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Nuclear Smuggling Detection & Deterrence (NA-213)

Nate Limback
Program Manager

Agenda

- NSDD Mission
- History
- Program Metrics
- Challenges
- Summary



NSDD Mission and Objective

Mission:

Build global capability to detect, disrupt, and investigate the smuggling of nuclear and other radioactive material before it can be used in an act of terrorism.

Objective:

Promote counter nuclear smuggling along high-risk pathways.



Radioactive material seized during a Georgian sting operation in 2021



Kazakh authorities measuring seized yellowcake in 2019

NSDD History



1998: Joint program created in cooperation with Russian Federal Customs Service (FCS) to limit the spread of SNM threat materials beyond Russian borders after the fall of the Soviet Union.

2003: Megaports initiative founded to equip major international seaports with similar RDS equipment as the core program.

2017: Additional vectors including Green Border Security Initiative (GBSI), Maritime Vector Partnership (MVP), and Internal Security and Law Enforcement (ISLE) are added to NSDD mission.

2013: SLD rebranded to One NSDD which dissolved Core and Megaports as individual program areas.

2002: Program expanded to include Former Soviet Union (FSU) countries and branded the Second Line of Defense (SLD) core program.

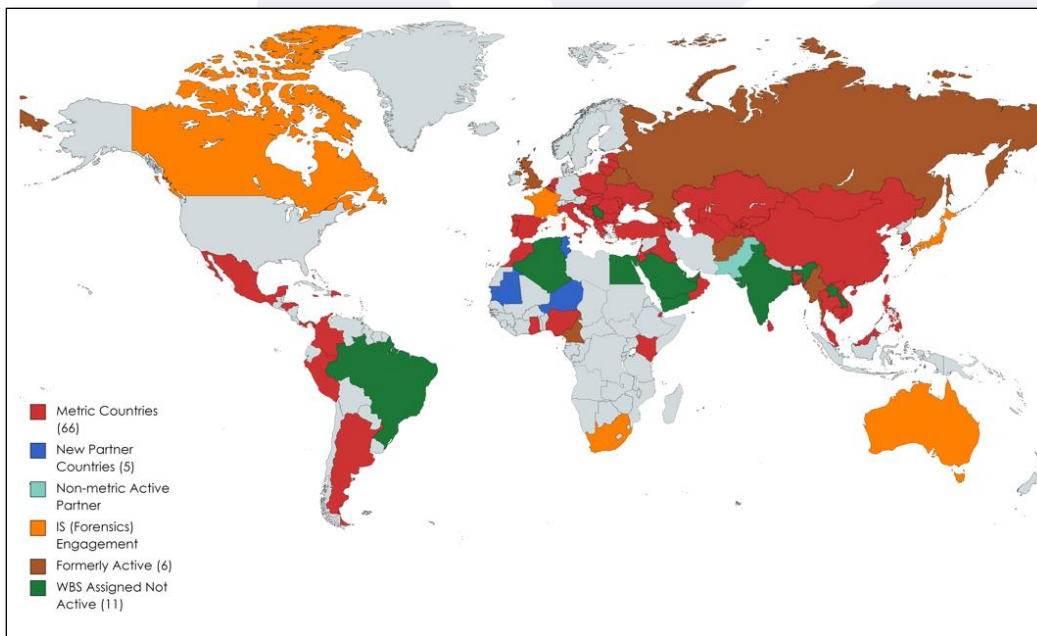
2006-2011: Russia and SLD commit to and finish installation of RDS equipment at all (383) Russia border crossing sites.

2014: Strategic Airports Initiative (SAI) added to the NSDD mission as a crucial vector.



Counter Nuclear Smuggling Global Reach

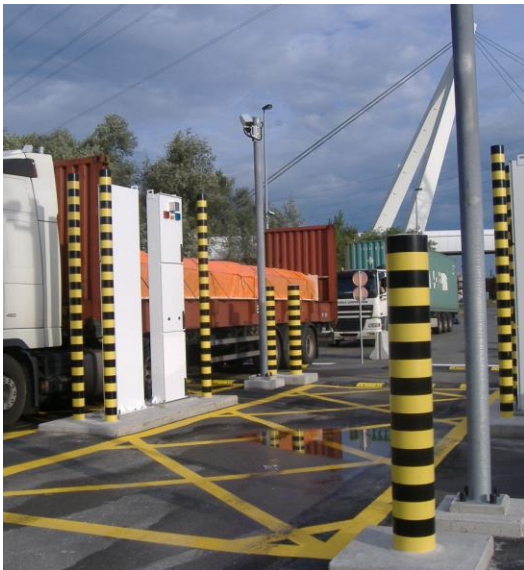
- NSDD Today:
 - Active agreements with ~90 partner agencies
 - Actively engaged with partners in 77 countries (FY23 Q3)
 - Internal security/law enforcement (ISLE): 13 countries (FY23 Q3)
 - Non-official points of entry (GBSI/MVP): 8 countries (FY23 Q3)
 - Installed equipment at more than 700 sites in over 80 countries (FY21 Q1).
 - Has installed over 4000 RPMs.
 - Performed service life extensions at over 100 sites in FY22.



Counter Nuclear Smuggling Challenges

- Probability of encounter: multiple mission spaces with complex smuggling pathways for material out of regulatory control (MORC)
- Probability of detection (radiation physics): implementing technical solutions to overcome MORC detection challenges
 - Background radiation, shielding, masking
- Probability of detection (operational): Integrate CNS mission with existing front line officer (FLO) duties
 - reduce burden on FLOs posed by innocent alarms, volume of traffic at POEs, and poor traffic control
- Equipment selection and sustainability: understand equipment performance/limitations (detection goals) and maintain deployed systems
- Building and maintaining partnerships

Challenge: Probability of Encounter



Official Ports of Entry (POEs)

Internationally recognized border crossing including land, air, and sea borders

- *Detection equipment (e.g. portals, vehicle-based, man-portable, RIDs)*
- *Ancillary computers, comms, cameras*



Frontier Areas: Green & Blue Borders

Outside of POE near an internationally recognized border, along administrative lines and/or disputed border areas

- *Detection equipment*
- *Suite of surveillance, patrol, interdiction and search equipment*

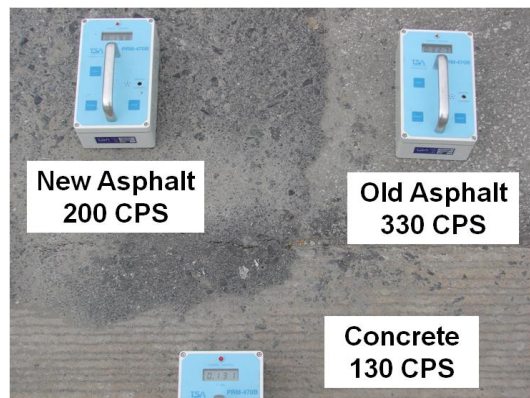


Internal Security and Law Enforcement

Set back from an internationally recognized border at various internal locations

- *Detection equipment*
- *Suite of surveillance, patrol, interdiction and search equipment*

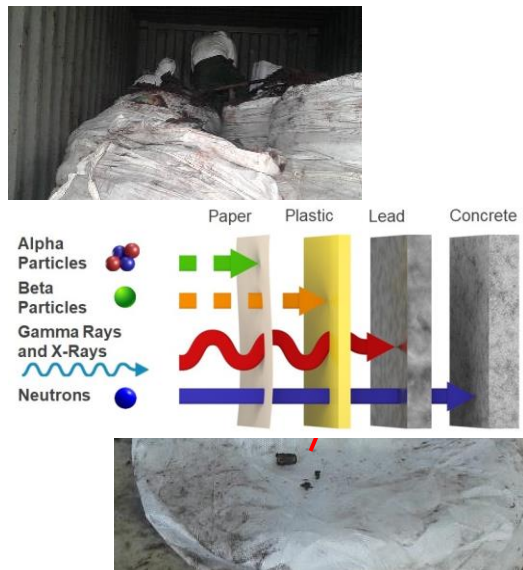
Challenge: Probability of Detection (Radiation Physics)



Background Radiation

Substantial global variability and can differ significantly over short distances

- High background radiation can decrease even stationary detector sensitivity



Shielding

High-density material such as lead and low-density material such as concrete shield gamma and neutron radiation, respectively

- Metal in vehicles can reduce the detector response
- An adversary may use these materials to attempt to evade detection



Masking

Radioactive material used to hide or “mask” the presence of another radioactive material

- Masking materials could be NORM, medical, or industrial isotopes
- These materials could be used by an adversary to hide or “mask” the signature from MORC

Challenge: Probability of Detection (Operational)



Naturally Occurring Radioactive Material (NORM)

Common in shipments (~2% of all occupancies) and may cause innocent alarms

- Requires substantial FLO time to process alarms
- Potentially increases FLO complacency

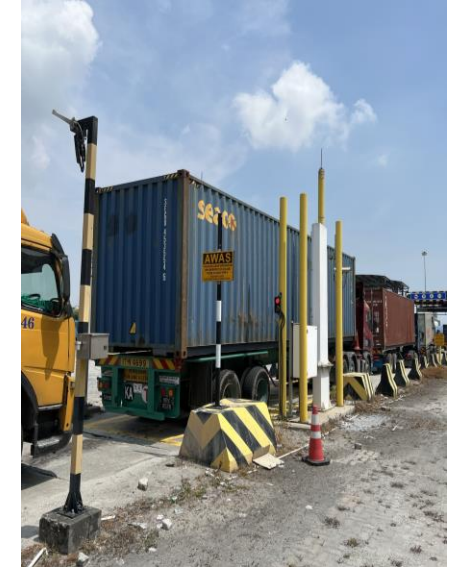


Photo by Stella Kalinina/NYT

POE Traffic Volume

Traffic volume at all types of POEs poses multiple operational challenges

- Global container traffic in last 20 yrs quadrupled to over 800 M TEUs



Traffic Control

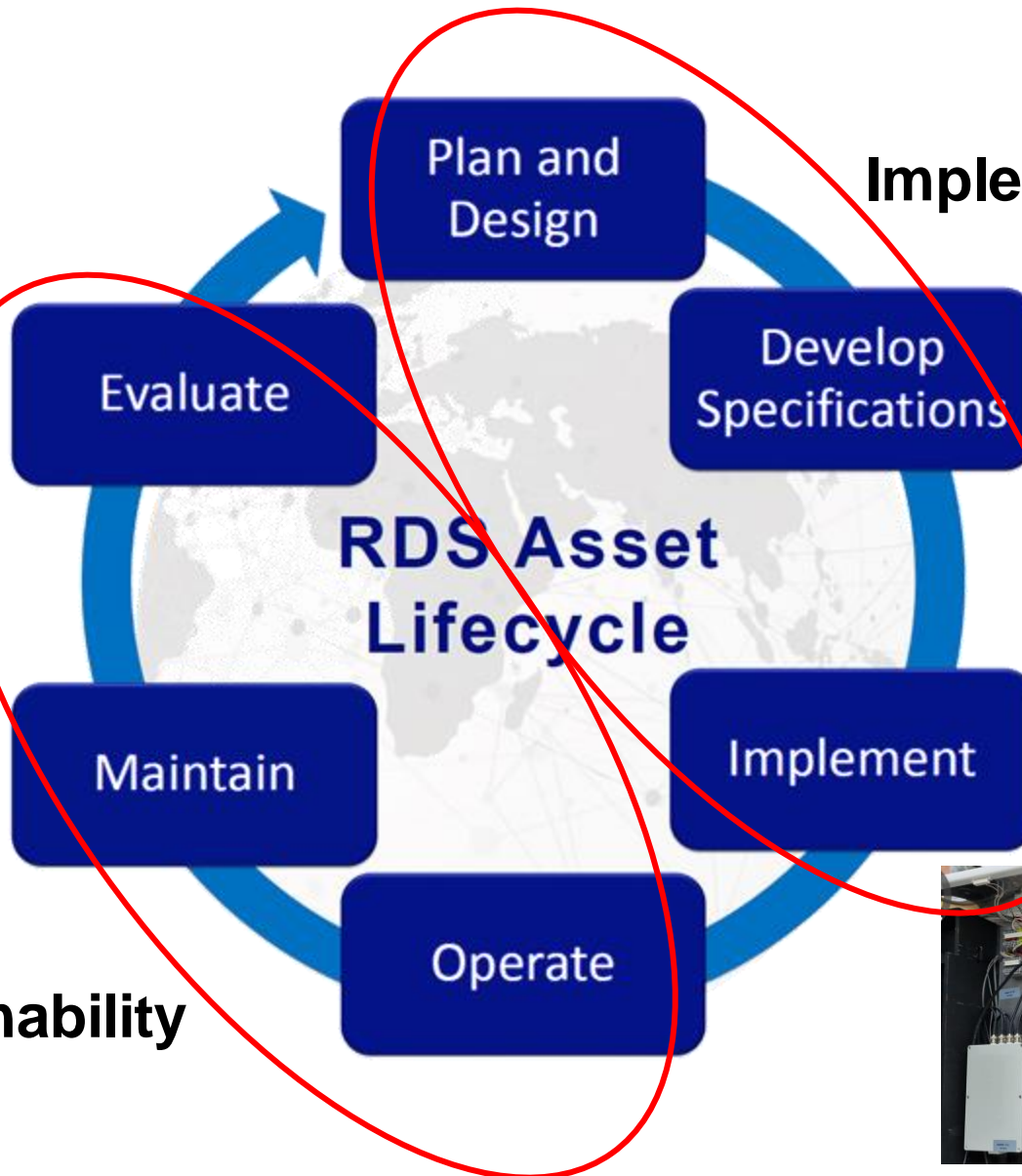
Speed control and crowding/tailgating can significantly impact the ability of RPMs to detect MORC.

- Crowding at pedestrian RPMs
- Speeding through RPMs
- Tailgating vehicles

Challenge: Equipment Selection and Sustainability



Challenge: Building and Maintaining Partnerships



Implementation



Sustainability



LANL/NSDD Teams



Field Engineer Team

Field engineers support both implementation and sustainability in partner countries as subject matter experts for equipment, operations, and training.



Sustainability Managers

Sustainability managers work closely with the federal country manager to provide partner countries the tools they need to execute the CNS mission.



Investigation Support Team

Members of the Investigation Support team are nuclear material subject matter experts that build partners' capacity to properly respond to a nuclear smuggling event.



Science and Engineering Team

The science and engineering team proactively and reactively perform critical testing that creates and improves solutions to the radiation detection challenges mentioned earlier.

Recent NSDD SET Projects at LANL



Marc Paff conducting measurements on a rail RPM.

Source Replacement Program

Testing was conducted that resulted in NSDD's ability to replace legacy check sources that have short half-lives with new sources that last much longer.



Ukraine Radiation Equipment (URE) installed in Aspect portal monitor

Ukraine Module Testing

In an effort to become more self-sufficient and independent, Ukraine has begun producing their own radiation detection equipment compatible with Aspect RPMs. NSDD has performed testing and provided feedback.



Seven pedestrian portals from different vendors during testing

Pedestrian Portal Project

NSDD performed testing on seven modern pedestrian portal monitors as part of a market survey to evaluate new capabilities so the program can continue to adapt into the future.

LANL NSDD Org Chart

LANL Nuclear Smuggling Detection and Deterrence Program

Field Engineers – Country Leads

Avilash Cramer

Argentina, Czech Republic, Hungary, Iraq, Lithuania, Oman, Singapore, South Korea, Spain, *Japan, Jordan*

Nikolas Economy

Belgium, Malta, Netherlands, Poland, Portugal, *Bahamas, India, Jamaica*

James Harper

Moldova, Mongolia, Morocco, Pakistan, Romania, Turkmenistan, *Albania, Bosnia, North Macedonia, Montenegro, Serbia, Turkey*

Sean Heffernan

Kazakhstan, Lebanon, Ukraine, Uzbekistan

David Kellner

Bulgaria, Dominican Republic, Croatia, Greece, Israel, Kuwait, Panama, Slovakia, Slovenia, Taiwan, Vietnam, *China, Cyprus*

Jeff Montoya

Armenia, Azerbaijan, Bangladesh, Estonia, Georgia, Kyrgyzstan, *Kosovo*

Andrew Phillips

Cambodia, Djibouti, Ghana, Honduras, Latvia, Malaysia, Mexico, Nigeria, Peru, Tajikistan, *Colombia, Kenya, Philippines*

Stewart Voit

Sri Lanka, Thailand

Program Manager
Nate Limback
Deputy Program Manager
Obie Gillispie

Sustainability Managers

Jason Brock

Cambodia, Honduras, Iraq, Mexico, *Myanmar*

Stewart Voit

Ghana, Latvia, Nigeria, South Korea

Obie Gillispie
Spain

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Greg Orlicz

Avilash Cramer
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Brian Jennings
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Stewart Voit

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Obie Gillispie (acting)

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BMWG
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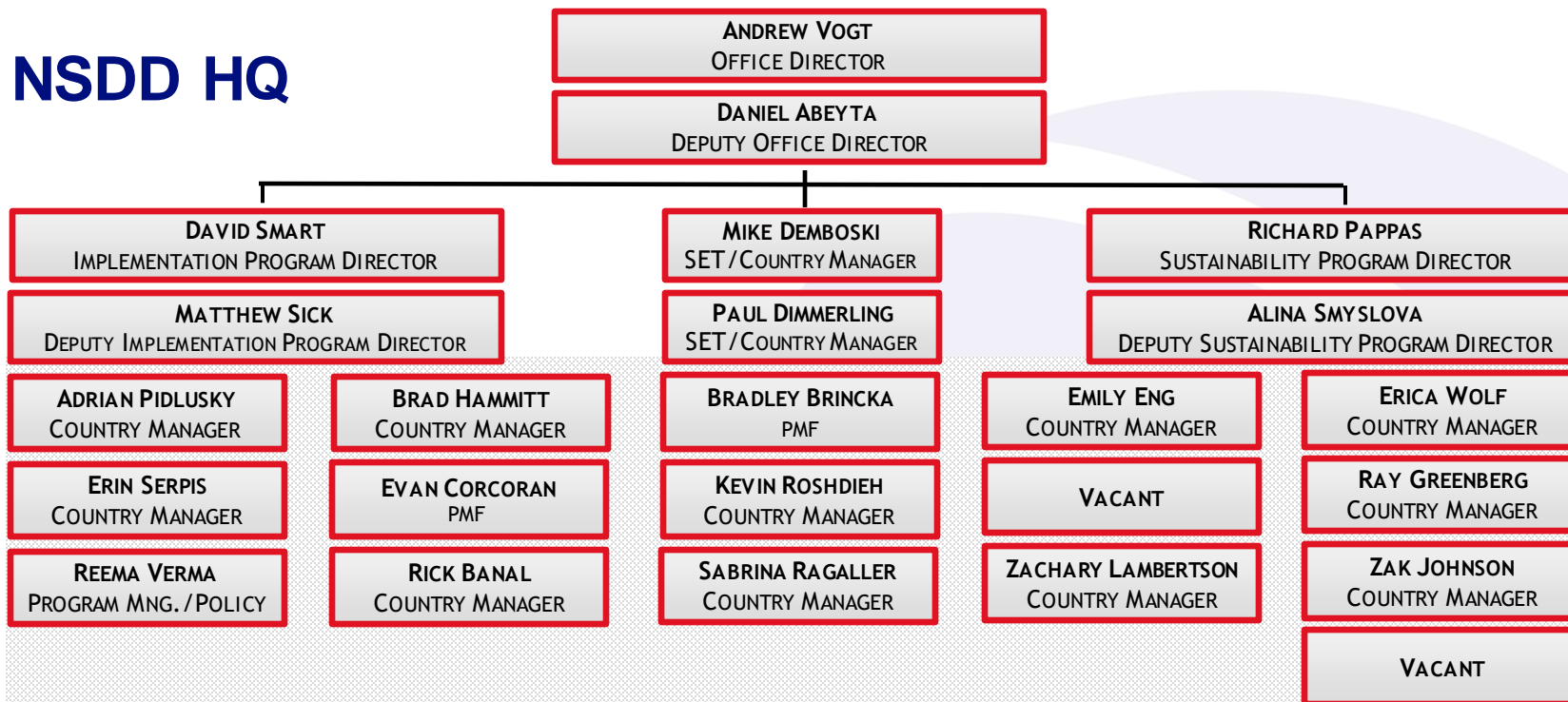
Detection Peer-to-Peer

Obie Gillispie
Avilash Cramer

Performance Evaluation

Obie Gillispie
Andrew Phillips

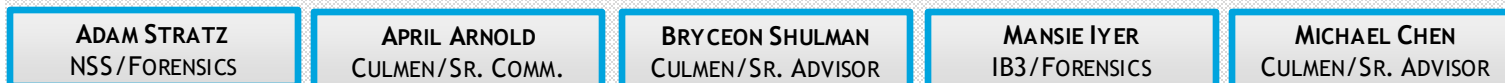
NSDD HQ



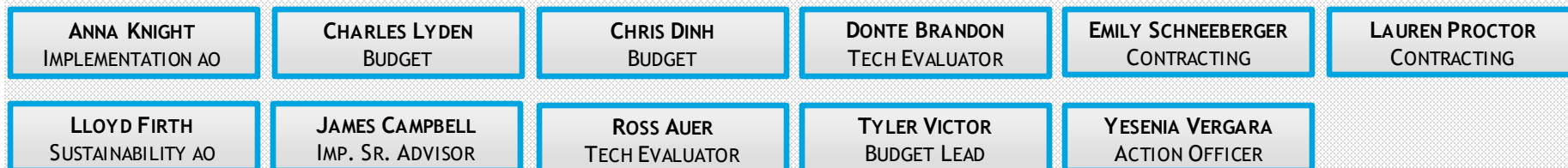
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APRIL 2023

Summary

- **Mission:** The risk of a terrorist group acquiring radioactive/nuclear materials requires NSDD's continuous efforts to build capacity of partner countries to deter, detect, and investigate acts of nuclear smuggling.
- Over the past 25 years, NSDD has and continues to deploy radiation detection equipment tailored to operational requirements with the goal of developing a layered, flexible, varied, and unpredictable nuclear detection architecture.
- An effective counter nuclear smuggling strategy considers both technical and operational challenges to develop the tools necessary to achieve the mission.
- LANL provides expert support to the NSDD mission to constantly improve and adapt to any future challenges.

Backup Slides

NSDD Detection Methods at Ports of Entry

- **All Sites**

- Primary gamma screening with polyvinyl toluene, (PVT) based RPM (gross counting; detects but does not identify)
- Neutron detection (He-3)

- **Secondary Inspection at Seaports**

- Typical innocent alarm: NORM bulk cargo – fertilizer, ceramics, melt salt, sand and gravel
- High Purity Germanium (HPGe) and Sodium Iodide (NaI) Radioisotope Identification Device (RIDs)
- Spectroscopic portal monitors at a few sites

- **Secondary Inspection at other sites (vehicle and pedestrian traffic)**

- Typical innocent alarm: radiopharmaceutical – meds and treated patient, NORM
- NaI RIDs
- Remove driver and other occupants, inspect separately
- Inspect vehicle separately



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INNOVATE. COLLABORATE. DELIVER.

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MARCH 10, 2023