PSCR Agenda

8:15 a.m.	**Open Innovation Overview** *Ellen Ryan, Deputy Division Chief, PSCR Division*
8:30 a.m.	**De-Identification Challenge and Tech to Protect Challenge Review** *Terese Manley, Prize Competition and Challenge Specialist* *Craig Connelly, Prize Competition and Challenge Specialist*
9:00 a.m.	**Identity, Credential, and Access Management (ICAM)** *John Beltz, Security Portfolio Lead*
9:30 a.m.	**Break**
9:45 a.m.	**Location Based Services Overview** *Jeb Benson, LBS Portfolio Lead*
10:15 a.m.	**Analytics Overview** *John Garofolo, Analytics Portfolio Lead*
10:45 a.m.	**Future of Pre-incident Planning Demo (PSCR Lab)**
11:05 a.m.	**Haptics Interface for Public Safety** *Scott Ledgerwood, UI/UX Portfolio Lead*
11:35 a.m.	**Virtual Reality (VR) / Augmented Reality (AR) Demo (PSCR Lab)**
12:00 p.m.	**Questions and Wrap Up**

PSCR OPEN INNOVATION

Solving the Public Safety needs of tomorrow...today

Overview of PSCR Prize Challenges

National Institute of Standards and Technology
U.S. Department of Commerce

Overview of PSCR Prize Challenges

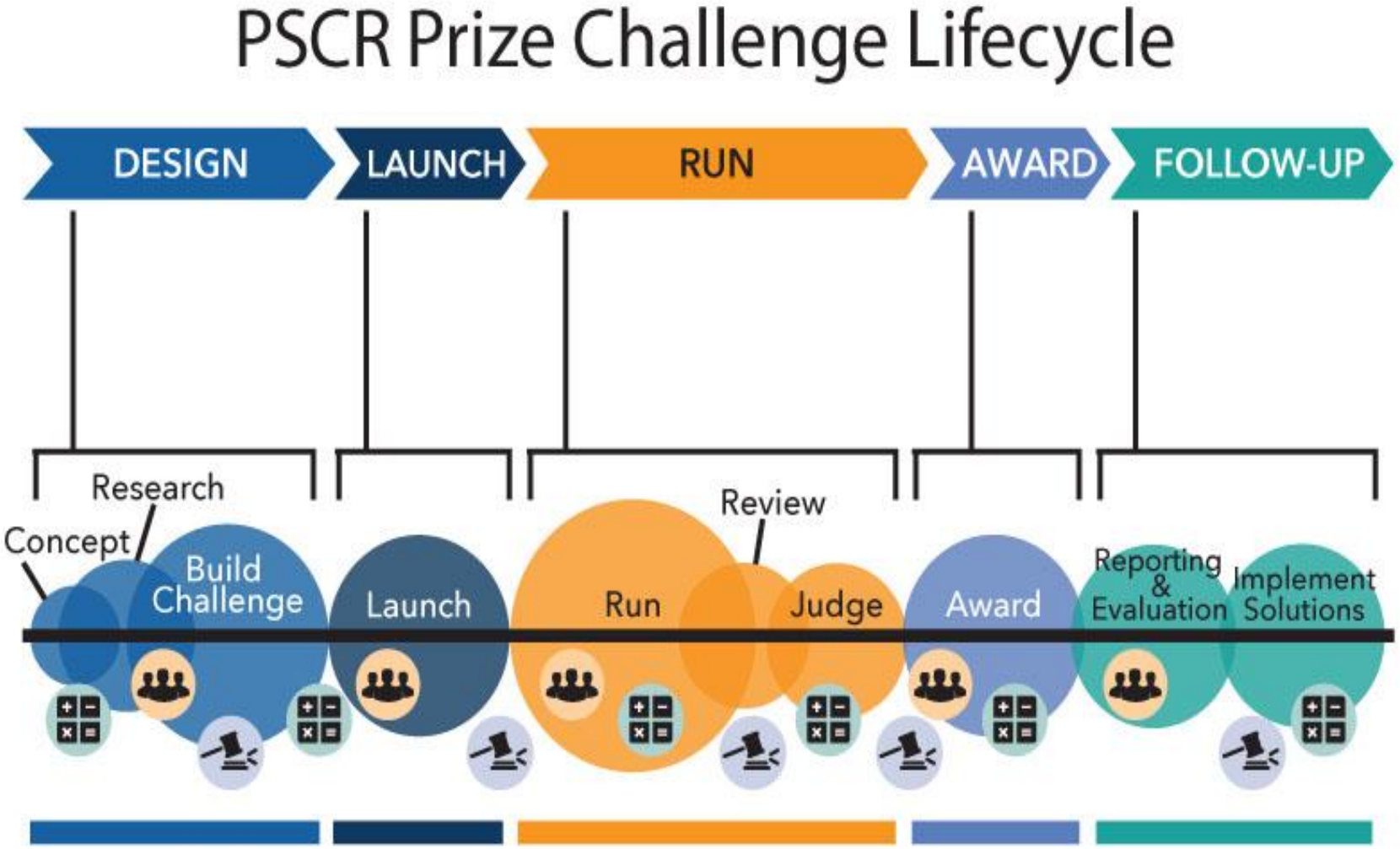
- Why Prizes Challenges?
- Lessons Learned
- NIST PSCR Prize Challenges

Why PSCR Prize Challenges?

Need multi-disciplinary public-private partnerships in areas where PSCR's internal researchers cannot likely achieve the outcome, working alone.

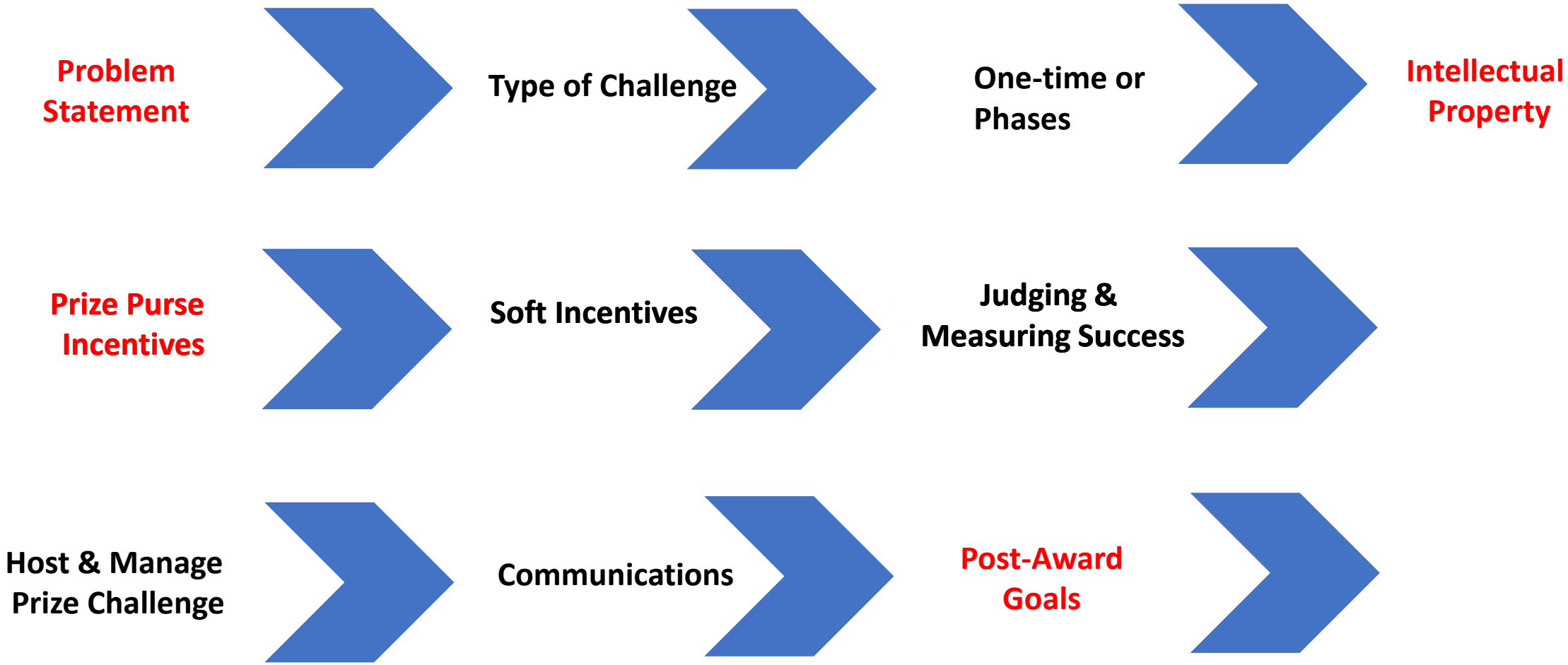
Pros	Cons
Pay only for winning solutions	Significant **preparation and planning** needed to run an effective and engaging prize challenge
Raise awareness of the communication challenges faced by First Responders	**New to NIST**: Internal resources not typically well-versed on how to execute prize challenges
Stimulate private sector investment by creating an innovation pipeline	Winning solution does not typically yield a market-ready, commercialized product

Lesson #1: Life Cycle of a PSCR Prize Challenge

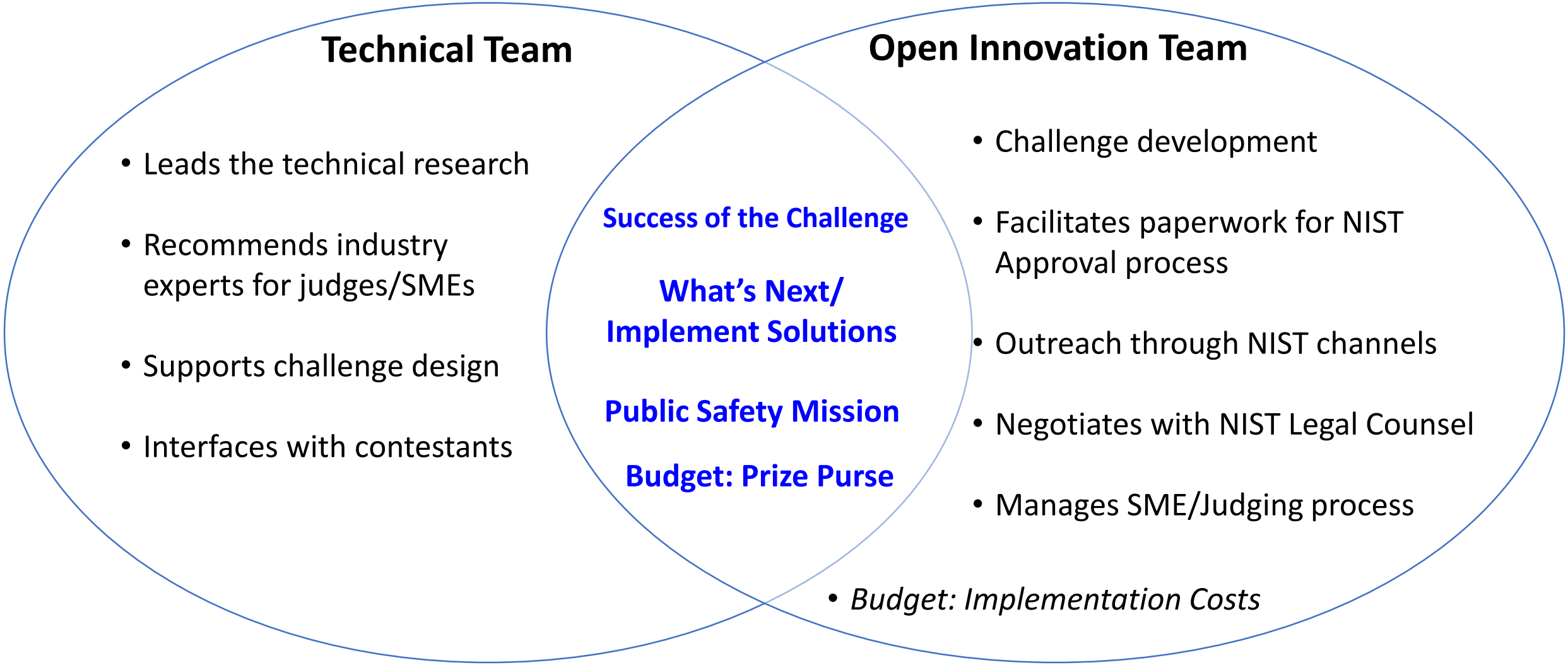


1. Concept
2. Research
3. Build Challenge
4. Launch
5. Run
6. Review
7. Judge
8. Award
9. Reporting & Evaluation
10. Implement Solutions

Lesson #2: Challenge Design Decision Points



Lesson #3: Managing Expectations



Past PSCR Prize Challenges

2017 The Future of Public Safety Technology Challenge

- **Challenge**: Submit a video concept that will inspire Americans to help develop the public safety technology of tomorrow.
- **Prize Purse**: **$100,000**

2018 Unmanned Aerial Systems Flight and Payload Challenge

- **Challenge**: Keep a UAS and its payload airborne for the longest time possible.
- **Prize Purse: $432,000**

2018 Virtual Reality Heads-Up Display Navigation Challenge

- **Challenge:** Create a heads-up display (HUD) for first responders' navigation with unimpeded visual aids.
- **Prize Purse: $125,000**

2018/2019 Differential Privacy Synthetic Data Challenge

- Creating new methods of data de-identification for practical utility through developing differential privacy synthetic datasets.
- **Prize Purse: $185,000**

Current PSCR Prize Challenges

Expanding the SIM Card Use for Public Safety Challenge

Challenge:

- Develop a method to securely store data on the SIM card and develop an application to provide Authentication Credential Use with our FIDO 2 authentication partners
- **Prize Purse: $100,000**

Tech To Protect Challenge

Challenge:

- 10 coding contests to solve technology challenges faced by emergency responders
- **Prize Purse: $2.2M**

PSCR's Haptic Interfaces for Public Safety Challenge

- **Challenge**: Create and integrate a haptic interface into a virtual reality environment for first responders
- **Prize Purse: $425,000**

PSCR OPEN INNOVATION

Solving the Public Safety needs of tomorrow...today

Differential Privacy Synthetic Data Challenge

NIST National Institute of Standards and Technology U.S. Department of Commerce

CTL Communications Technology Laboratory

Data Sharing & Differential Privacy

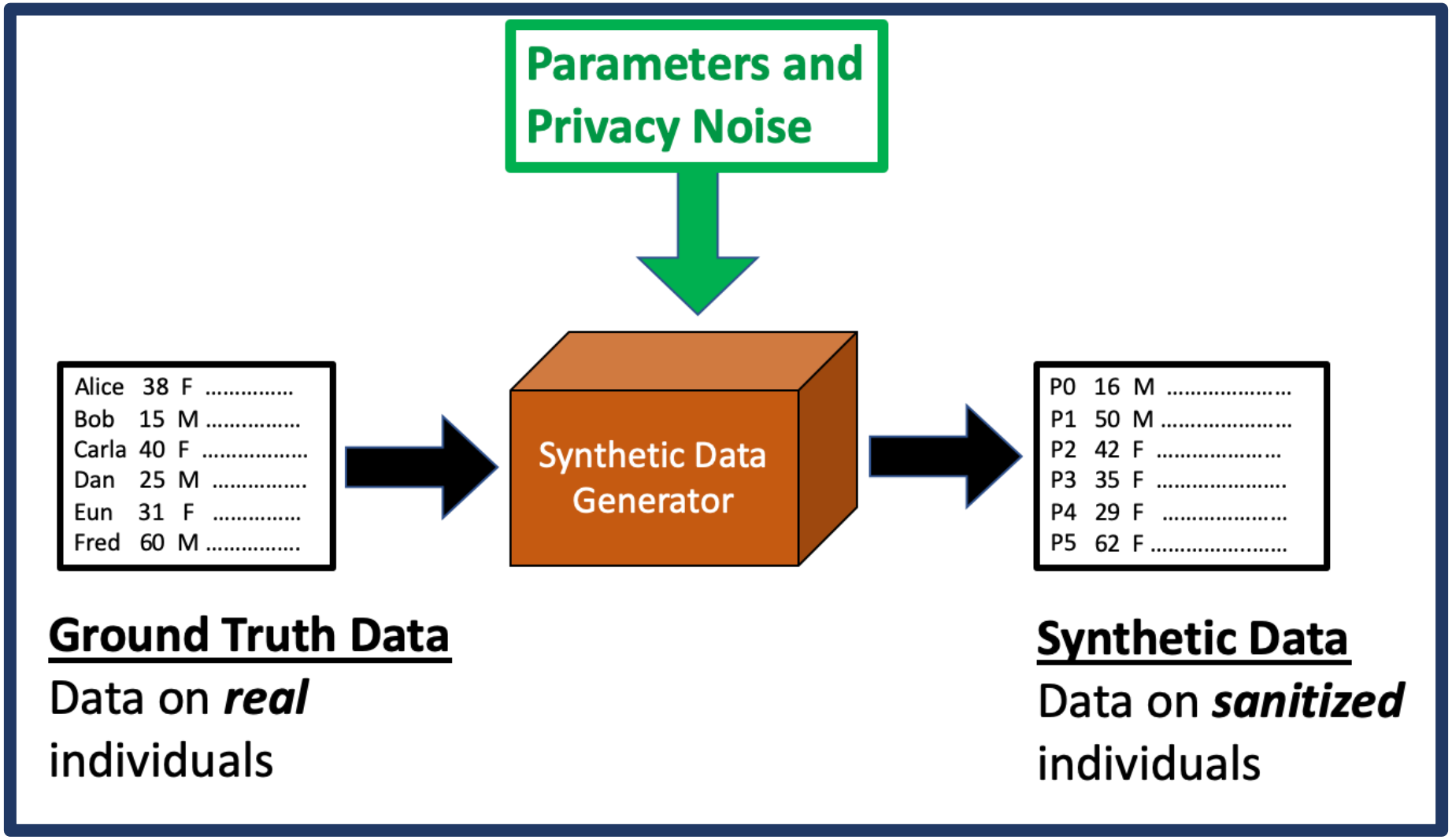
Public Safety has an immediate need for data analysis

- Agencies are using advanced communications technology
- Informed decision-making and increase safety
- Share data freely for better predictions of incidents
- Real-time analytics
- Ensure data privacy

Researchers have an immediate need for utility

- Datasets should not be shared without privacy protection
- Differential Privacy is a growing standard for de-identification
- Trade-offs between data privacy and utility
- Benchmarking is needed to take theory to practical application

Synthetic Data Generation



Advancing Differential Privacy

- Quickly worsening privacy risks have brought Differential Privacy into a period of rapid advancement and adoption
- Planned use in the 2020 Census and current use by Google and Apple; Increase in state and local data sharing
- Moving from theory to practice, benchmarking and competitive algorithm development are crucial
- The community needed NIST's metrology expertise

The Challenge - Developing a Design

Challenge Objective: Support rapid advancement in the development of high quality, practically usable differentially private data release tools

Phase 1

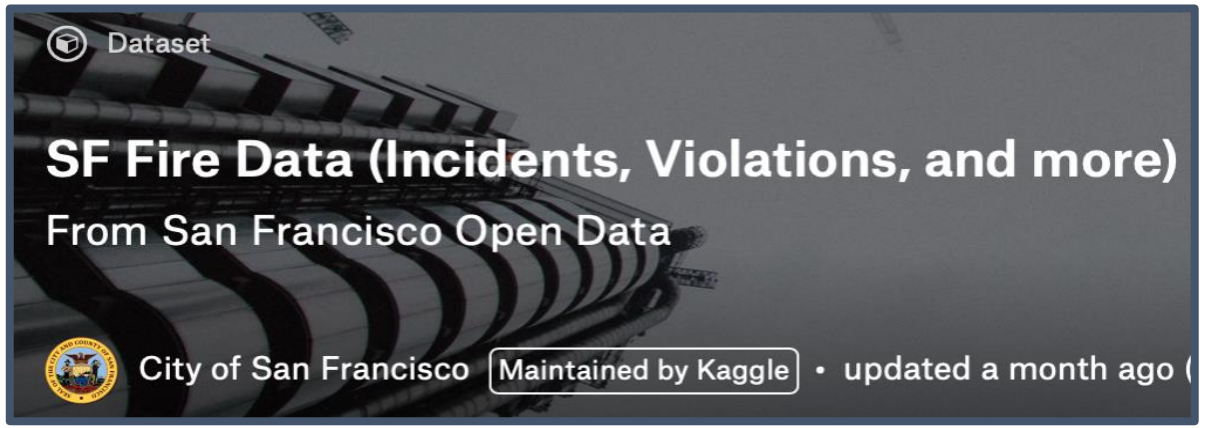
- Summer 2018
- Concept phase
- Teams proposed DP algorithms as white papers
- Winners chosen by judge panel and people's choice
- HeroX platform

Phase 2

- Oct 2018 - May 2019
- Empirical phase
- Teams developed software solutions
- Sequence of 3 Matches
- Leaderboard showed synthetic data quality scores
- Topcoder platform

The Challenge – Phase 2 Design

Match Design: Each Match introduced a new scoring metric *(on top of previous metrics)* to increase difficulty. Data included both emergency incident data and population data.



Match 1:

Data: San Francisco Fire Data

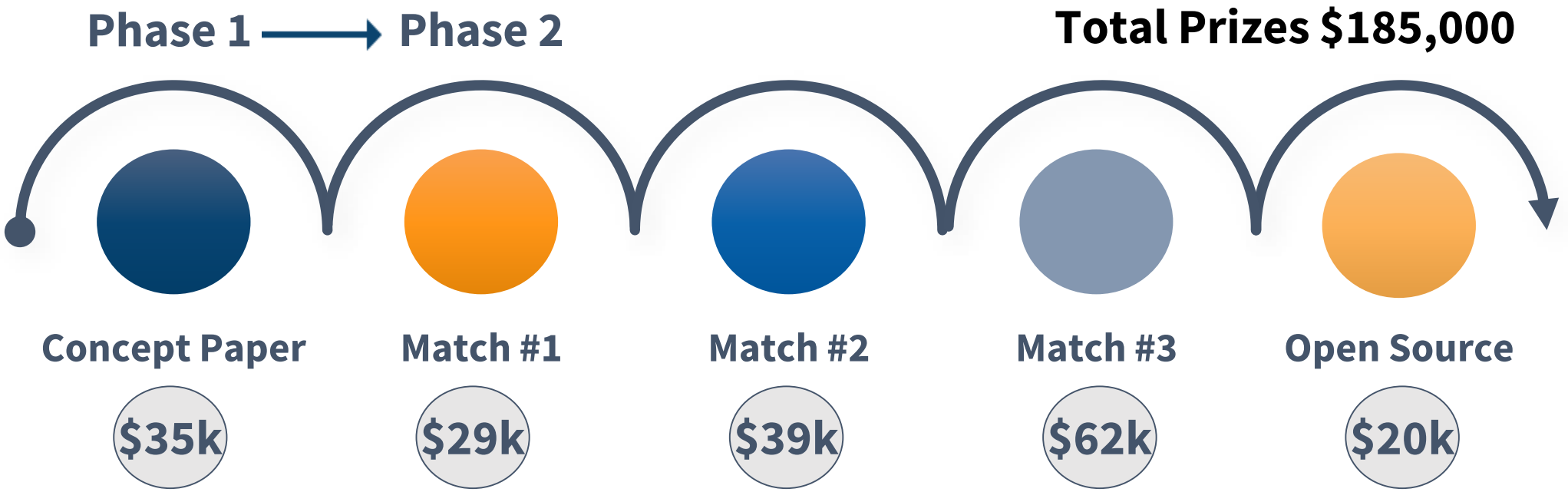
Match 2:

Data: San Francisco Fire Data

Match 3:

Data: 1940's Census Data

The Challenge – Prize Design



The Challenge - Results

- Even with increased difficulty in each match, teams continued to maintain and ***improve*** their performance
- Teams made new discoveries that improved their chosen approaches
- These discoveries are ***vital to progress of the field***
- **Prototyped solutions (open sourced and well documented) will continue to be improved and feed into downstream research**

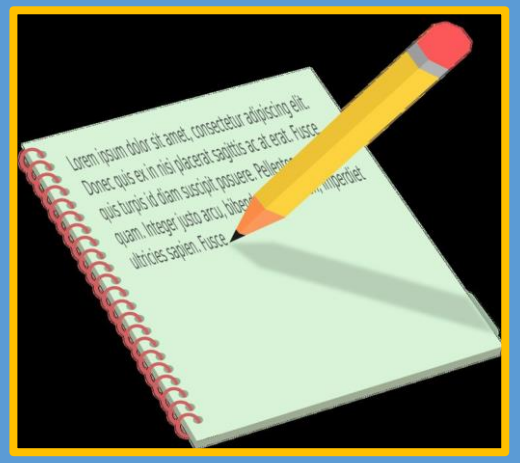
The Challenge – Lessons Learned

The significance of taking theory and moving it to practical, applied algorithms

New benchmarking techniques were developed that are having a significant effect on the research community

Expansion of the DP community and recruitment of new data scientists

Future use of automated DP validation will assist the manual process of DP certification



The Challenge – What's Next

Developing two NIST-IR research publications
1) summary of Challenge solutions & results
2) comparison of techniques to evaluate synthetic data

Developing Journal of Cybersecurity and Privacy special issue;
A meta-analysis of the challenge solutions

Evaluating future workshop and Prize Challenge

NIST Privacy Collaboration Space repository, where contestants source code was voluntarily posted

Designing apps that further the mission of Emergency Responders

TECH TO PROTECT CHALLENGE

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PSCR

What is the Tech to Protect Challenge?

Open Innovation Program

Focusing on creating early stage and prototype software solutions for emergency responders

Collaborative Effort

Includes public safety, large and small business, government, and innovators across the country

Incentives

NIST anticipates awarding 182 prizes based on technical capabilities and commercialization potential to top performing participants, ranging from $1k-$100k, totaling $2.2 million

National Institute of Standards and Technology
U.S. Department of Commerce

Who is included?

Co-sponsors

FIRSTNET®
Built with AT&T

AXON

MOTOROLA SOLUTIONS

SF STATE

FLATIRON SCHOOL

Government

PSCR

First Responder Network Authority®

Public Safety

Participants

National Institute of Standards and Technology
U.S. Department of Commerce

Why this approach?

Potential to Improve Public Safety

- Digital natives entering the ranks
- Expectation of top of the line technology and innovative solutions

Communicate Unique Needs

- Public Safety apps will always be better if developers understand the community's unique needs

Unique Needs from Other App Users

- Security, reliability, privacy, etc.
- Unique laws or regulations
- Operational environments

Concept to Prototype

- Open Innovation diversifies the potential solutions created
- Process provides time, feedback, testing, planning, and bridge

How did we design this?

When are the key dates?

Where can I participate?

Seattle, WA

San Francisco, CA

Los Angeles, CA

Denver, CO

College Station, TX

Chicago, IL

Pittsburgh, PA

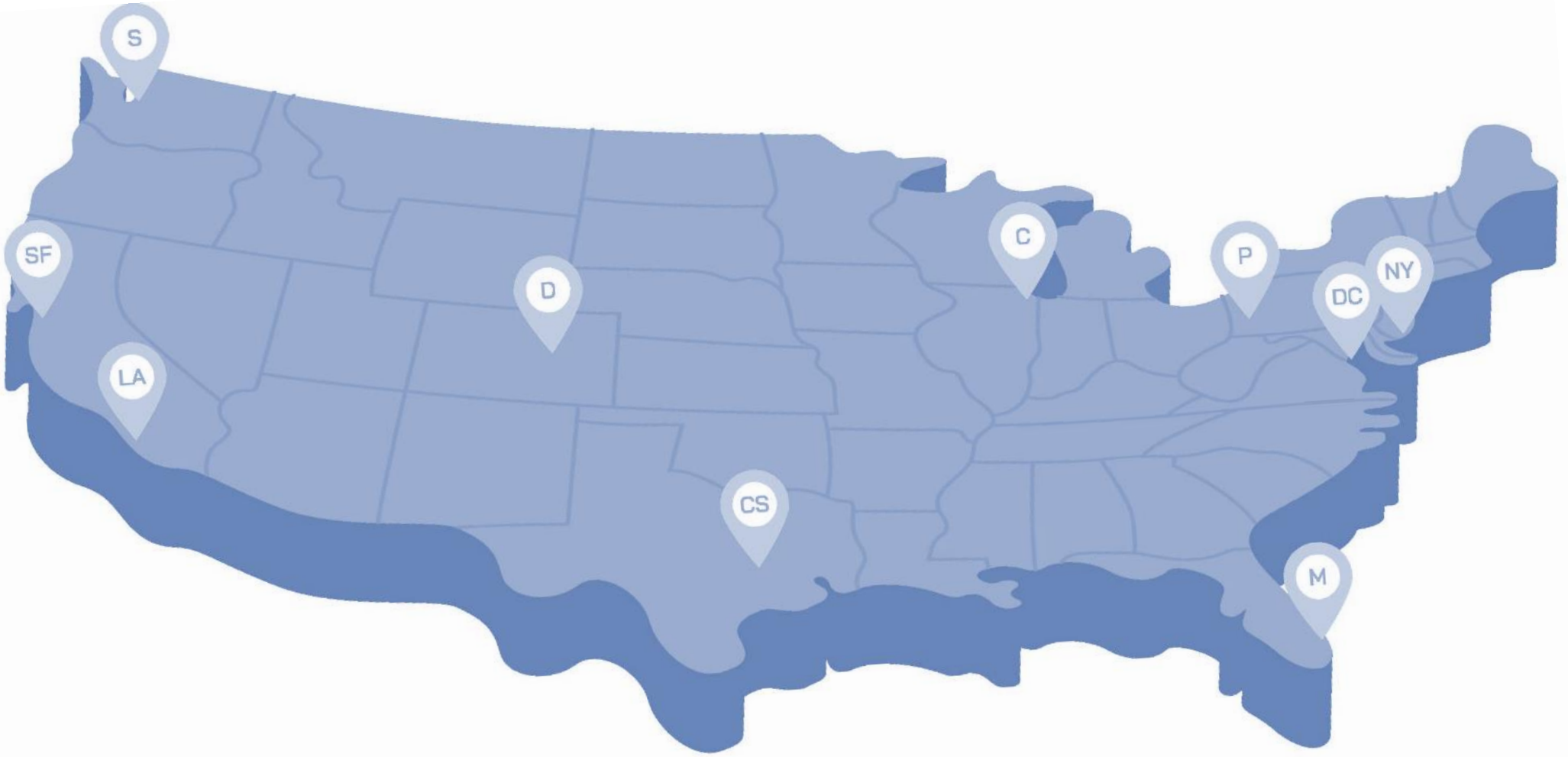
New York, NY

Washington, DC

Miami, FL

&

Online



Contest Snapshot

CONTEST 001//

360 Degree View: A Mobile Dashboard for Your Network Security

PSCR

Build a centralized mobile data dashboard to keep emergency responders continually aware of the security of their connections.

CONTEST 002//

No Need To Repeat: Delivering Mission Critical Communications

PSCR

Strengthen voice communications with push-to-talk technology for mission-critical response.

CONTEST 003//

Looking Under the Hood: Using Augmented Reality to Help Save Trapped Passengers

First Responder Network Authority®

Use AR to map the safest way to extricate passengers in critical vehicle collisions.

CONTEST 004//

Got You Covered: Mapping LTE Capabilities to Save Lives

PSCR

Expand mapping capabilities to better assess LTE network coverage.

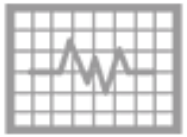
Contest Snapshot

CONTEST 005//

Fire Safety in 3D: Incentivizing Homeowners to Create Pre-Incident Plans for Firefighters

PSCR

Design a prototype app that incentivizes homeowners to upload 3D floor scans in order to create fire safety checklists and pre-incident plans.



CONTEST 007//

Sensor Integration: Monitoring Emergency Responders' Health

First Responder Network Authority®

Leverage emergency responder sensor and sensor networks to support on-the-job safety.

CONTEST 006//

Voice Commands to Virtual Assistants: Hands Free Device Control

First Responder Network Authority®

Create a customized, voice-activated virtual assistant fit for emergency response.

CONTEST 008//

No Coverage: Placing Deployable Networks in Emergencies

PSCR

Develop a diagnostic tool that informs emergency responders on the expected and current coverage and services of LTE deployable networks.

Contest Snapshot

CONTEST 009//

Making the Case: Proactive Image Protection

PSCR

Enhance digital security by creating software that detects image tampering and manipulation.

CONTEST 010//

Organizing Chaos: Calming Catastrophe by Tracking Patient Triage

First Responder Network Authority®

Improve response for locating, tagging and tracking patients in mass casualty incidents.

www.techtoprotectchallenge.org/contest

Thank You!

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Thank you!