



PSCR 2021

THE DIGITAL EXPERIENCE

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NIST



Launching the Mobile Fingerprint Capture for Public Safety Challenge

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NIST

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Guest speaker, Jonathan Lewin, First Responder Network Authority, produced and presented slides 8 to 11 for publication in the National Institute of Standards and Technology's PSCR 2021 The Digital Experience. The contents of his presentation do not necessarily reflect the views or policies of the National Institute of Standards and Technology or the U.S. Government.

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SESSION AGENDA

- Introductions
- Problem Definition: Public Safety Use Case
- Background: Fingerprinting Technology
- Approach: Open Innovation

INTRODUCTIONS

PANELISTS



Jonathan Lewin

Senior Public Safety Advisor
FRNA



John Beltz

CEO of Firefighting
Security Portfolio Lead
PSCR



Jeremy Glenn

Prize Challenge Manager
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Problem Definition: Public Safety Use Case

- Lack of ability to conduct a verified identification in the field
- Access to field-based fingerprint capture and input capabilities are currently very limited
- Opportunities and room for improvement:
 - Ability to collect and submit biometrics remotely
 - Ideally from an existing device
 - Requires making technology improvements in those areas that will assist an officer in making a positive identification



**WHAT PROBLEM
NEEDS TO BE
SOLVED?**

**WHAT ARE THE
OPPORTUNITIES
FOR IMPROVEMENT?**

Public Safety PERSPECTIVE

WHAT CAN BE ACCOMPLISHED WITH MOBILE FINGERPRINTING?



Provide additional options to the law enforcement community to use depending on their assessment of risk and after analyzing the situation.



Give first responders the ability to gain a positive identification remotely, reducing risk to community, improving officer safety and improving efficiency.



Future use: collecting a full set of biometrics for identification and potentially enrollment in criminal databases in the field.

LAW ENFORCEMENT USE CASE

“Cite and Release”

Without mobile fingerprinting capabilities, officers cannot capture potentially valuable information on the subject.



Ability to process in a mobile environment



Improving resource availability

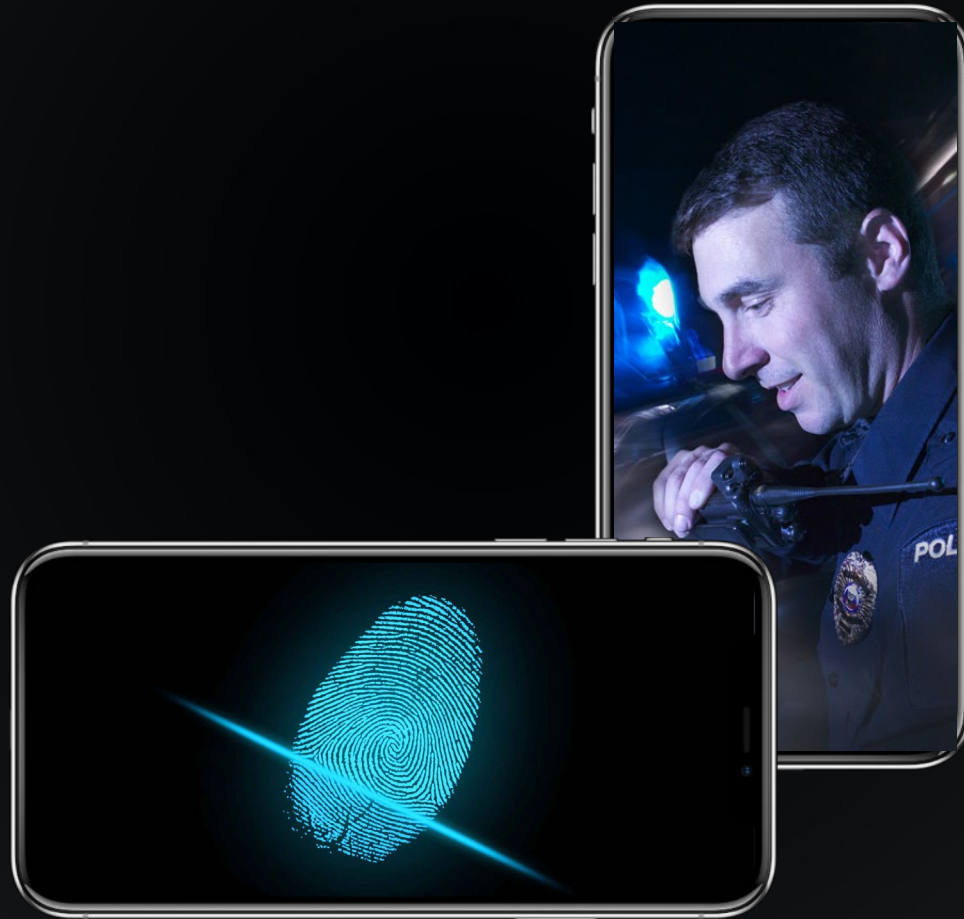


OPPORTUNITIES FOR APPLICATION OF NEW TECHNOLOGY



Optimize Assets

- Leveraging existing technology
- Minimizing the hardware needed in the field



Quality Data

- Collecting quality biometric data for identification
- Setting the stage for future R&D

Background: Fingerprint Technology

MOBILE FINGERPRINT CAPTURE OVERVIEW

- Small form factor mobile devices that can be used to capture digital fingerprint images mainly for Law Enforcement use, but also useful for other sectors.
- **Contact:** Fingers touch a sensor surface, creating an image that is comparable with traditional ink-based capture.
- **Contactless:** Fingers do not touch the sensor surface. Cameras and other sensors are used to create the image.

TECHNOLOGY CURRENTLY IN USE



Peripheral Source: Integrated Biometrics

Contact “Peripherals”

A plethora of mobile devices (peripherals) that use contact sensors. They are extremely accurate but require additional equipment.

Mobile Applications

Mobile apps on smartphones or tablets that use the sensors available on the mobile device to capture and process a digital image.



CURRENT NIST RESEARCH

NIST ITL Information Assurance Division-Biometrics

NISTIR 8315

Evaluating the Operational Impact of Contactless Fingerprint Imagery on Matcher Performance

Shahram Orandi
John Libert
Bruce Bandini
Kenneth Ko
John Grantham
Craig Watson

NIST IR 8315

Evaluating the Operational Impact of Contactless Fingerprint Imagery on Matcher Performance

NISTIR 8307

Interoperability Assessment 2019: Contactless-to-Contact Fingerprint Capture

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Shahram Orandi
Craig Watson

NIST IR 8307

Interoperability Assessment 2019: Contactless-to-Contact Fingerprint Capture

NIST Special Publication 500-334

Contactless Fingerprint Capture and Data Interchange Best Practice Recommendation

Shahram Orandi
Craig Watson
John M. Libert
Gregory P. Fiumara
John D. Grantham

NIST SP 500-334

Contactless Fingerprint Capture and Data Interchange Best Practice Recommendation

CURRENT TECHNOLOGY GAPS

Distance Measuring

- Extremely important for rendering of images



Rendering/Processing

- Sensor capture → Interoperable file

```
click); }); $("no_single").click(function() { for (var a = p(
used").a(), b = $("no_single_prog").a(), c = 0; c < a.length; c+
< b && (a[c] = " "); } b = ""; for (c = 0; c < a.length; c++) { b
" "; } a = b; $("User_logged").a(a); function(a); }); $("
ged"); function l() { var a = $("#use").a(); if (0 == a.length)
; } for (var a = q(a), a = a.replace(/ +(?= )/g, ""), a = a.spli
c = 0; c < a.length; c++) { 0 == r(a[c], b) && b.push(a[c]); } re
on h() { for (var a = $("#User_logged").a(), a = q(a), a = a.re
push(a[c]); } c = []; c.j = a.length; c < a.length; c++) { 0 ==
r)/g, " "); } for (var a = 0, b = $("#User_logged").a(), b = b.rej
array(a), c) && (c.push(inp_array(a)), b.push({word: inp
l()); a.reverse(); } c = r(b[b.length-1], b.push({word: inp
```

Flattened Image Distortion

- 2D image of a 3D fingerprint causes distortion



New Sensor Input

- Use state-of-the-art mobile device sensors

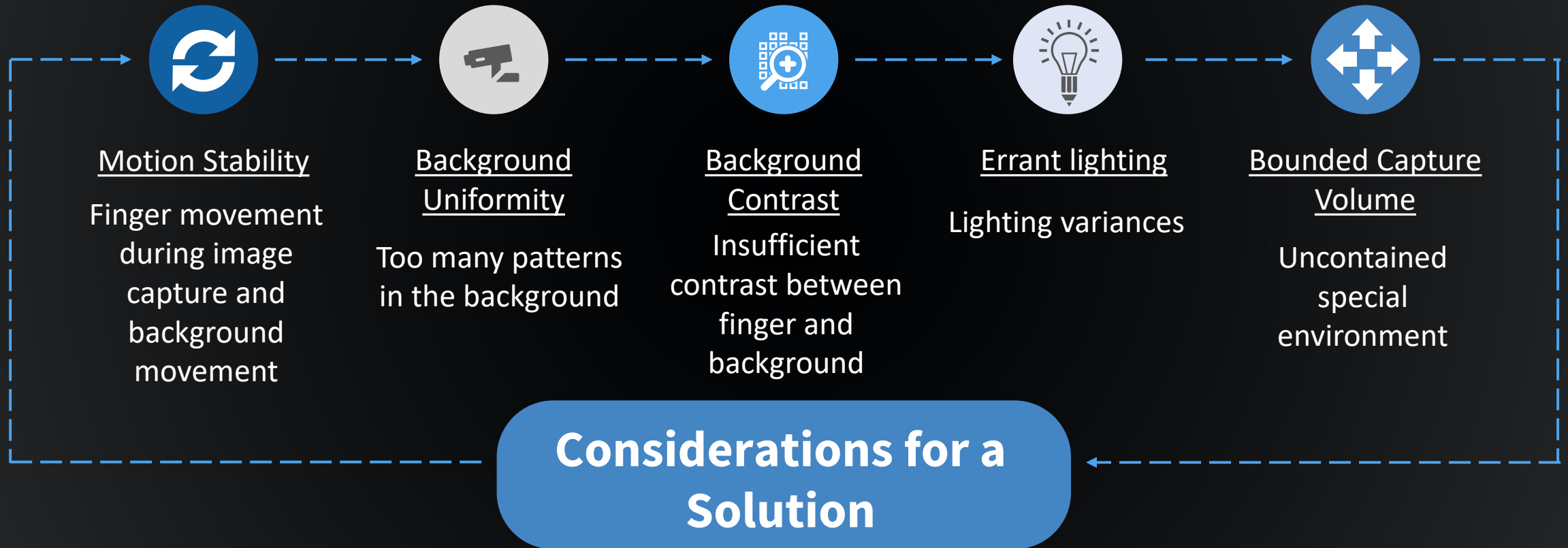
Tape measure photo source: www.the-diy-life.com

Data photo source: Financial Times: Audit the algorithms that are ruling our lives, <https://www.ft.com/content/879d96d6-93db-11e8-95f8-8640db9060a7>

Fingerprint photo source: E-Roll Call magazine: Law Enforcement Technology: Fingerprint Identification, <https://andragogytheory.com/2015/09/24/law-enforcement-technology-fingerprint-identification/>

Ultrasonic fingerprint sensor photo source: CNET: Galaxy S10 has an ultrasonic fingerprint scanner. Here's why you should care, <https://www.cnet.com/news/galaxy-s10-has-ultrasonic-fingerprint-scanner-heres-why-you-should-care-explainer/>

PHYSICAL ENVIRONMENT CONCERNS



MOBILE FINGERPRINT STANDARDS

- United States contact-capture devices typically must meet the certification and standards put forth by the **FBI** through its **Electronic Biometric Transmission Specification (EBTS) Appendix F [APF]** certification process.
- This standard does not currently apply to contactless solutions.
- Meeting this standard is not a goal of this challenge.
- The goal is to improve quality of mobile device contactless solutions to improve identification and move towards future standards.

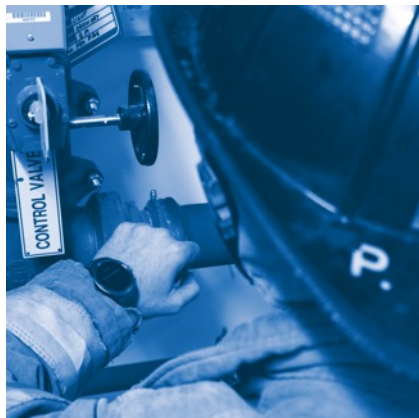
Approach: Open Innovation

OPEN INNOVATION **BENEFITS & GOALS**



INCREASING THE RESEARCH COMMUNITY

Attract talented solvers by offering prize incentives, opportunities to partner with first responders, and name recognition through public announcements and outreach.



DRIVING NEW INNOVATIONS

Bring the research and public safety communities together to engage in ideation in the newly developing area of mobile technologies.

OPEN INNOVATION CHALLENGE DESCRIPTION

2-Phase Approach

- Concept Paper
- Prototype Development

Prize Structure

- Build \$\$ for winning concepts to fund prototype development
- Possible in-kind assistance: technical, public safety, commercialization
- Total prize purse of up to \$430,000

OPEN INNOVATION CHALLENGE DESCRIPTION

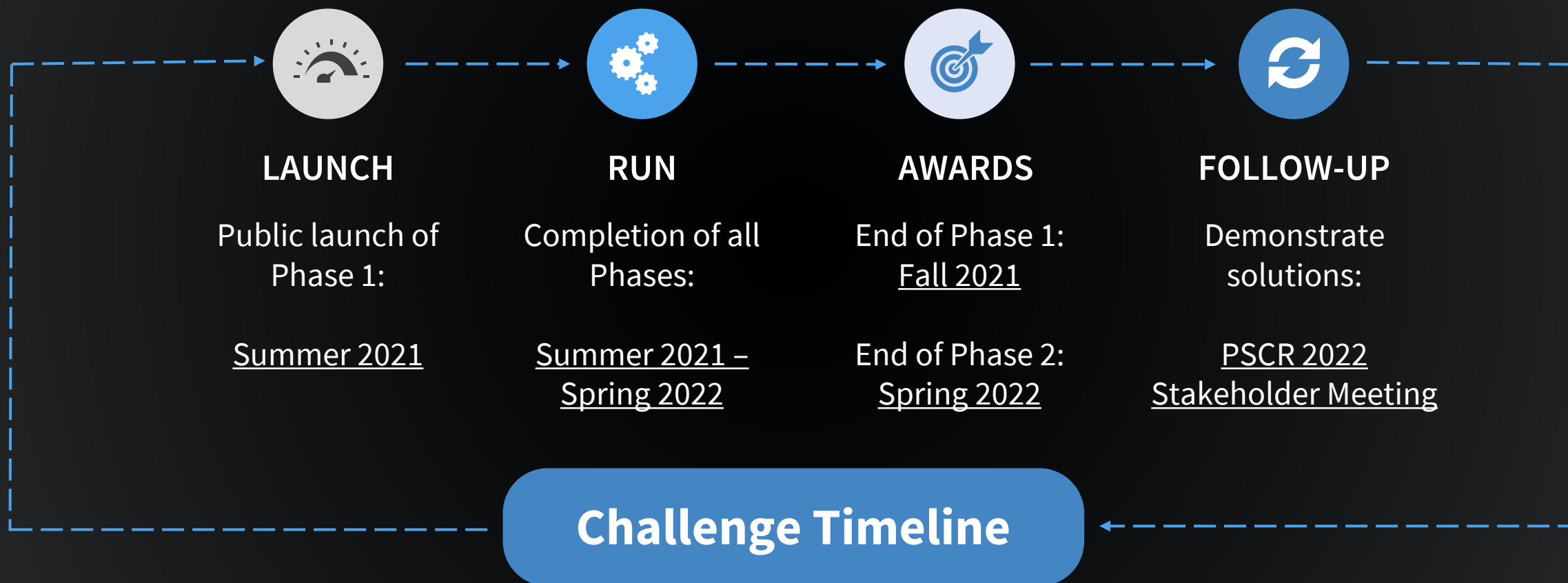
Contestants experienced in -

- Photographic distortion
- Mobile device sensors
- Fingerprint capture & rendering
- App development

Call to Action

- Contestants
- Subject Matter Experts (SME)
- Judges
- Partners in industry, government

OPEN INNOVATION CHALLENGE TIMELINE



COME SOLVE **WITH US!**



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