Biometric Recognition & Identification at Altitude & Range (BRIAR)

Lars Ericson, Program Manager, Proposers' Day, 07 October 2020

Office of the Director of National Intelligence

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BRIAR

Welcome to the BRIAR Proposers' Day!

- Thank you for your interest

- Please send us questions and comments at any time during any presentation through the WebEx "Q&A" tool

- Questions may relate to this presentation or the draft BAA Technical Volume posted on beta.sam.gov.

- To assure a clear broadcast stream, audio and video are disabled for meeting participants

- A recording of the entire Proposers' Day will be posted on the BRIAR website

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 at the Proposers' Day

Goals

- Familiarize participants with IARPA's interest in the BRIAR program

- Foster discussion of complementary capabilities among potential program participants, i.e., TEAMING
  - Someone might have a missing piece of your puzzle
  - Teaming Information Forms on beta.sam.gov for sharing contact info, areas of expertise, and expertise sought
  - Teaming Forms will be posted on iarpa.gov

Please ask questions and provide feedback.
This is your chance to alter the course of events.

Q & A

- There will be a 15-minute break and a 30-minute break during the agenda for preparing questions.

- Responses to selected questions will be broadcast at **3:30 pm EDT**, so please don't log out or close your WebEx connection

- Feedback (but not Qs) about the draft BAA may be submitted to the program email at dni-iarpa-baa-20-04@iarpa.gov

- After this Proposers' Day, IARPA will consider all the feedback received in preparing the final BAA, which will be posted on beta.SAM.gov

Agenda

Time	Topic	Speaker
1:00 PM – 1:10 PM	Welcome, Logistics, Proposer's Day Goals	Dr. Lars Ericson Program Manager, IARPA
1:10 PM – 1:20 PM	IARPA Overview	Dr. Catherine Cotell, Deputy Director (Emeritus), IARPA
1:20 PM – 2:20 PM	BRIAR Program Overview	Dr. Lars Ericson
2:20 – 2:35 PM	Break to formulate Qs	
2:35 PM – 3:00 PM	Doing Business with IARPA	Michelle Crecca, IARPA Contracting Officer
3:00 PM – 3:30 PM	Break (Qs after 3:15pm will not be addressed)	
3:30 PM – 4:30 PM	BRIAR Questions & Answers	Dr. Lars Ericson

Note: All times are EDT (Washington, DC Time)

IARPA Overview

Dr. Catherine Cotell, IARPA Director for Research (Emeritus)
Intelligence Advanced Research Projects Activity

Office of the Director of National Intelligence

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Office of the Director of National Intelligence

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

Department of the Army

Federal Bureau of Investigation

Department of the Navy

Department of Homeland Security

Air Force

Coast Guard

Marine Corps

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** and **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, 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
- Transition new capabilities to intelligence community partners

IARPA Snapshot

IARPA's research portfolio is diverse, including math, physics, chemistry, biology, 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**, a **Bell prize**
- IARPA is a member of the National Science and Technology Council (NSTC) 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

Getting Started with IARPA

At IARPA, we take real risks, solve hard problems, and invest in high-risk/high-payoff research that has the potential to provide our nation with an overwhelming intelligence advantage.

Are you interested in partnering with us to advance the state-of-the-art in research and development?

Read More

iarpa.gov | 301-243-1995

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

Opportunities to Engage:

RFIS AND WORKSHOPS	"SEEDLINGS"	PRIZE CHALLENGES	RESEARCH PROGRAMS
Opportunities to learn what is coming, and to influence programs.	Typically a 9-12 month study; you can submit your research proposal at any time. We strongly encourage informal discussion with a PM before proposal submission.	No proposals required. Submit solutions to our problems – if your solutions are the best, you receive a cash prize and bragging rights.	Multi-year research funding opportunities on specific topics.

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DISCLAIMER

- **All images, reference, and articles are included as illustrative examples only**

- **Neither ODNI nor IARPA endorses any product or company referenced within**

Problem Statement

- **The Intelligence Community (IC) needs the ability to identify people at range and altitude for a range of missions:**
  - Counterterrorism
  - Protection of critical infrastructure facilities
  - Military force protection
  - Border security

- **This is hindered by:**
  - Image quality issues (motion, turbulence, resolution)
  - Algorithms developed on low-pitch angle views of people
  - Reliance on face recognition as the only biometric modality

Public Domain

Public Domain

Public Domain

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Challenge #1

Probe Video

- Range = 650 m
- Medium Turbulence

Gallery Enrollment Image
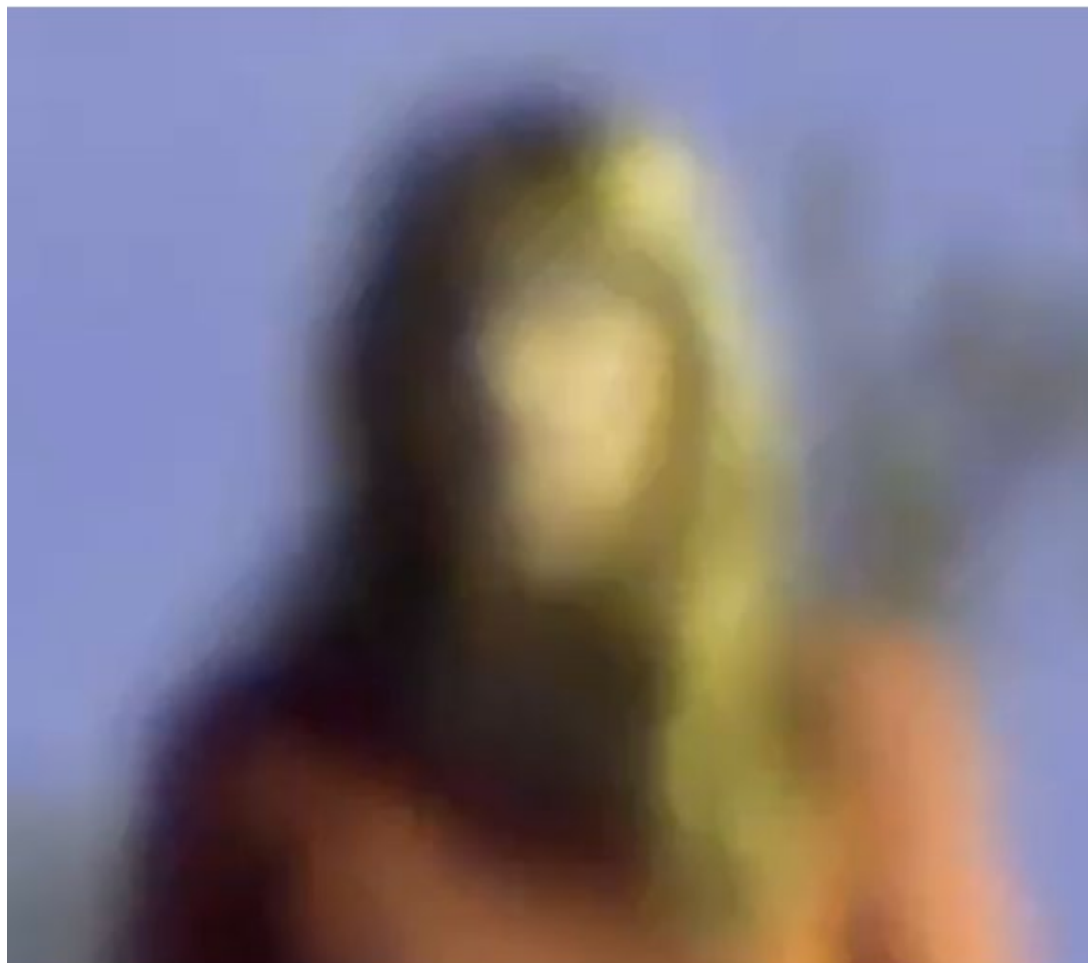
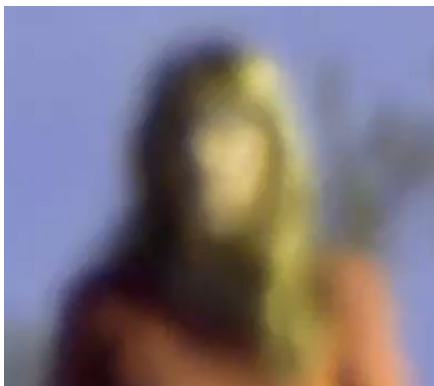Permission granted by subjects for use of imagery in public presentations

Atmospheric Turbulence (AT)

- An imaging phenomenon that introduces blur, distortion, and intensity fluctuations.

- Blur and distortion from atmospheric turbulence are often predominant image degradations.

Medium Turbulence (1 km)

Reflected light passing through moving air molecules
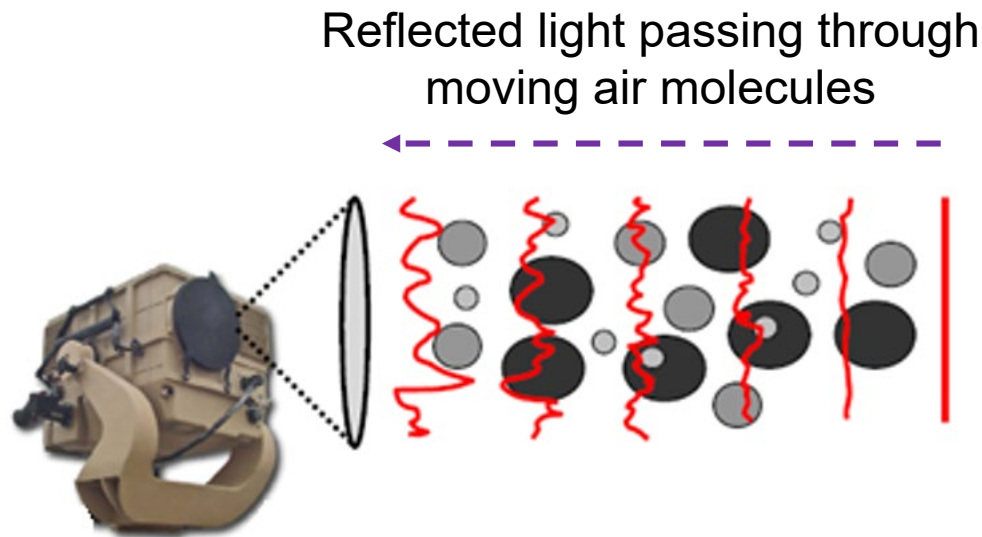
Real Scene

Permission granted by subjects for use of imagery in public presentations
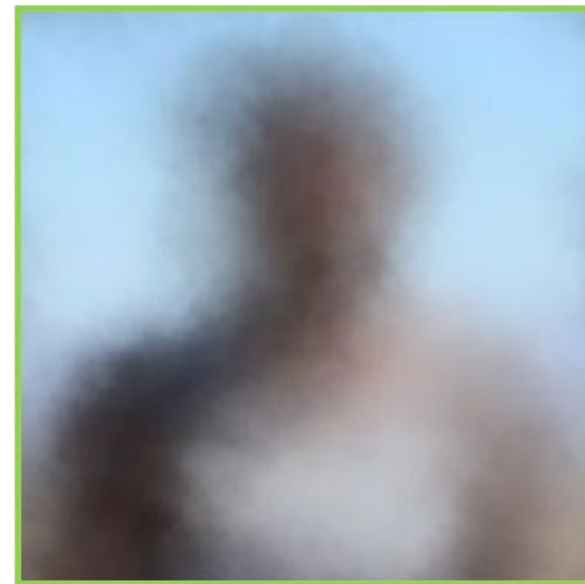
Examples of Atmospheric Turbulence

Atmospheric Turbulence
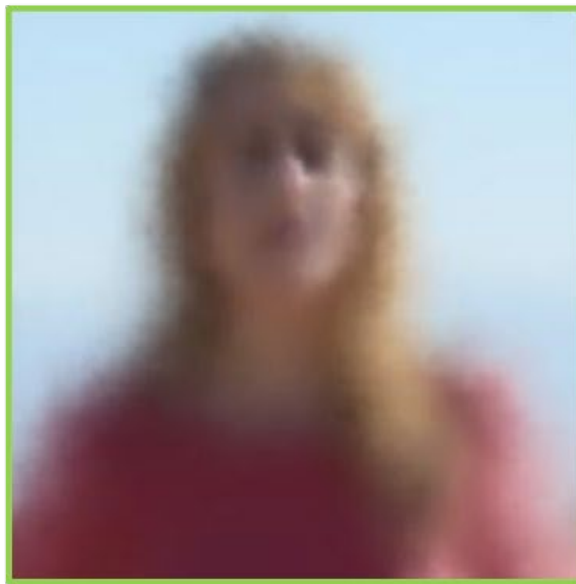
Low   Medium   High

**Single frames from video collected by Army C5ISR Center
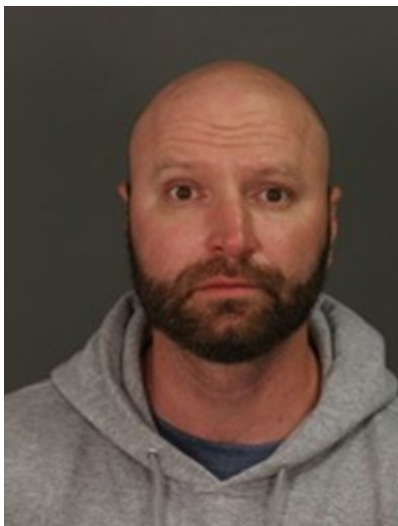for the Long-Range Face ID (LRFID) dataset**

Challenge #2

Probe Video

Issues

- Brief view of subject
- Severe look angle
- Motion, resolution challenges

Gallery Enrollment Image

Permission granted by subjects for use of imagery in public presentations
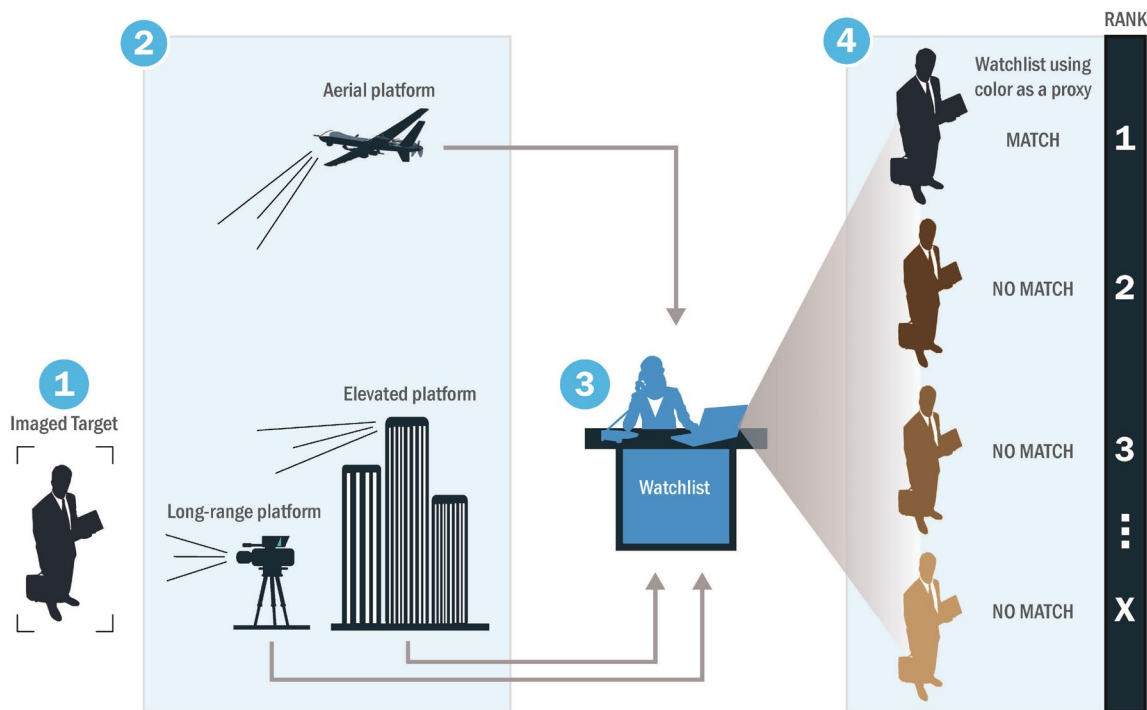
Challenge #2: Revisited

Permission granted by subjects for use of imagery in public presentations

BRIAR Program Overview

- Develop software algorithm-based systems capable of performing whole-body biometric identification at long-range and from elevated platforms
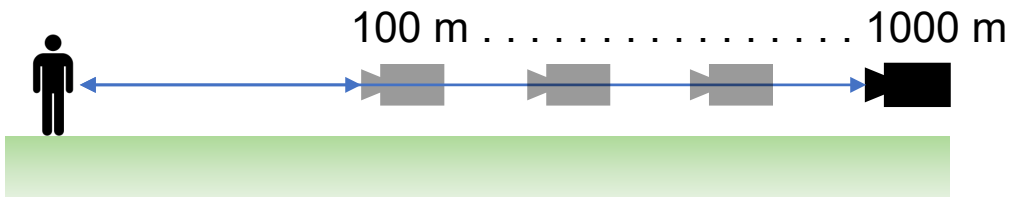
Definition: Whole-Body (WB) Biometrics

- The shape, movement, measurements, or other aspects of a human form (including face)

- To determine biometric signals that are universal, unique, and permanent human characteristics

- For the purposes of verification, recognition, or identification.
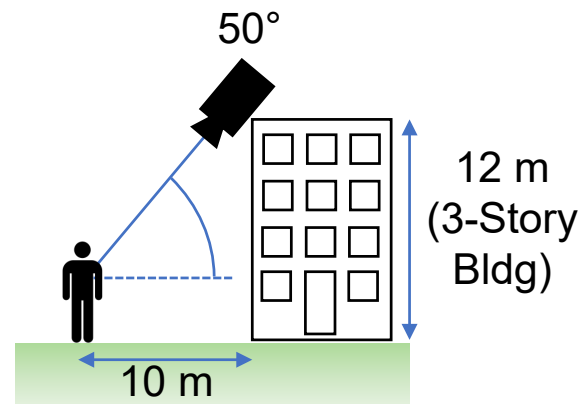
Imaging Conditions
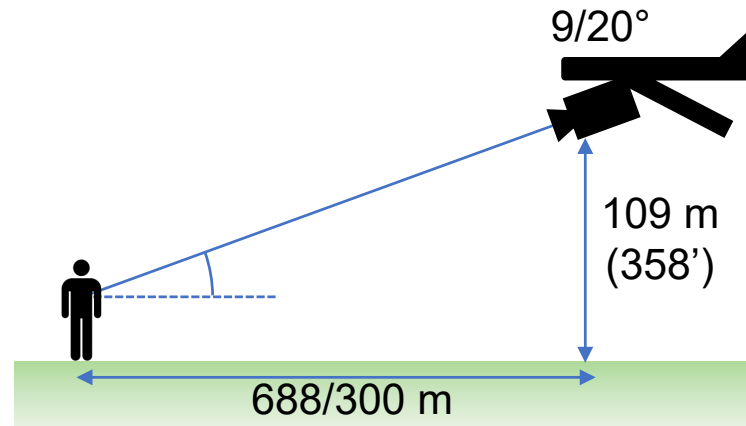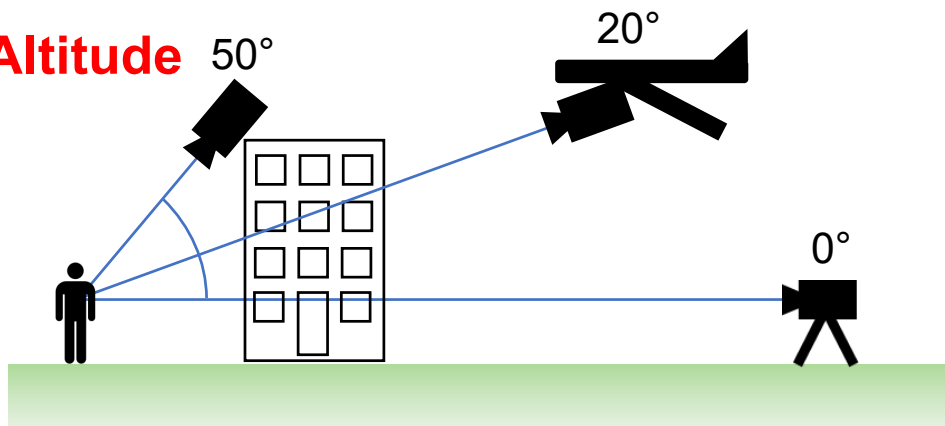
Program Focus: Visible Band Imagery Only

Example Conditions

50°

12 m
(3-Story
Bldg)

10 m

Range

100 m . . . . 1000 m

Altitude 50°

20°

0°
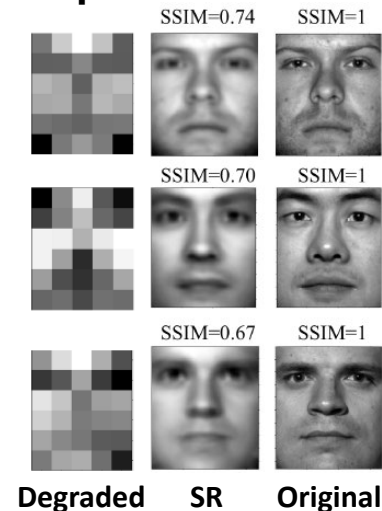
9/20°

109 m
(358')

688/300 m

How is it done today?

Long-Range Face Recognition (FR)

- Dramatic improvements in unconstrained FR
  - NIST Face Recognition Vendor Test (FRVT) highlights State-of-the-Art (SOTA)
  - Continued innovations in architectures, data processing, explainability, domain transfer, training techniques
- Current long-range FR approaches
  - **COTS:** Use image pre-processing + general unconstrained FR matcher
  - **R&D:** Learn a common embedding space for hi/low res images[2]

- **Challenges**
  - Lack of relevant datasets
  - Default unconstrained FR focused on med-high resolution imagery
  - Training data largely low pitch angle views
  - Many deep learning image enhancement techniques hurt FR

Super Resolution[1]

SSIM=0.74   SSIM=1

SSIM=0.70   SSIM=1

SSIM=0.67   SSIM=1

Degraded   SR   Original

Common Feature Space

Training Phase

Training Set

S_{low} S_{high}

Coupled mappings

Recognition Phase

Query Sample   Gallery Set

Common feature space
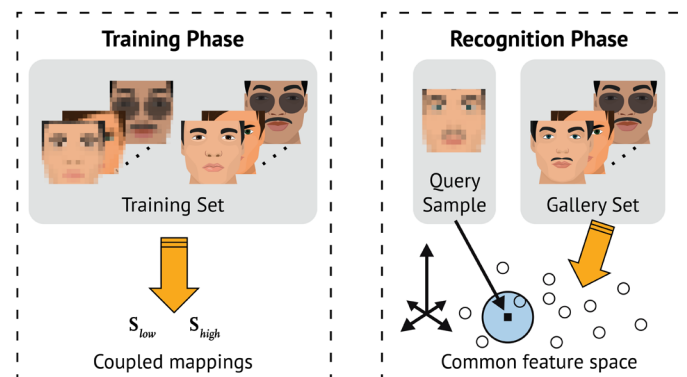
[1] Kolouri, et al.; "Transport-Based… Images," CVPR 2015. Use authorized for Government purpose.
[2] Li, et al.; "Low-Resolution… Mappings," Sig Proc Lett 2010.

Gait Recognition (GR)

Appearance-Based Approach
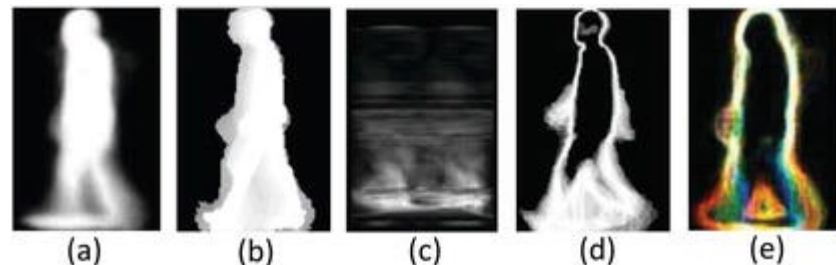

(a)   (b)   (c)   (d)   (e)

- Advantages:
  - Standoff
  - Low resolution

- Disadvantages:
  - Motion-based
  - Many covariates can complicate (clothing, shoes, ground, illumination, pose, subject health state)

Model-Based Approach

(a)   (b)   (c)   (d)   (e)

Current State:

- Work limited to close range and mostly constrained indoor

- Data limited due to lack of open source imagery/videos

- Deep Neural Network (DNN) use of temporal information under explored

- Research needed in clothing invariance, complicated backgrounds, multi-view scenarios, long-range/low resolution

Images: CC BY 3.0 (https://creativecommons.org/licenses/by/3.0/)
J. Sun, et al.; "Gait Recognition," Motion Tracking and Gesture Recognition; InTechOpen (2017).

Person Re-Identification (ReID)

- **ReID:** Identifying other sightings of a person within a camera network

- Significant advances driven by smart city, public safety

- Solutions utilize color and shape of clothing as foundational component
  - Driven by academic test datasets

Challenges

- Relies on impermanent appearances (e.g., clothing)

- Limited subject pool → Only have to match to same day sightings

- Short range and medium resolution scenarios

Probe   Gallery

Chang et al., "RCAA: Relational Context….," ECCV 2018.
Use authorized for Government purpose

Some Approaches Use Attributes:
Male, Short Hair, Short Sleeves, Young, Up Red, Down Blue, Backpack
(Red = impermanent attributes)

Atmospheric Turbulence (AT) Mitigation for Faces

Approaches

- "Lucky frame" where a subset of image(s) with less AT are selected for processing

- Fuse registered face across frames

- Fuse face parts across frames

- Sharpen each frame individually

- Often use face priors to know end goal of deblurring process
  - E.g., Face exemplar masks, Face semantics

- DNNs starting to be used

Challenges

- Many assume scene or object to be static

- Many require priors

- Fusion often needs landmarks

- Lack of real AT face datasets

- Focused on stand-alone image processing and not combined with classifier

R. Yasarla, V. Patel; ""Learning… using CNNs," ECCV 2020. Use authorized for Government purpose

(a)   (b)   (c)   (d)   (e)   (f)
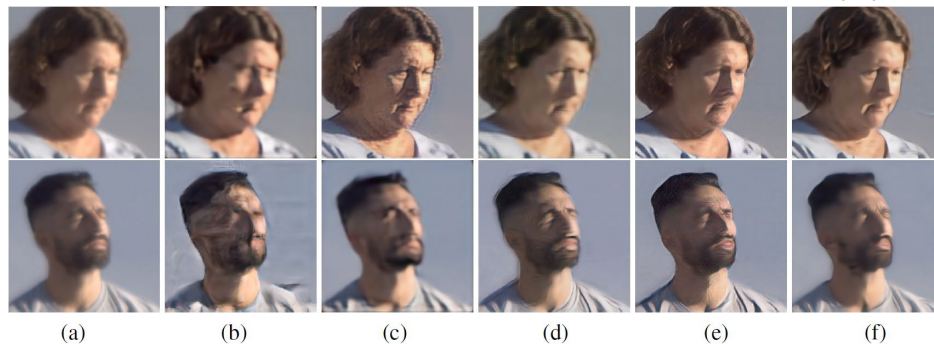
Current limitations of R&D

- Lack of training data for BRIAR-type domain → Unable to fully leverage DNNs

- Underdeveloped area of biometrics research
  - Long-range FR
  - Gait/WB recognition
  - Multi-modal fused recognition

- Stovepipe R&D of image enhancement and DNN classifiers → Suboptimal performance

UG² Prize Challenge 2018

- **Image enhancement of unconstrained non-ideal imagery**

- Algorithms output "enhanced" image

- Image classified by set of open-source pre-trained deep neural networks
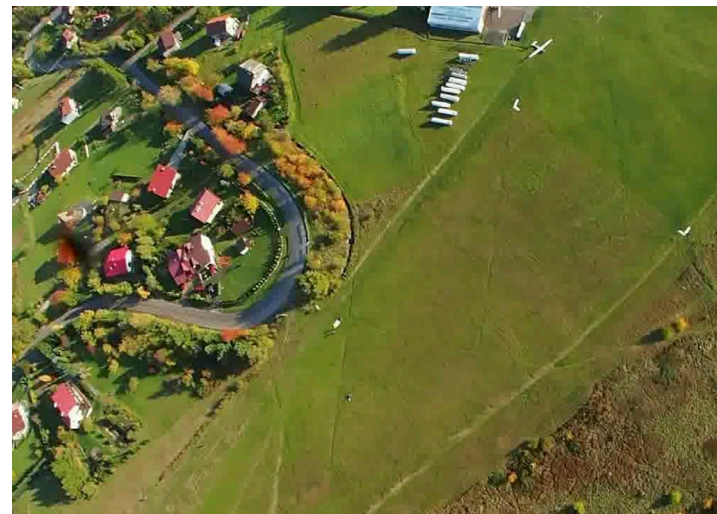
R. VidalMata, et. al; "Bridging the Gap…," IEEE PAMI (2020)
Use authorized for Government purpose

Conclusions:

- Improvements depended on type of network

- Some enhancements hurt classification

Enhanced frame (jpg, png, or tiff)

Cropped annotated object

Object classification

Classification score (txt)

Model	M1	M2
VGG16	0.8	0.7
Inception	0.7	0.9
ResNet	0.6	0.7
VGG19	0.8	0.8
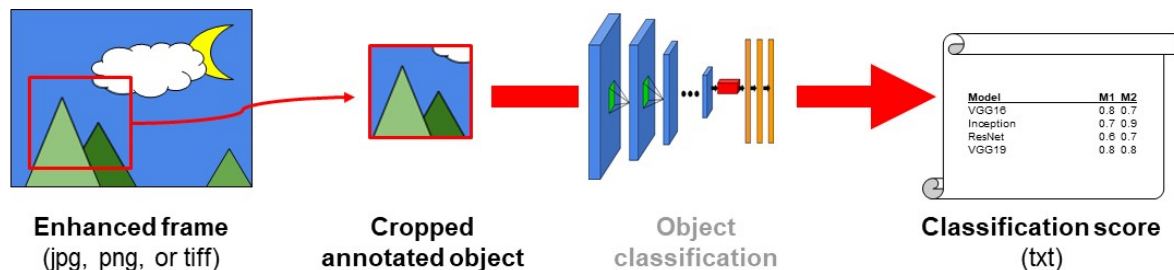
How might we get there?

You tell us!

- **Agnostic to research approach**

- Propose what is needed to meet objectives
    - Research thrusts
    - Staff
    - Resources
    - Teaming

- Highlighting some promising R&D…

DNNs Applied to Turbulence Mitigation

Examples

- Disentangled blur + distortion[1]

- Semantic segmentation to learn deblurring for different face parts[2]

- Learned blur/distortion priors w/ edge-preserving loss[3]
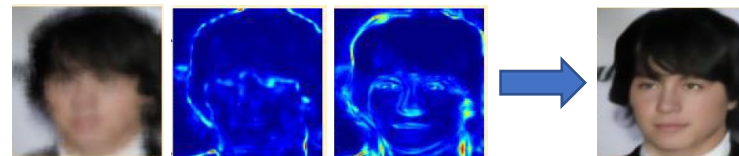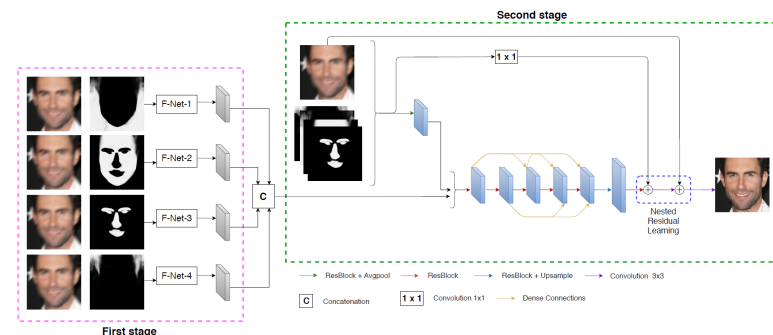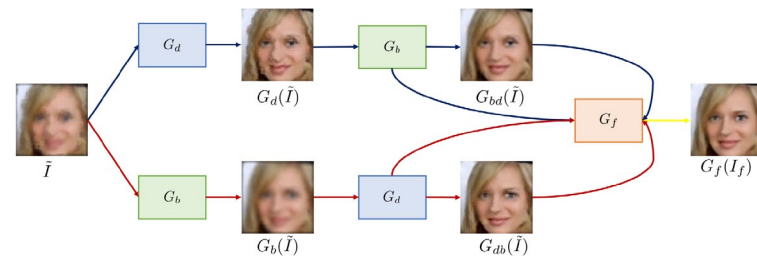
[1] C. Lau, et al.; "ATFaceGAN…" Face & Gesture 2020 (accepted); [2] R. Yasarla, et al.; "Deblurring Face Images…" IEEE TIP 2020; [3] R. Yasarla, V. Patel; ""Learning… using CNNs," ECCV 2020. Use authorized or Government purpose

Keypoint Anthropometry

- **Keypoint estimation of human pose (static and temporal)**
- Applications
  - Activity recognition
  - ReID
  - Clothing/fashion simulations

Bottom-up Approach[1]

- Bottom-up approach associates body parts with individuals

[1]Cao, et al.; "OpenPose…," IEEE PAMI 2019.
Use authorized for Government purpose

Top-down Approach

- Top-down approach detects people and then recognizes body parts

(cartoon illustration)

(a) Input Image

(b) Part Confidence Maps

(c) Part Affinity Fields

(d) Bipartite Matching

(e) Parsing Results

Gender or Shape from Anthropometry

Gender Classification[1]

- Gender classification using ratios of measurements
- Learning using Support Vector Machine (SVM) framework
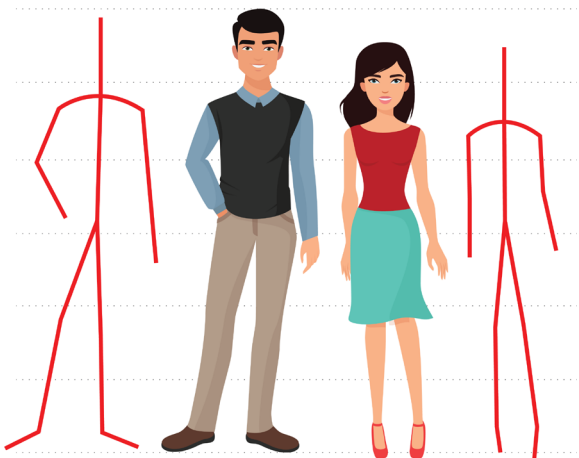
(cartoon illustration)

Body Shape from RGB[2]

- Human body shape under clothing from RGB image
- Keypoints for 3D shape/pose optimization
- Clothing segmentation with cloth-skin displacement models

CC BY 4.0 (https://creativecommons.org/licenses/by/4.0/)

[1] I. Kakadiaris, et al.; "Show Me Your…," ICIP 2016; [2] Y. Shigeki, et al.; "Estimating 3D human…," IPSJ TCVA 2018.

Biometrics from Anthropometry

NIST Study[1]

- Data: CAESAR project 3D scans (5k people)

- Biometric vector of 12 distances

- Added simulated noise to landmarks

- 9 mm RMS error =
  - ~83% Rank 1 w/ 3.4k gallery
  - ~95% TAR @ 0.1% FAR
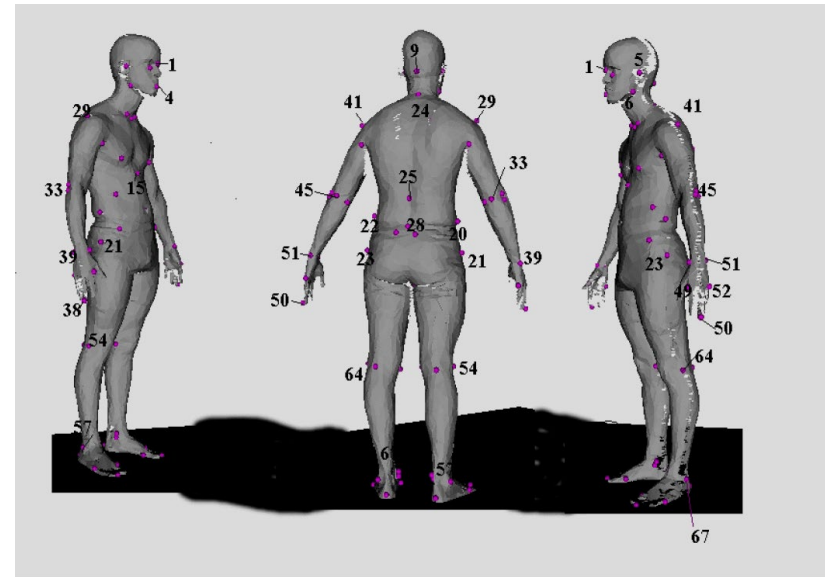
[1] Godil, et al.; "Human Identification from Body Shape," Proceedings of 3DIM; 2003
Use authorized for Government purpose

Low Resolution Landmark Detector

- Fiducial landmark detection on low resolution images

A. Kumar, et al.; "S2LD: Semi-Supervised…" CVPR 2020.
Use authorized for Government purpose

- Use series of GANs to train heatmap generator and discriminator

Failure to Detect　　**Other Approaches**　　**This Work**

Multimodal Biometrics (Face/Body)

- Majority of research is either
  - Pre-DNNs (<2014)
  - Focused on ReID problem

- None applied to medium-long range scenarios

- Pre-DCNNs
  - Side-view FR + GR[1] (Fusion: 80% → 91% Rank-1)
  - FR + Attribute Labels[2] (Fusion: 16% → 8% EER)

- FR in ReID
  - FR+ReID with clothing change detection to de-emphasize ReID[3] (Fusion: 85% → 93% Rank-1)

- FR + Body
  - FR + Body using for overhead surveillance camera imagery[4] (Fusion: 2.3% → 1.5% EER)
  - FR + Body Silhouette[5] (Fusion: 19% → 9% EER)

(cartoon illustration)

Same person

Different clothing

(cartoon illustration)
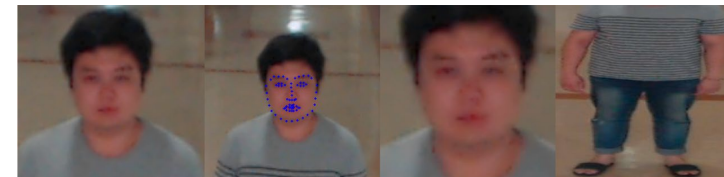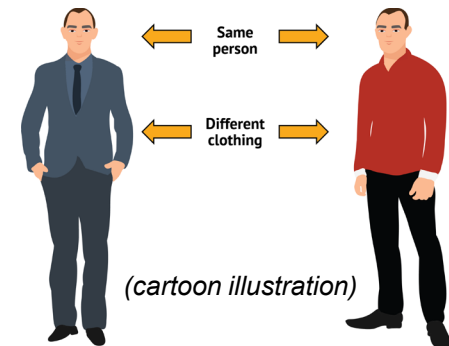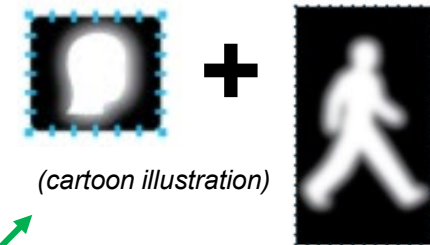
[1] Zhou, et al.; "Feature… identification" Patt. Rec. 2008
[2] Tome, et al.;"Soft… Distance," ITIFS 2014
[3] Xue, et al.; "Clothing… Identification," CVPR 2018
[4] Koo, et al.; "CNN-Based… Environments," Sensors 2018
[5] Gonzalez-Sosa, et al.; "Person… Information," ICPR 2018

How will BRIAR be successful?

- Advance multi-modal fused biometric signatures
  - E.g., Whole-Body Identification (WBID)

Revolutionary Advances

- Build upon unconstrained face recognition (FR)

Evolutionary Advances

- Collect lots of relevant data

New: Evolutionary Advances

Program Data

Program Data

- **Domain of interest not available in research community**

- Robust data strategy needed to facilitate
  - Innovative research
  - Relevant and comprehensive evaluations

- **Type of data**
  - Development Data – For use by researchers (investigations, algorithm training)
  - Evaluation Data – For use by researchers and the Test & Evaluation (T&E) Team for common performance evaluations

Program Data Collections

- Semi-annual field data collections by T&E Team
- Annual field data collections by Performers
- IRB-approved involving consenting volunteers
  - Diverse demographics and body shape/types

- Video imagery (range of image stabilization at capture time)
- Multiple sensors (visible cameras only)
- Unmanned Aerial Vehicles (UAVs), Ground and Building Sensors
- Whole-body and face biometric enrollments
- Annotated for research, training, and evaluations
  - Localizations, capture conditions, demographics, environment, subject ID

Example UAVs of Interest

- Focus on medium sized fixed wing and rotor
  - E.g., Group 2 (22-55 lbs max weight, 3,500 ft ceiling)
- Propose R&D platforms for performer collections; IARPA to provide updated guidance at kickoff
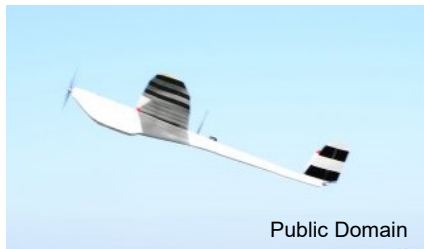
Platforms are for illustrative examples only; Neither ODNI nor IARPA endorses any products

Sources of Data

- Regular field and lab collections by T&E team (x8)
  - Deployed sensors, UAVs, outdoor, enrollment
- Performer data collections (x4/performer)
  - Field collects with platforms and enrollment
  - Shared between all teams and T&E
- Simulated data using USG modeling to augment
  - Expand T&E collected datasets
  - Augment research training data provided by performers
- External datasets as supplements
  - Janus program datasets – IJB-S, IJB-MDF
  - USG partner dataset(s) – NVESD LRFID
  - Academic research datasets – Depends on approach
- Other Performer generated data (e.g., Synthetic)
  - Optional – Dependent on research approach

Phase 1 Program Data in Detail

Phase	Type	Origin	Dataset	Month	# Subjects (Probes)	# Subjects (Gallery)
1	Development	T&E	BRS1	1	200	200
1	Evaluation	T&E	BTS1	1	100	250
1	Development	T&E	BRS2	7	200	200
1	Evaluation	T&E	BTS2	7	200	500
1	Development	R&D	BRC1	13	800[1]	800[1]
1	Development	T&E	BRS3	13	200	200
1	Evaluation	T&E	BTS3	13	300	750

- Separate datasets for development and evaluation
- Performer self collections shared across the program
- T&E datasets include collected and augmented data
- Evaluation datasets are supersets of previous test sets
- Plan to provide data at Kickoff

[1] 200 subjects/performer

BRIAR Research Set (BRS)
BRIAR Test Set (BTS)

Program Data By Phase

Phase	Type	Origin	# Subjects (Probes)	# Subjects (Gallery)
1	Development	T&E + R&D	1,400	1,400
1	Evaluation	T&E	300	750
2	Development	T&E + R&D	3,200	3,200
2	Evaluation	T&E	600	1,500
3	Development	T&E + R&D	4,000	4,000
3	Evaluation	T&E	800	2,000

- Unique subjects with annotated video

- Sufficient data for modern DNN approaches:
  - 4,000 subjects x 10 cameras x 1 min video x 30 fps
    → 72,000,000 frames for supervised learning

Simulated data using USG modeling

Night Vision Integrated Performance Model

To be carried out by T&E Team using NV-IPM

- Augment and expand field collections

- Transform external datasets for researchers

Range

	100 m	300 m	500 m
Low			
Medium			
High			

Turbulence

Simulated　　　Collected　　　Simulated

Illustrative Example

Permission granted by subjects for use of imagery in public presentations
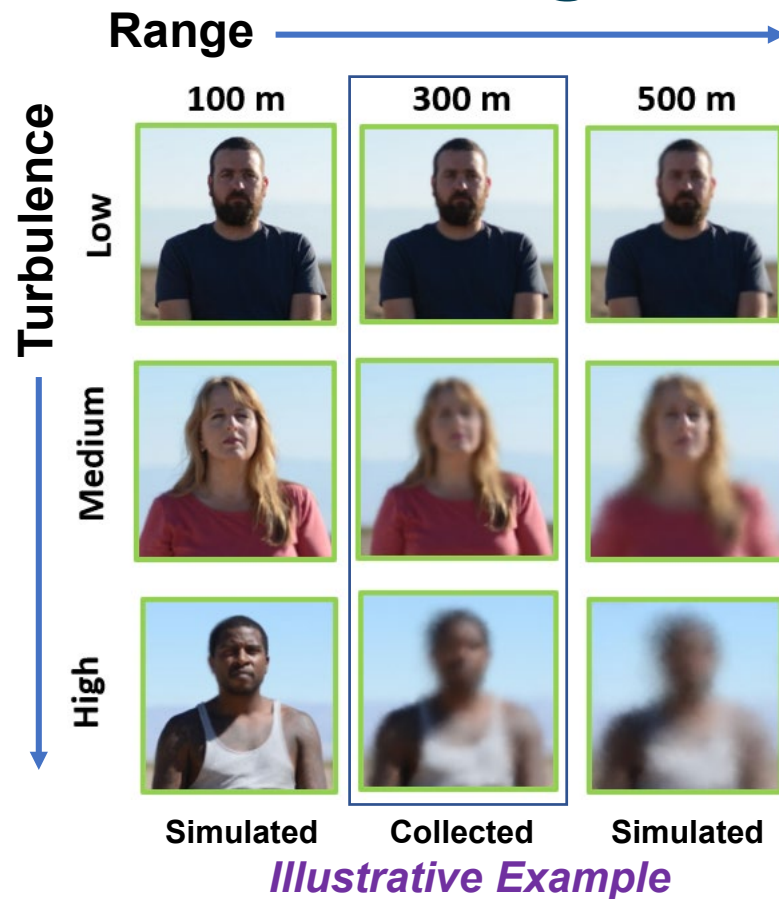
Note: Does not preclude proposals from including related research (e.g., Domain adaptation, modeling and simulation, or training approaches)

Program Objectives & Deliverables

BRIAR Technical Challenges & Objectives

- Matching at long range (100-1000m)
- Matching at severe pitch views (20-50°)
- Atmospheric turbulence mitigation
- Multi-image templates from video
- Body and face localization in moving video
- Cross-view WB matching indoor and outdoor
- Robust against incomplete or occluded views
- Multi-modal fusion (WB+Face = 1 Template)
- Agnostic to sensor platform and optics
- Adapt to edge processing and real-time streaming
- Accurate across diverse demographics and body shapes
- Invariant to pose, illumination, expression, and clothing changes
- Adapt or transfer solutions to platform-specific environments
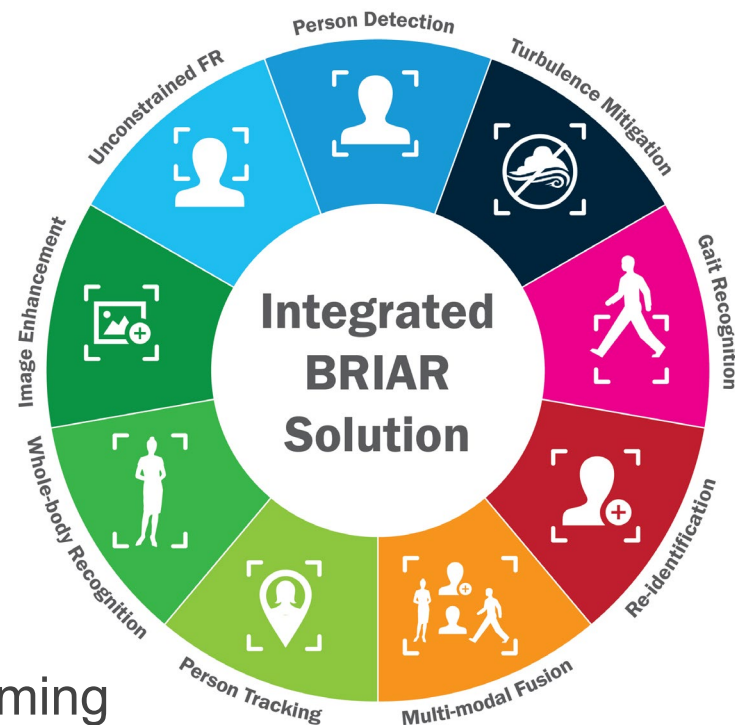
Out of Scope Research (excerpts)

- Development of optical sensor hardware.

- Development of sensor platforms (e.g., UAVs).

- Approaches that rely on secondary external data signals, such as cell tower tracking or non-optical sensors.

- Research that utilizes proprietary data that are not made available to other Performers.

- Approaches that consist merely of integrating currently existing software.

- Research involving biometric matching of non-visible imagery.

See the draft Technical BAA for full list

Primary Program Deliverables

- Integrated BRIAR software systems
  - Primary + lean version for edge processing
- Standalone subcomponent modules for all research thrusts
- Training tools and software code
- Software documentation and manuals
- Collected research datasets with annotations
- Research activity reports

- In general, deliverables to be provided with a minimum of Government Purpose Rights (GPR)

Notional BRIAR System Design

- Example cartoon for end-to-end BRIAR system

Degraded input video ① → **Image enhancement** ② → **Localization** ③ → **Biometric processing** ④A / ④B → **Encoding** ⑤ → **Fusion** ⑥ → **Matching** ⑦
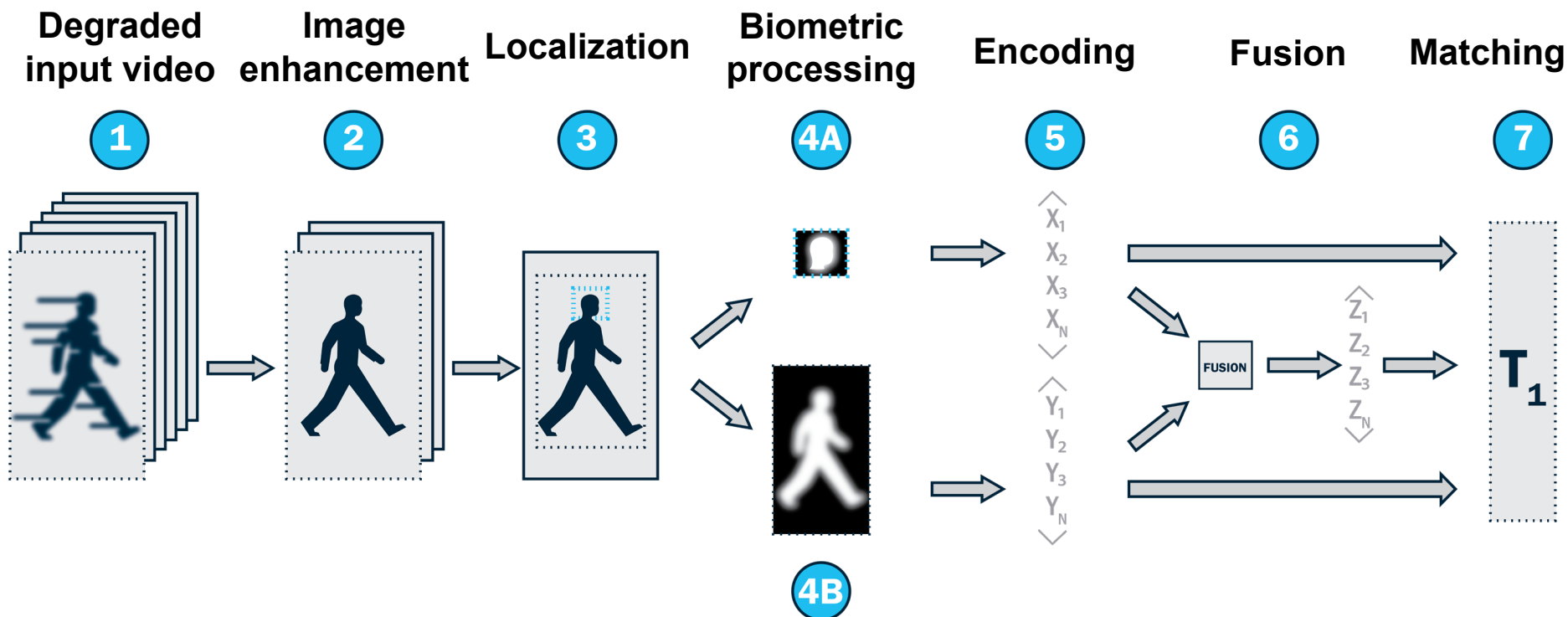
Not prescriptive – Opportunity for innovative approaches in any/all stages

Standardized BRIAR Software API

- Program will use a standardized Application Programming Interface (API) for all software

- Defines function calls, data structures, and gallery management

- For operating and evaluating BRIAR software

- Multi-modal biometric data (WB and Face)

- Based on Janus Program API as foundation (https://noblis.github.io/janice/)

- API v1 to be provided at kickoff

Test & Evaluation

Program Evaluations

- ## Biometric System Performance
  - Verification (1:1 Matching)
  - Recognition (1:N Rank Retrieval)
  - Identification (1:N Open Search)

Evaluated on common BRIAR Test Sets (BTS) disjoint from development data

- ## Subcomponent Performance
  - Image Preprocessing, WB/Face Detectors
- ## System Functionality
  - Template Size, Processing Speed, API Compliance

Phase	Probes					Gallery	
	Subjects	Range		Pitch	Noise	Subjects	Enrollment
1 (BTS3)	300	1 – 500 m	OR	0 – 30°	Low – High	750	Constrained
2 (BTS6)	600	1 – 1000 m	OR	0 – 50°	Low – High	1,500	Semi-constrained
3 (BTS8)	800	1 – 1000 m	AND	0 – 50°	Low – High	2,000	Unconstrained

Program Target Metrics

Figure of Merit		Phase 1	Phase 2	Phase 3
Verification (1:1) True Accept Rate (TAR) @ False Accept Rate (FAR)	**Whole Body**	85% @ 1%	85% @ 0.1%	85% @ 0.01%
	Face Only	70% @ 1%	70% @ 0.1%	70% @ 0.01%
Rank Retrieval (1:N) Closed Search (# subjects)	**Whole Body**	90% in Top 20 (375)	95% in Top 20 (750)	98% in Top 20 (1,000)
	Face Only	80% in Top 20 (375)	90% in Top 20 (750)	95% in Top 20 (1,000)
Open Search (1:N) False Negative ID Rate (FNIR) @ False Positive ID Rate (FPIR) (# subjects)	**Whole Body**	50% @ 1% (375)	20% @ 1% (750)	20% @ 0.3% (1,000)
	Face Only	70% @ 1% (375)	50% @ 1% (750)	50% @ 0.3% (1,000)
Template Size	**All Modalities Combined**	< 1 MB	< 1 MB	< 1 MB
Processing Speed * **(of full pipeline)**		5x Slower than real time on $10k hardware	Real time on $10k hardware	Real time on edge hardware (lean algorithm only)

* Trained algorithm at run time. Does not include training during model development.

Program Structure

Responsible Biometrics Research

- **All** subjects will be volunteers consented under an IRB-approved protocol
- Data management with **explicit** security and privacy safeguards
- Datasets with **intentionally** diverse subject populations
- **Explicit** program technical objective:
  - WB and face recognition that perform accurately across diverse demographic and human body shape groups.
- Performers to submit and maintain a **Privacy Plan**
- All external research datasets will be **reviewed** in accordance applicable privacy policies, statutes, and regulations

Program Phases: Summary

Area	Phase 1 (18 months)	Phase 2 (18 months)	Phase 3 (12 months)
System R&D	Subcomponent	Integrated	Optimized
Accuracy	Feasible	Relevant	Reliable
Probes	Unconstrained data with moderate pitch or range	Unconstrained data with severe range or pitch	Unconstrained data with severe pitch and range
Gallery	Controlled	Partial controlled	Unconstrained
Processing	Offline	Real-time	Edge

Proposals to address all three (3) phases

Phase 1 (18 months)

- Research whole-body (WB) biometrics, face recognition, and subcomponents

- Meet proof of concept accuracy levels to show feasibility

- Demonstrate batch image processing with post-test fusion of modalities

- Offline processing of full data resolution

Data Focus

	Range		Pitch
Probes	Moderate (1-500 m)	**OR**	Moderate (0-30°)
Gallery	Controlled, indoor enrollment		

Phase 2 (18 months)

- Explore how to combine subcomponents into single system
- Demonstrate integrated image processing and fusion of FR and at least 1 WB modality in single pipeline
- Real time processing of streaming data at ground station
- Extend performance to near-operational levels

Data Focus

	Range		Pitch
Probes	Severe (1-1000 m)	**OR**	Severe (0-50°)
Gallery	Partially controlled enrollment		

Phase 3 (12 months)

- Advance combined system and optimize signal fusion in network

- Expand image processing and fusion to include secondary components and pipeline adaptive to environmental conditions

- Develop version of pipeline to run onboard edge computing at Phase 2 performance goals

- Push performance to operational levels

Data Focus

	Range		Pitch
Probes	Severe (1-1000 m)	**AND**	Severe (0-50°)
Gallery	Unconstrained		

Program Schedule

- **BAA formal release:** Oct/Nov 2020 (tentative)
- **Kick-off:** Q3/Q4 FY2021 (estimate)

Phase 1 (18 Months)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
GFI Datasets (BRS, BTS)	O						O						O					
Researcher Collected Datasets (BRC)													●					
Software Deliverables																●		
Performer Evaluations												◊				◊		
Independent Government Evaluations																		◊

Phase 2 (18 Months)	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
GFI Datasets (BRS, BTS)	O						O						O					
Researcher Collected Datasets (BRC)							●						●					
Software Deliverables						●						●				●		
Performer Evaluations							◊					◊				◊		
Independent Government Evaluations							◊						◊				◊	

Phase 3 (12 Months)	37	38	39	40	41	42	43	44	45	46	47	48						
GFI Datasets (BRS, BTS)	O						O											
Researcher Collected Datasets (BRC)							●											
Software Deliverables						●						●						
Performer Evaluations							◊					◊						
Independent Government Evaluations							◊					◊						

Point of Contact

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- Electronic mail: dni-iarpa-BAA-20-04@iarpa.gov

include IARPA-BAA-20-04 in the Subject Line

- Website: https://www.iarpa.gov/index.php/research-programs/briar

THANK YOU!

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Time	Topic	Speaker
1:00 PM – 1:10 PM	Welcome, Logistics, Proposer's Day Goals	Dr. Lars Ericson Program Manager, IARPA
1:10 PM – 1:20 PM	IARPA Overview	Dr. Catherine Cotell, Deputy Director (Emeritus), IARPA
1:20 PM – 2:20 PM	BRIAR Program Overview	Dr. Lars Ericson
2:20 – 2:35 PM	Break to formulate Qs	
2:35 PM – 3:00 PM	Doing Business with IARPA	Michelle Crecca, IARPA Contracting Officer
3:00 PM – 3:30 PM	Break (Qs after 3:15pm will not be addressed)	
3:30 PM – 4:30 PM	BRIAR Questions & Answers	Dr. Lars Ericson

Note: All times are EDT (Washington, DC Time)

Break to Formulate Questions

Doing Business with IARPA begins at 2:35pm

Doing Business with IARPA
October 7, 2020 (FY21)

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IARPA
BE THE FUTURE

General

- Broad Agency Announcement (BAA)

- Questions and Answers

- Eligible Applicants
- Preparing the Proposal

- Submitting the proposal

- Evaluation and award process

- Other
    - Organizational Conflicts of Interest
    - Intellectual Property
    - Pre-Publication Review
    - Academic Institution Acknowledgement
    - Multiple Proposal Submissions
    - Contract Type
- Disclaimer

- IARPA uses BAA type solicitations conducted under FAR Part 35, Research and Development Contracting

- BAAs will be posted to beta.SAM.gov

- We typically allow 45 – 60 days for proposals

- All the information needed to submit a proposal will be in the BAA.

- The BAA will have a Q&A period during which prospective offerors can submit questions

- The email for questions will be provided in the BAA

- Q&As will be posted to beta.SAM.gov so be sure to check regularly

- No answers will go directly to offeror nor shall questions be sent to other than the email designated in the BAA

- Note that your question will be posted so be careful not to reveal information that you don't want made public..

- Collaborations and teaming are generally encouraged by IARPA

    - team formation is the responsibility of Offerors

- Foreign organizations and/or individuals

    - This is program dependent, the BAA will specify if there are any limitations

    - Regardless of eligibity, must comply with:

        - Any contract security clauses or requirements

        - Export Control Laws (ITAR, EAR) and implementing contract clauses

Eligible Applicants, cont.

- The following are generally **not** eligible to submit proposals for IARPA research programs or participate as team members under proposals submitted by eligible entities
    - Other Government Agencies,
    - Federally Funded Research and Development Centers (FFRDCs),
    - University Affiliated Research Centers (UARCs)
        - An entity of which only a portion has been designated a UARC may be eligible to submit subject to an OCI review if stated in the BAA
    - Any organizations that have a special relationship with the Government that would give them
        - access to privileged and/or proprietary information
        - access to Government equipment or real property

- The BAA contains proposal preparation instructions such as:
  - Due date and time
  - Page limitations and format
  - Information to be addressed in the proposal (e.g., technical, cost and administrative)
  - Templates for required proposal attachments (e.g., Cover sheets, OCI notification, Academic Institution Acknowledgement, IP/Data Rights Assertions, Cost breakdown)
- The BAA also contains the evaluation factors for award including the technical evaluation criteria (e.g., technical approach, relevance to IARPA, work plan, experience, key personnel, resource realism, etc.)
- The BAA describes the method of evaluation and selection
- IARPA may only request the Technical Volume initially with the detailed Cost volume requested after selection

- Proposals must be submitted through IARPA's IDEAS system
    - Interested Offerors must register electronically IAW instructions on: **https://iarpa-ideas.gov.** (will be available after BAA is posted)
    - Interested Offerors are strongly encouraged to register in IDEAS at least one week prior to proposal "Due Date"
    - Offerors must ensure the version submitted to IDEAS is the "Final Version"
    - For Classified proposals, the BAA will contain separate delivery instructions
- The BAA will have instructions for how to respond if there are system problems with IDEAS
- If the Cost Volume is not requested until after selection, it will be directly submitted to the contracting officer, not through IDEAS

- Each BAA will detail the method for evaluation and selection but IARPA generally follows a two-step process:

  - Fist step is evaluation and selection for negotiations. This is conducted through a scientific/peer review process after which offerors are notified of selection
  - Second step is negotiation and contract award conducted by the contracting officer

- Proposals will be reviewed individually against the BAA requirements in accordance with FAR 35 and not against each other

- IARPA follows FAR Part 9 regarding Organizational Conflicts of Interest (OCIs). The main principles being:
    - preventing conflicting roles that might bias a contractor's judgement
    - preventing an unfair competitive advantage

- The BAA will describe how offerors are to identify and disclose all facts relevant to potential OCIs for the offeror as well as any proposed team members

- OCI disclosures may require a mitigation plan describing the actions the offeror will take or intends to take to prevent the conflict

- IARPA generally prohibits contractors from concurrently providing System Engineering Technical Assistance (SETA) and T&E support while being a technical R&D performer due to OCI concerns. Each case will be determined individually.

- The Government needs to be able to effectively manage the program and evaluate the output and deliverables, communicate the information across Government organizations and support further use and development of program results

- Offerors will address their IP Rights assertions in their proposal. The Government may request additional information as may be necessary to evaluate

- The Government will evaluate the IP rights being offered and whether they are in the Government's best interests.

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- IARPA encourages publication of **UNCLASSIFIED** IARPA-funded research in peer-reviewed journals, presentation at conferences and publication in conference proceedings.

- Prior to public release of any work submitted for publication, the Performer will:
  - Communicate results to be publicly released with the IARPA Program Manager to discuss any sensitivities (e.g., security, speculation on IC use cases, etc.)
  - Provide advance courtesy copies to the IARPA PM and Contracting Officer Representative (COR/COTR)

- According to Executive Order 12333, contracts or arrangements with academic institutions may be undertaken only with the consent of appropriate officials of the institution.

- An Academic Institution Acknowledgement letter is required for offerors that are academic institutions and for any proposed teammate that is an academic institution.

- A template for this letter will be included in the BAA. Each letter must be signed by a senior official of the institution (e.g. President, Chancellor, Provost or other appropriately designated individual).

- IARPA requires this letter before entering into negotiations and/or awarding a contract. It is highly advised that it be submitted with the proposal.

- Proposal Submissions to other entities:

  - Typically, the BAA asks offerors to name, in their proposal, other federal, state or local agencies and/or other parties receiving the proposal (or substantially the same proposal) or funding the proposed effort.

  - If the offeror has submitted the same or substantially the same proposal to other entities, it may impact IARPA's decision to select and fund the effort.

- Multiple Proposal Submissions to IARPA:

  - BAAs usually allow an entity to participate in multiple submissions as a prime or subcontractor. If allowed by the BAA, multiple submissions which include a common team member shall not receive duplicative funding for the same work (i.e., no one entity can be paid twice for the same work).

Cost or Cost-Plus-Fixed-Fee type contracts are typically awarded due to the nature of the R&D work. IARPA may, in some instances, consider other contract types, such as Firm Fixed Price, as well as non-FAR based agreements such as Other Transactions.

The types of contracts and agreements that will be considered and the conditions for such consideration (e.g., small business, start-ups, commercial, foreign entities, etc.) will be addressed in the BAA.

The information conveyed in this brief is for planning and general information purposes and is subject to change.

Please carefully read the final BAA and adhere to its requirements which may differ from what has been presented in this briefing.

THANK YOU!

Answers to Questions