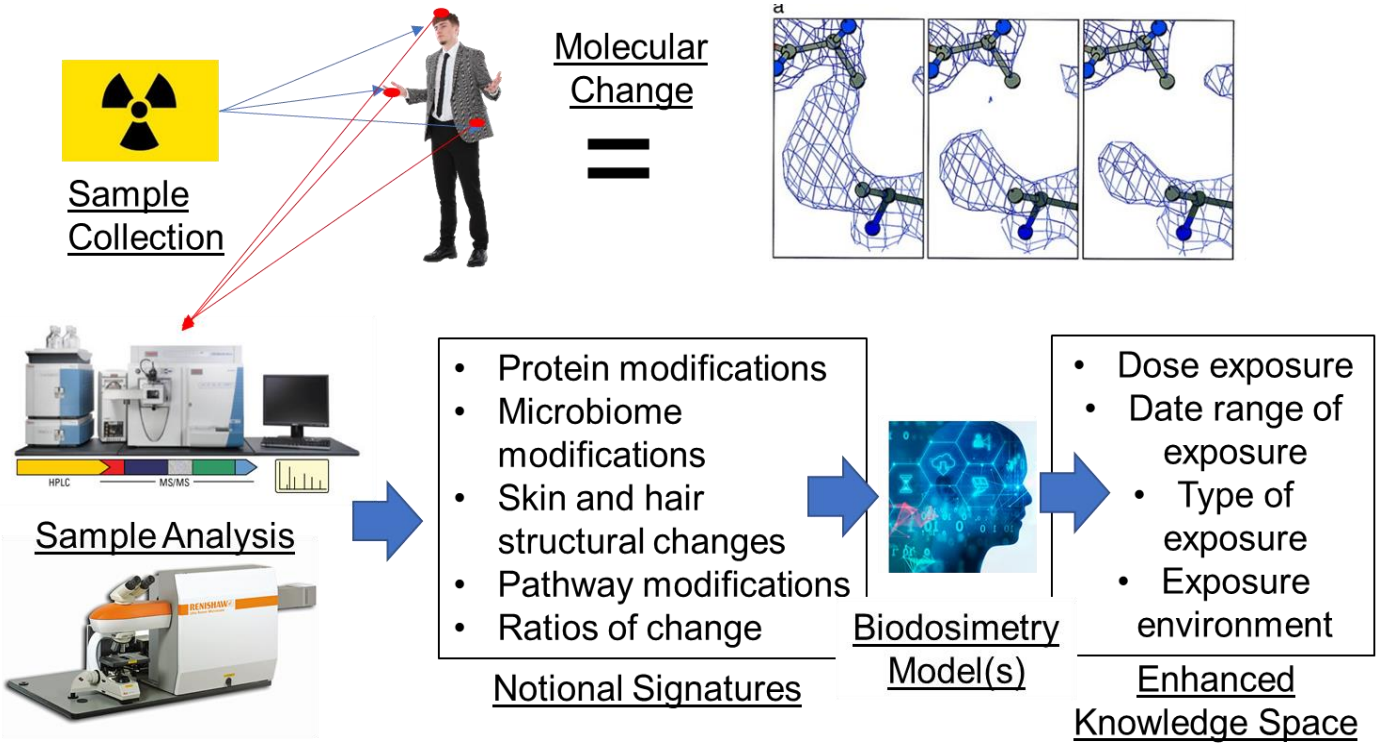
- **Research and develop** robust methods for discovery and detection of these signatures from minimally and non-invasive samples.

- **Train and develop** models and software tools to confidently interpret biomarkers to identify exposure incidence, exposure dose (especially low-dose), exposure dose-rate, exposure timeline, and other elements of the exposure incident.

Program Objective and Deliverables

TEI-REX Program Overview

Develop methodologies and protocols for discovery and characterization of biomarker signatures associated with ionizing radiation exposure, demonstrate detection of robust biomarkers associated with TEI-REX samples, and generate computational biodosimetry models for evaluation of samples to inform towards exposure incidents.



TEI-REX Definitions

- **Lower-dose exposures**: For TEI-REX, this is defined as < 0.75 Gray, with particular interests in the range of ambient background to 0.1 Gray.
- **Exposure Environment or Testbed**: The platform used to irradiate models and/or samples.
- **Exposure Models**: These are the systems, ranging from *in vitro* cell lines to *in vivo* organisms, which are experimentally irradiated.
- **Exposure Samples**: These are the specific materials, taken from the irradiated model, containing the biomarkers of interest.
- **Minimally or non-invasive samples**: These are fluids, cells, hair, or other organic material or by-product that can be collected painlessly and unobtrusively.
- **Biodosimetry Models or Computational Models**: These are the software tools and models developed or trained to evaluate biomarker data and provide high-confidence predictors of exposure and exposure environment.

Elements Out of Scope

- Samples which cannot be collected through minimally- or non-invasive means
  - More intrusive samples may be used for early research and development but must lead towards appropriate TEI-REX sample types
  - Detection of radionuclides
- Biomarkers or Signatures
  - Research focused on signatures of DNA damage, to include single or double stranded breaks and/or associated repair activation signatures
    - Use of traditional biodosimetry tools for validation is permitted
  - Ratiometric expression profiling of DNA, RNA, and/or proteins
  - Biomarkers that require multiple serial sample collections from the same biological organism
    - Population level baselines are permitted

Elements Out of Scope

- Radiation types
  - Research using cosmic or heavy ion radiation
- Final products
  - Design or manufacture of new equipment for analytical biomarker analysis.
  - Focus on throughput, scalability, and multiplexing of existing biodosimetry approaches.

Expectations for Responsible Research

- Research using *in vivo* models must be under the purview and approval of an established Institutional Animal Care and Use Committee (IACUC).
- Proposed research efforts using human samples will be closely scrutinized for the need and benefit to the research effort.
  - All such efforts are also expected to have extensive history working with human samples and have institutional review board (IRB) oversight.
- All research entities proposing research involving radiation and radionuclides must have demonstrated experience and appropriate institutional review and oversight.

Primary Program Deliverables

- Protocols and workflows for biomarker discovery and detection
- Raw, processed, and curated data associated with biomarker research and biodosimetry model development
- Panels of characterized biomarkers
- Software tools and models developed to analyze samples for biodosimetry outputs
- Limited quantity of samples, generated in-house, for 3rd party test and evaluation

All models and protocols are expected to be provided with a minimum of Government Purpose Rights (GPR)

Program Test and Evaluation and Metrics

What is Test and Evaluation?

- IARPA uses third-party Test and Evaluation teams to generate blinded samples, evaluate performer approaches, and validate deliverables.
- This approach helps ensure the end products of a program are transition-ready.
- TEI-REX is a very challenging T&E activity due to the variety of potential models, samples, and biomarkers.
- T&E will generate a limited variety of blinded samples from select models in Phase 1, performer approaches must demonstrate capability or extensibility to these models during blinded testing.
- T&E will include evaluation of performer biomarker discovery /detection protocols, biomarker panels, and computational biodosimetry models.

Test and Evaluation (T&E) Plan

- Researchers are encouraged to propose model systems and analytical methodologies based upon their technical expertise.
- T&E will generate irradiated standards, controls, and blinded samples with replicates in sufficient numbers, ~500 samples per event, to be statistically confident of performer biodosimetry evaluation.
  - **Events: 2x in Phase 1; 1x in Phase 2; 3x in Phase 3**
- Performers will provide in-house generated irradiated samples, ~50 per evaluation, for T&E evaluation of biomarker detection methods at least once per Phase.
- Performers will provide computational models to T&E for evaluation at least once per Phase.

Potential T&E Models

- Phase 1
  - Mouse models
  - 2D cell cultures
  - 3D skin constructs
- Phase 2 and 3 - future models will be established and discussed with performers in advance
  - Additional *in vivo* models, to include humanized or human-like
  - Expanded *3D* skin constructs
  - Bioprinted grafts/follicles
  - Organoids
  - Organ-on-a-chip
  - Human samples (professional or medical)

Program Metrics

Metrics must enable quantitative evaluation of performer progress throughout the program.

	Metric (FA1 and 2)	Phase 1	Phase 2	Phase 3
Biomarker Detection	TPR	70%	80%	90%
	FPR	30%	15%	10%
	Precision	60%	70%	80%
	Sample mass/volume	< 50mg/50µL	< 5mg/5µL	< 5mg/5µL
	Extensibility: Biomarker(s) Detected in at Least X Sample Type(s) from X Model(s)	1 Sample / 1 Model	1 Sample / 2 Models	1 Sample / 3 Models
	Analysis run-time	1 Sample / 24 hours	1 Sample / 10 hours	1 Sample / 3 hours

Program Metrics

	Metric (FA1 and 2)	Phase 1	Phase 2	Phase 3
Biodosimetry Model	**Prediction of Exposed Dose***			
	Accuracy	70%	80%	90%
	MAE	30%	15%	10%
	Precision	60%	70%	80%
	Predicted Timing of Exposure (in days)*			
	Accuracy	70%	80%	90%
	MAE	30%	15%	10%
	Precision	60%	70%	80%
	Prediction of Dose-Rate (mGray/min)*			
	Accuracy	N/A	60%	70%
	MAE	N/A	30%	20%
	Precision	N/A	70%	80%
	Prediction of Ionizing Radiation Type (Particulate and/or Electromagnetic)*			
	Accuracy	N/A	60%	80%
	Precision	N/A	70%	80%
	Extensibility: Exposed Dose Predicted in at Least X Sample Type(s) from X Model(s)	1 Sample / 1 Model	1 Sample / 2 Models	1 Sample / 3 Models
	Model Interpretability: Model identifies X percent of composite biomarkers informing towards predictions	70%	80%	90%

*must be evaluated at the grouped level of sample evaluation (target variable is held constant) as well across the entire collection of samples evaluated

Program Structure

TEI-REX Structure

Two Focus Areas covering one overarching Goal

	Focus Area 1 (FA1):	Focus Area 2 (FA2):
Descriptor	• Signatures and detection methodologies • Analysis within 25 days of an exposure event	• Signatures and detection methodologies • Analysis 90 days or greater from an exposure event
Goal	Develop methodologies and protocols for discovery and characterization of biomarker signatures associated with ionizing radiation exposure, demonstrate detection of robust biomarkers associated with TEI-REX samples, and generate computational biodosimetry models for evaluation of samples to inform towards exposure incidents.	

TEI-REX Structure

Three program Phases encompassing the two Focus Areas

	Focus Area 1	Focus Area 2
Phase 1 (18 Months)	Research the discovery, detection, and modeling of signatures associated with **higher** dose, *1-4 Gray*, ionizing radiation exposures **within 25 days** of an exposure event from TEI-REX samples.	Signatures and detection methods for characterizing **higher** dose, *1-4 Gray*, ionizing radiation exposures, **greater than 90 days** from an exposure event, from TEI-REX samples.
Phase 2 (12 Months)	Signatures and detection methods for characterizing **lower** dose, *background to 0.75 Gray*, ionizing radiation exposures **within 25 days** of the last exposure event from TEI-REX samples.	Signatures and detection methodologies for characterizing **lower** dose, *background to 0.75 Gray*, ionizing radiation exposures **90 days or greater** post-exposure event from TEI-REX samples.
Phase 3 (12 Months)	Optimize the capabilities developed under Phases 1 and 2, and integrate protocols, biomarkers, and models, against a series of realistic and challenging model types, sample types, and/or confounders selected with direct input from program transition partners.	

Proposals must address both Focus Areas across all three Phases

Phase 1 Expectations

- Establish a research pipeline for the discovery, characterization, and modeling of **robust biomarker signatures**, induced by ionizing radiation exposure.
- Prediction of the following from one sample type within 25 days (FA1) or greater than 90 days after (FA2) an exposure event
  - **Dose exposure 1-4 Gray (higher)**
  - **Timeline of exposure (days-months)**
- Predictions to be made using biodosimetry model(s) with inputs from unique biomarkers found in TEI-REX appropriate samples.
  - Dose range selected as most likely to enable discovery of radiation induced biomarkers while avoiding suppression by noise associated with severe cellular damage and/or cell apoptosis (model dependent).

Phase 2 Expectations

- Optimize Phase 1 efforts to analyze samples at lower dose exposures, a greater variety of exposure time points, and a wider variety of samples/organisms while also improving upon overall confidence and accuracy of predictions.

- Prediction of the following from at least two sample types within 25 days (FA1) or greater than 90 days after (FA2) an exposure event
  - **Dose exposure** ambient background – 0.75 Gray (low)
  - **Timeline of exposure** (days - months)
  - **Type of radiation** (particulate, electromagnetic, and/or mixed)
  - **Dose rate of exposure** (mGray/min)

Phase 3 Expectations

- Analyze a range of **realistic exposure scenarios** across a range of **doses**, **timelines**, and **organism types**.

- Performers will integrate and expand their workflows towards identifying the empirical limits of TEI-REX methodologies.

- Performers will integrate, improve and adapt discovery, detection, modeling, and deductive approaches to evaluate **at least 3 model types**.

Tentative Program Timeline

- BAA formal release: early Oct 2021
- Kick-off: Q2FY22

Phase 1 (18 Months)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Higher-dose biomarker exposure research																		
Performer self-evaluation against metrics																		
Government Test and Evaluation																		
Performer protocol and model delivery																		
Phase 2 (12 Months)	19	20	21	22	23	24	25	26	27	28	29	30						
Lower-dose biomarker exposure research																		
Performer self-evaluation against metrics																		
Government Test and Evaluation																		
Performer protocol and model delivery																		
Phase 3 (12 Months)	31	32	33	34	35	36	37	38	39	40	41	42						
Performer approach optimization																		
Government Test and Evaluation																		
Performer protocol and model delivery																		

Point of Contact Information

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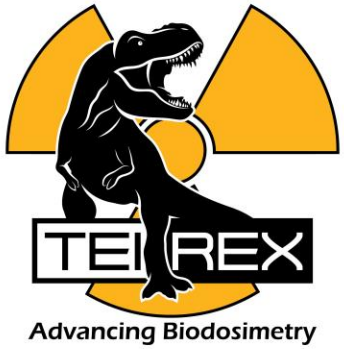

ARO Overview

Intelligence Advanced Research Projects Activity

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Creating Advantage through Research and Technology

U.S. Army Contracting Command

Business Briefing

U.S. ARMY RESEARCH OFFICE

In partnership with

The Intelligence Advanced Research Projects Activity (IARPA)

BAA: Targeted Evaluation of Ionizing Radiation Exposure (TEI-REX)

Kevin Bassler
ACC-APG RTP Division
29 September 2021

Opportunity Day

Please note that nothing discussed today should be construed as intent to change the BAA.

Unless a change is made to the BAA, all proposers should propose only to what is discussed in the BAA and not to these slides or information conveyed today.

Federal Award Information

Anticipated awards will be made in the form of procurement contracts or cooperative agreements, and are subject to the availability of appropriations. Multiple awards are anticipated. Funding for the Option years will be contingent upon satisfactory performance and the availability of funds.

The BAA shall result in awards of all phases of TEI-REX. Funding for the Option Period(s) shall depend upon performance during the Base Period (and succeeding Option Periods), as well as program goals, the availability of funding, and IARPA priorities. Funding of Option Periods is at the sole discretion of the Government.

The Government reserves the right to select for negotiation all, some, one, or none of the proposals received in response to this solicitation and to make awards without discussions with offerors.

Award Instruments

There are two types of award instruments anticipated

1) Cooperative Agreement
2) Procurement Contract

Awards are subject to the availability of appropriations. Multiple awards are anticipated. Funding for the Option years will be contingent upon satisfactory performance and the availability of funds.

Award Instruments

Cooperative Agreement (CA) under the authority of 31 U.S. Code § 6305 .

An executive agency shall use a cooperative agreement as the legal instrument reflecting a relationship between the United States Government and a State, a local government, or other recipient when—

(1) the principal purpose of the relationship is to transfer a thing of value to the State, local government, or other recipient to carry out a public purpose of support or stimulation authorized by a law of the United States instead of acquiring (by purchase, lease, or barter) property or services for the direct benefit or use of the United States Government; and

(2) substantial involvement is expected between the executive agency and the State, local government, or other recipient when carrying out the activity contemplated in the agreement.

Award Instruments

Procurement Contract - A legal instrument, consistent with 31 U.S.C. 6303, which reflects a relationship between the Federal Government and a state government, a local government, or other entity/contractor when the principal purpose of the instrument is to acquire property or services for the direct benefit or use of the Federal Government.

Contracts are primarily governed by the following regulations:

a. Federal Acquisition Regulation (FAR)

b. Defense Federal Acquisition Regulation Supplement (DFARS)

c. Army Federal Acquisition Regulation Supplement (AFARS)

General Information

- Carefully read all information in the BAA.
- Page Limitations- Certain sections will contain page limitations. Any information beyond the limitations will not be considered.
- Be sure to include all REQUIRED documents and attachments.
- Proposal Due Date and Time- Be sure to submit early enough to avoid transmittal issues. Proposals after the due date will not be considered. It is strongly recommended to submit 48 hours early.

ELIGIBILITY INFORMATION

Eligible applicants under this BAA include Institutions of higher education (foreign and domestic), nonprofit organizations, and for-profit concerns (large and small businesses).

Foreign entities and/or individuals may participate but only as a part of a U.S. based team. The prime contractor must be a U.S. entity. Foreign entities and individuals may participate as subcontractors or employees of a U.S. based entity however, all foreign participation must comply with any necessary Non-Disclosure Agreements, Security Regulations, Export Control Laws, and other governing statutes applicable under the circumstances.

ELIGIBILITY INFORMATION

Federally Funded Research & Development Centers (FFRDCs), including Department of Energy National Laboratories, and University Affiliated Research Centers (UARCs) are not eligible to receive awards, as primes or sub-awardees, under this BAA.

There is no requirement for cost sharing, matching, or cost participation to be eligible for award under this BAA. Cost sharing and matching is not an evaluation factor used under this BAA.

Full Proposal Submission Process (Assistance Instruments)

- All proposers for a Cooperative Agreement *MUST* submit through grants.gov.
- At grants.gov you can search by the funding opportunity number, which is To Be Determined (TBD) or search by the CFDA Number 12.431
- Grants.gov recommends submitting your proposal package ***at least 24-48*** hours prior to the close date to provide you with time to correct any potential technical issues that may disrupt the proposal submission.

Full Proposal Submission Process (Contracts)

- All proposers seeking a contract can submit through grants.gov or email directly to TEI-REX_BAASubmission-2021@iarpa.gov.
- At grants.gov you can search by the funding opportunity number, which is TBD or search by the CFDA Number 12.431
- Grants.gov recommends submitting your proposal package ***at least 24-48*** hours prior to the close date to provide you with time to correct any potential technical issues that may disrupt the proposal submission.

Potential Important Dates

- Proposals are due as posted in the BAA upon its release. Proposals submitted after the closing date will not be considered or evaluated by the Government.
- Submit your proposal package ***at least 24-48*** hours prior to the close
- Full BAA Posting: 7 October 2021
- Question Period: 2 weeks, must be submitted by 21 October 2021 @ 5:00 PM EDT
- Responses to questions expected: 28 October 2021
- Proposals due (via Grants.gov OR TEI-REX_BAASubmission-2021@iarpa.gov) by 6 December 2021 @ 5:00 PM EDT

Evaluation Process

- Preliminary review for proposal completeness, eligibility requirements, conformance with BAA requirements
- Individual proposals will be evaluated against the evaluation criteria – not against each other
- Proposals received under this BAA will be evaluated using merit based, competitive procedures based on the Evaluation Factors of the BAA.
- All information necessary for the review and evaluation of a proposal must be contained in the proposal itself. No other material will be provided to the panel. Proposals should contain sufficient technical detail to allow for in-depth technical assessment.

Proposal Evaluation Criteria

Current Proposed Factors- descending area of importance

A. **Overall Scientific and Technical Merit**
B. **Effectiveness of Proposed Work Plan**
C. **Contribution and Relevance to the IARPA and ARO Mission and Program Goals**
D. **Relevant Experience and Expertise**
E. **Resource Realism**

The above factors are anticipated and proposer's should review the BAA for the criteria as they may change when the BAA is released. More detail for each area is anticipated.

Break – Last chance to submit questions is at 12:00 PM EDT
We will start again at 1:00 PM EDT

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Addressing Submitted Questions

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Answers to Questions

Lightning Talks – Starting at 2:00 PM EDT

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Lightning Talk Agenda

Time	Organization	Lead Speaker
2:05 PM – 2:10 PM	Radiological Research Accelerator Facility, Columbia University	Dr. Guy Garty
2:12 PM – 2:17 PM	Nuclear Engineering Department - North Carolina State University	Dr. Robert Bruce Hayes
2:19 PM – 2:24 PM	Signature Science and The University of Texas at Austin	Dr. Curt Hewitt
2:26 PM – 2:31 PM	Johns Hopkins School of Medicine	Dr. Yun Chen
2:33 PM – 2:38 PM	ASELL	Dr. Michael Ehret
2:40 PM – 2:45 PM	University of Washington and Spectragen Informatics	Dr. Michael MacCoss
2:45 PM – 2:50 PM	Proposers' Day Closeout	Dr. Michael Patterson

Lightning Talk Overview

- Teams have 5 minutes to highlight capabilities aligning with TEI-REX interests
- Use this opportunity to fill gaps in your team
- Slides and documents will be made available on IARPA.gov until the full BAA closes

Meeting Closeout

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Reminder on Teaming

- Participants are encouraged to find partners and collaborators, someone might have a missing piece of your puzzle.
- Collaborating and capability summaries will be accepted, with minimal review only for appropriateness, and made available to the public.
  - Teaming documents and summaries can be submitted until the BAA closes, submit to TEI-REX_ProposersDay@iarpa.gov.
  - If you would prefer your information not be shared, not including a recording of this meeting as it will not be modified or removed, email TEI-REX_ProposersDay@iarpa.gov.

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