

Empowering Small and Medium Size Enterprises Through Effective Additive Manufacturing Data Management



June 6-8
National Institute of Standards and Technology
National Cybersecurity Center of Excellence
Rockville, MD



Goal

The workshop will explore how best to empower the productive working relationship of small and medium size Enterprises (SMEs) with top tier manufacturers through effective additive manufacturing (AM) data management.

The goal is to examine the AM data management “Pain Points” associated with SME interactions with large system integrators (LSI) and government procurement agencies.



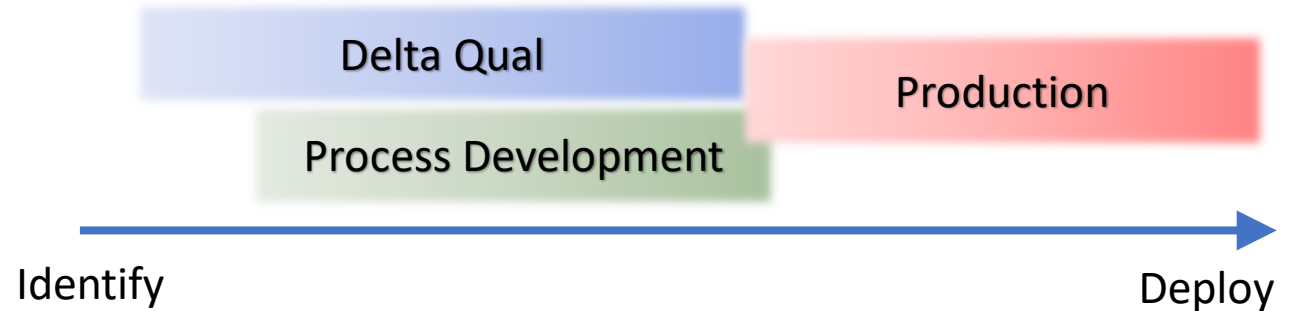
The complex, diverse and frequently parochial relations between LSIs, SMEs, and customers tend to inhibit facile working relationships. This increases the cost and time required to bring a product to market while inhibiting innovation and profitability.

To facilitate the maturation of these relationships the workshop will :

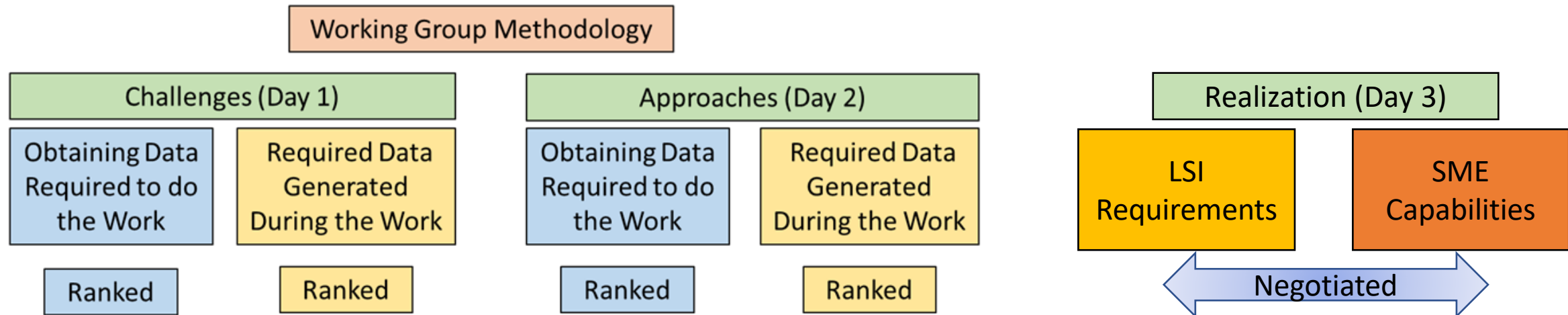
- Explore three major phases of the AM lifecycle
 - Development,
 - Production,
 - Delta Qual./Requalification
- Identify interactions and data exchanges among stakeholders to enable existing or innovative business models needed to accelerate the adoption of AM
- Examine mechanisms that support these interactions, including:
 - Computational tools,
 - Data repositories used, and
 - Collaborative platforms
- Identify political, economic, social, and technological (PEST) challenges

Three Tracks

- Delta Qualification / Restart – The re-qualification of additively manufacturing a part necessitated by changes to the original means of production
 - e.g., software update, change in AM machine, type, model, series
- Process Development – The research, development, test and evaluation of an additively manufactured part's lifecycle.
 - Requirements to produce a quality part are identified and documented
- Production – The process of additively manufacturing of a part
 - Assumes that the process development has been completed



Three Days



Day 1 will explore the role of data in AM-driven services and supply chains and where challenges exist

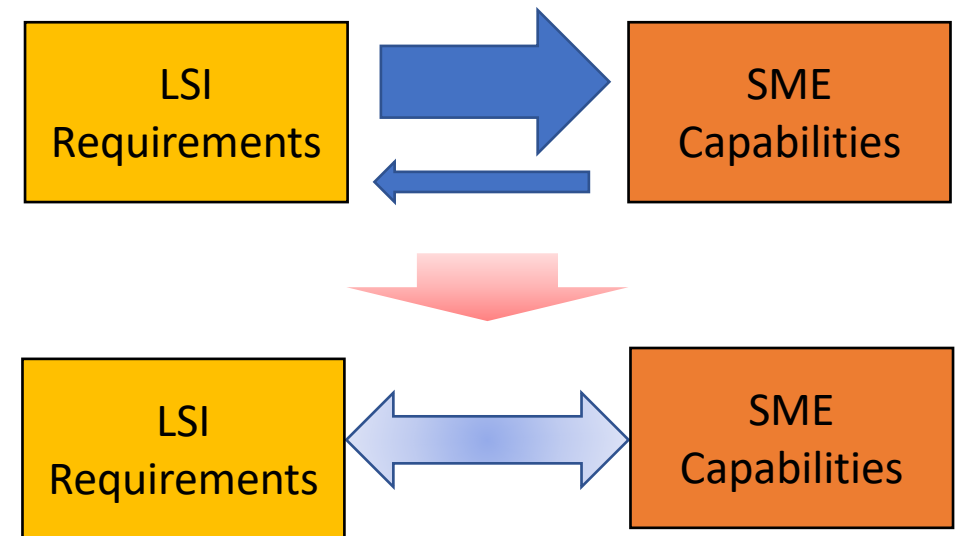
Day 2 will explore the organizations and solution providers that can help address gaps and facilitate LSI and SME interactions

Day 3 will realize how Day 2 approaches should be implemented to overcome Day 1 challenges and action items will be identified

Desired Outcomes

With a focus on data and data-related activities:

- Identification and prioritization of major challenges that inhibit LSI and SME interactions
- Identification and prioritization of potential approaches, both near term and long term, that will alleviate challenges and facilitate LSI and SME interactions
- Identification and prioritization of specific, realizable actions that should be taken to advance and mature LSI and SME interactions



Workshop results will inform a NIST programmatic strategy and assist in the development of needed standards.

Empowering Small and Medium Size Enterprises Through Effective Additive Manufacturing Data Management

Welcome from NIST



Charles "Chuck" H Romine
Associate Director of Laboratory Programs

June 6, 2023

NIST AT A GLANCE

Industry's National Laboratory



3,400+
FEDERAL
EMPLOYEES



5
NOBEL PRIZES



2 CAMPUSES
GAITHERSBURG, MD [HQ]
BOULDER, CO



3,500+
ASSOCIATES



10
COLLABORATIVE
INSTITUTES



1,000+
BUSINESSES
WORKING WITH NIST



ManufacturingUSA

NATIONAL OFFICE
COORDINATING
15 MANUFACTURING
INSTITUTES

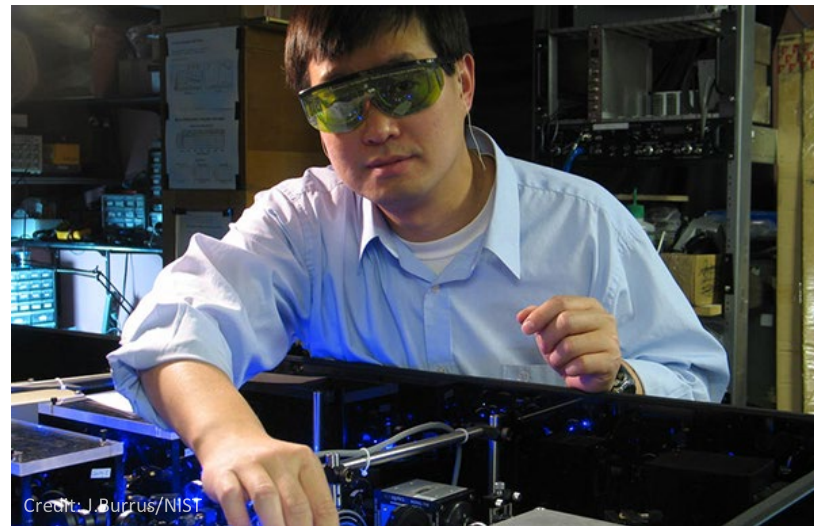


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MANUFACTURING
EXTENSION
PARTNERSHIP CENTERS



U.S. BALDRIGE
PERFORMANCE
EXCELLENCE PROGRAM

To promote U.S. innovation and industrial competitiveness by advancing **measurement science, standards, and technology** in ways that enhance economic security and improve our quality of life



©Robert Rathe

Credit: J. Burrus/NIST

©Nicholas McIntosh Photography

Delivering our Mission: Products and Services **NIST**



1,200 Standard Reference Material (SRM) products

100 Standard Reference Data (SRD) products

600 measurement services

Every year:

32,000 SRM units sold

13,000 calibrations and tests

800 accreditations of testing and calibrations laboratories

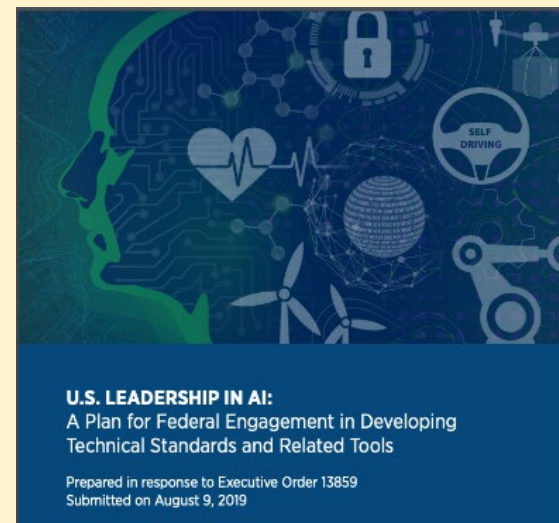
Million-Pound Deadweight Machine

Credit: NIST

Standards Leadership for the Nation

- Standards are critical in the face of increasing global competition.
- NIST research feeds into standards development activities.
- NIST has unique responsibilities to coordinate federal activities.

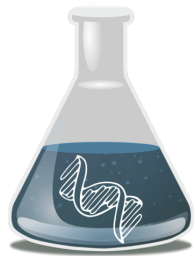
440 NIST technical staff lead and participate in more than **100** unique standards development organizations, contributing their expertise in over **1,500** standards activities



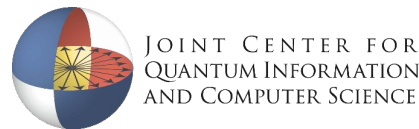
Partnerships to Strengthen Positions

- NIST has an extensive collaboration network
- NIST laboratories rely on many partnership mechanisms, including:

Consortia



Institutes and Centers



Grants Programs



NIST works with the nation's manufacturers to invent, innovate, and create by:

- **Precision measurements-** manufacturers use NIST test methods, tools, and scientific data every day
- **Advanced materials-** NIST is building a materials infrastructure to accelerate the design and deployment of new materials
- **Partnerships-** collaborations with industry and academia help advance research and support US manufacturers



Hollings Manufacturing Extension Partnership centers in every US state provide services to small and medium manufacturers

Manufacturing USA is nationwide network of public-private institutes to meet technical needs and create tomorrow's workforce



NIST labs develop measurements and tools for advanced manufacturing



Advanced Materials



Smart Manufacturing



Advanced Sensing/
NIST on a Chip



Nanomanufacturing



Biomanufacturing

- NIST Laboratory Programs
 - Develop the measurement science to support US manufacturing
 - Collaborate in advanced manufacturing activities across Labs
 - Leverage & support Manufacturing USA and Hollings Manufacturing Extension Partnership
- Additive Manufacturing falls within NIST's Smart Manufacturing thrust

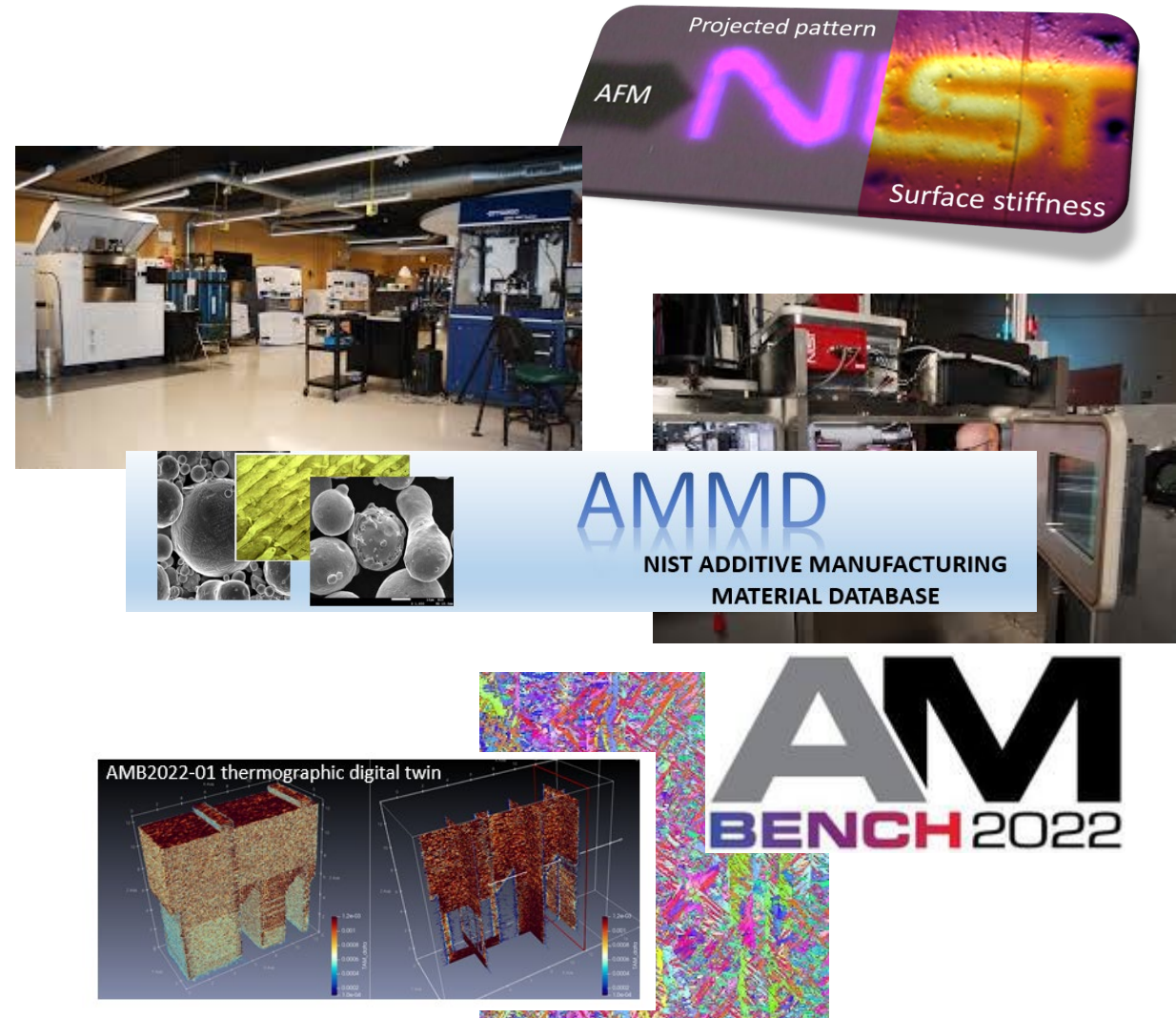
Additive Manufacturing across NIST

Additive manufacturing has a strong presence at NIST

The NIST labs are a microcosm of a distributed AM community, including:

- Variety of equipment,
- Distributed locations,
- Multi-disciplinary expertise,
- Significant data-driven research

Data is a key unifier



Empowering SMEs with AM Data



- AM has the potential to provide newfound agilities to manufacturing supply chains
- Information and data sharing is essential for robust business collaborations
- AM processes can generate enormous data but at a cost
 - Open data and data bases provide valuable shared resources
 - Standards and standardized data representation support common interpretations



NIST/ASM International Virtual Additive Manufacturing Data Management Workshop



NIST in partnership with ASM International held a virtual additive manufacturing (AM) data management workshop on October 27 – 28, 2020.

NIST co-hosted the FAIR AM Data workshop with ASM International in October 2020

Closing Comments

NIST serves industry through a **multifaceted approach** including **measurement science, technology development, and standards**

As a **world-renown research institute** NIST strives to **lead by example** and set new standards in **research excellence**

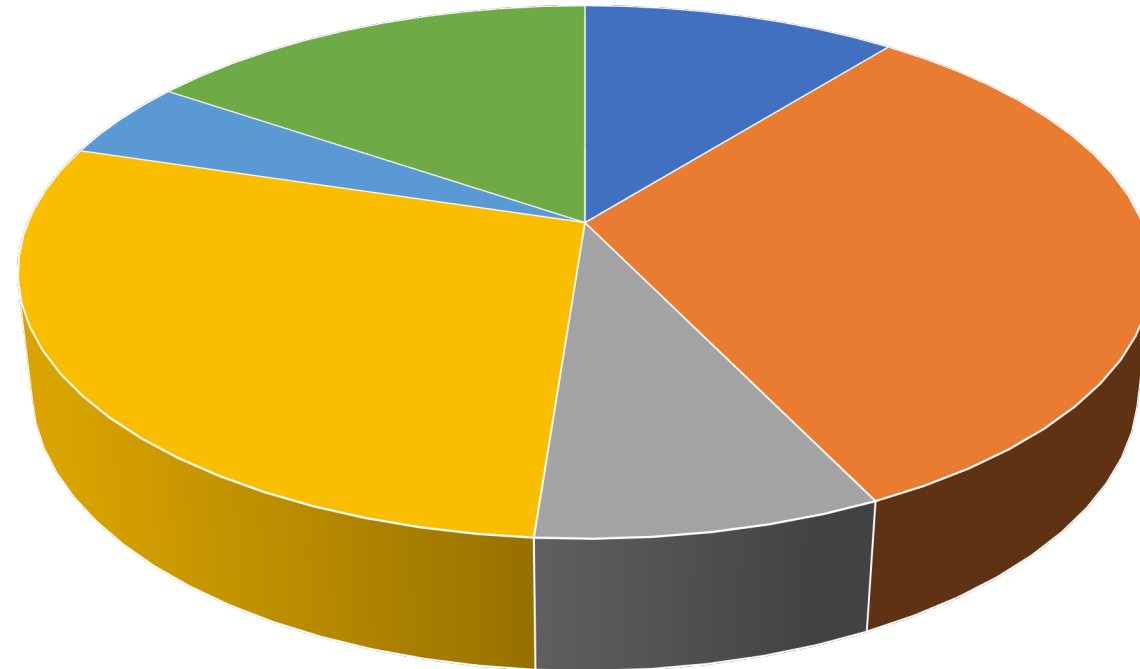
Advanced Manufacturing, including **additive manufacturing**, remains a **strategic priority** of NIST in support of US commerce

Effective data management in AM empowers **small and medium size enterprises** in AM industrialization



Participation and Logistics

Workshop Attendees: 84



■ LSI ■ Government ■ Academic ■ SME ■ DoD ■ Non_profit

Participation and Logistics



JOHN DEERE



Agenda – Day 1 Morning

Time	Agenda Item
0700	Registration, Badging, Refreshments
0800	<p>Welcome & Opening Remarks Paul Witherell & Yan Lu (NIST)</p> <ul style="list-style-type: none">• Opening Remarks• Charles “Chuck” H. Romine (Associate Director of Laboratory Programs, NIST) “Welcome from NIST”• Workshop Goals, Objectives, and Approach
0840	<p>Keynote Speakers – Business/Procurement Focus William Frazier (Pilgrim Consulting)</p> <ul style="list-style-type: none">• R. Chris DeLuca (OUSD) “Data and Advanced Manufacturing”• Neil Orringer (ASTRO) “AM Forward Explained – One year later”
0940	Networking - Refreshment Break
1000	<p>Panel 1: Small & Medium Size Enterprise Perspective Bill Bihlman (Aerolytics)</p> <ul style="list-style-type: none">• Carl Dekker (Met L Flo)• Youping Gao (Castheon)• Neil Goldfine (JENTEK) “In-process Sensing for Metal AM Parts, Using Eddy Current Arrays”• Derek Hass (CCAM) “Gaps in the Digital Thread Across the Multiple Tiers of Manufacturing Supply Chains: An R&D Perspective”
1130	Lunch / Networking

Agenda – Day 1 Afternoon

Time	Agenda Item
1300	<p data-bbox="1014 301 1786 386">Panel 2: Large System Integrator Perspective William Frazier (Pilgrim Consulting)</p> <ul data-bbox="333 418 1946 654" style="list-style-type: none"><li data-bbox="333 418 708 454">• Dave Abbott (GE)<li data-bbox="333 482 733 518">• Jesse Boyer (P&W)<li data-bbox="333 546 1480 582">• Nick Mule (Boeing) “Digital Additive Manufacturing at Boeing”<li data-bbox="333 611 1946 654">• Abdala Nassar (John Deer) “Empowering SMEs Through Effective AM Data Management”
1415	<p data-bbox="1238 668 1556 704">Transition & Break</p>
1430	<p data-bbox="830 721 1964 756">Working Groups – Identification of Data Management Challenges.</p> <p data-bbox="914 799 1880 835">Process Development Production Delta Qual/Restart</p>
1700	<p data-bbox="1200 853 1595 889">Working Group Report</p>
1730	<p data-bbox="1327 986 1467 1022">Adjourn</p>
1830	<p data-bbox="1156 1072 1638 1108">Networking - No Host Social</p> <p data-bbox="1182 1150 1612 1343">GUAPO’S Cantina** 9811 Washington Blvd Gaithersburg, MD 20878 (301) 977-5655</p> <p data-bbox="721 1353 2074 1389">https://www.guaposrestaurant.com/location/gaithersburg-guapos-restaurant/</p>

Agenda – Day 2 Morning

Time	Agenda Item
0700	Registration, Badging, Refreshments
0800	Welcome and Opening Remarks Brandon Ribic (America Makes)
0830	Keynote Speakers – Customer/End User Perspective William Frazier (Pilgrim Consulting) <ul style="list-style-type: none">• David Furrer (P&W) “Modeling and Data to Design and Control AM Processes”• Slade Gardner (Big Metal Additive) “Small Business Data Management Points”
0930	Networking - Refreshment Break
1000	Panel 3: Consortium Perspective Brandon Ribic, (America Makes) <ul style="list-style-type: none">• Kareem Aggour (GE) “Additive Manufacturing Common Data Model”• Mahdi Jamshidinia (ASTM) “Additive Manufacturing Industrialization Through Collaborative Research and Standardization”• Doug Hall (MMPDS)• Kevin Slattery (Barnes GA) “Supporting Army readiness through a robust digital additive manufacturing supply chain”
1130	Lunch / Networking

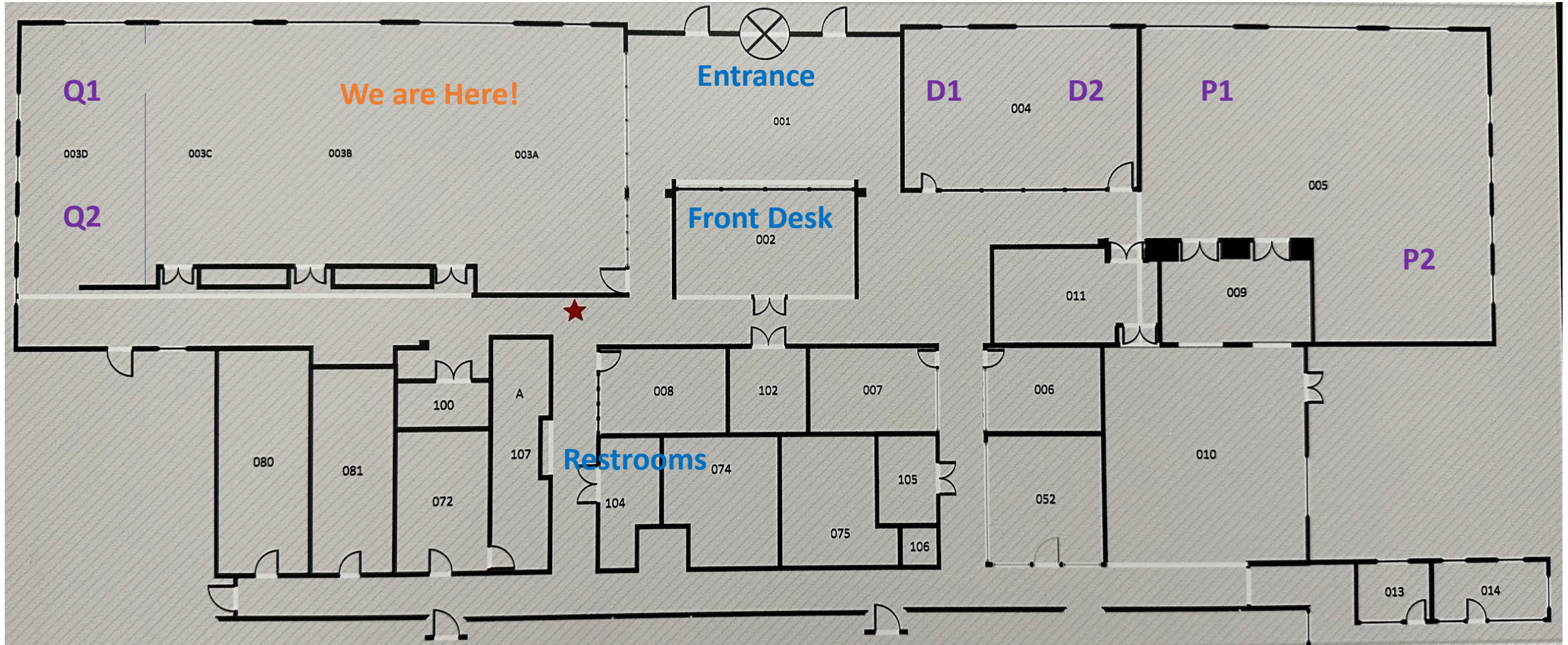
Agenda – Day 2 Afternoon

Time	Agenda Item
1300	<p>Panel 4: Software & Data Analytic Tool Provider Perspective Alex Kitt (EWI)</p> <ul style="list-style-type: none">• Anil Chaudhary (AO)• Vadim Shapiro (Intact Solutions) “Leveraging Design, Process, and Physical Data in Simulation-First Workflows”• Michael Taylor (Hexagon) “AM Data and Innovation”• Mike Vasquez (3Degrees)
1415	Transition & Break
1430	<p>Working Groups -Approaches to Data Management Challenges Process Development Production Delta Qual/Restart</p>
1700	Working Groups Report
1730	Adjourn

Agenda – Day 3 Morning

Time	Agenda Item
0700	Registration, Badging, Refreshments
0800	Welcome & Opening Remarks Chris Cosgrove (RAMP MD) <ul style="list-style-type: none">• Todd Sabin (Department of Commerce, State of Maryland)
0830	Keynote Speakers William Frazier (Pilgrim Consulting) <ul style="list-style-type: none">• Jason Bridges (LM) “Challenges for Small Business Data Sharing with Primes”• Wayne King (Barnes Global Advisors) “How do we broaden the use of Laser Powder Bed Fusion Additive Manufacturing”
0930	Working Groups Report Process Development Production Delta Qual/Restart
1030	AM Product Realization
11:45	Concluding Remarks
1200	Adjourn

Breakout Session Rooms and Spaces



Emergency Procedures for NCCoE Visitors

Evacuation Emergencies

What is an Evacuation Emergency?

- Fires
- Explosions
- Earthquakes
- Indoor toxic material releases
- Indoor radiological and biological accidents
- Workplace violence

What Will Happen During an Evacuation Event?

- A building-wide alarm will sound
- Verbal instructions over the building's public address (PA) system will follow shortly after the alarm
- Exit the conference room and head for the nearest exit (**Red Signs – Upper Right Map**)
- If the Security Guard is close by and accessible, ask for further instruction
- Once outside the building, swiftly walk toward the designated meeting area as indicated on the drawing "Evacuation Meeting Area" (**Yellow notation – Lower Right Map**)

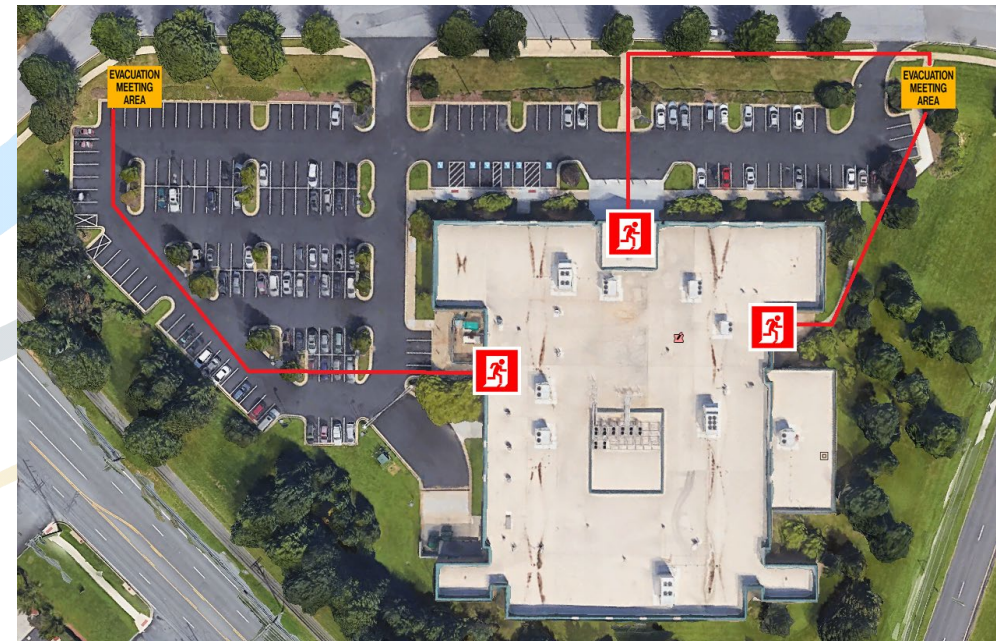
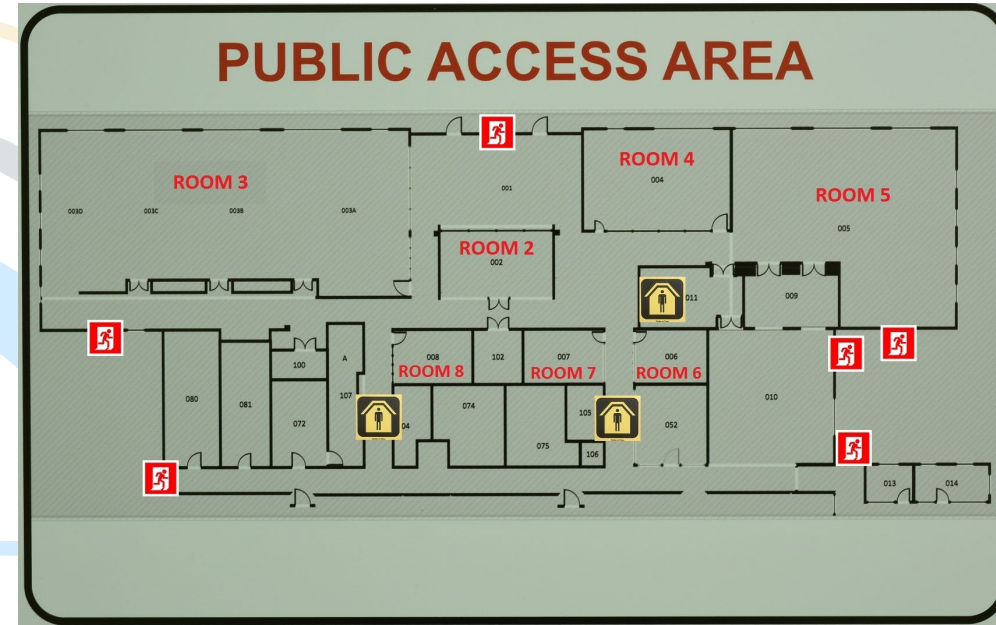
Shelter-In-Place (SIP) Emergencies

What is a Shelter-In-Place Emergency?

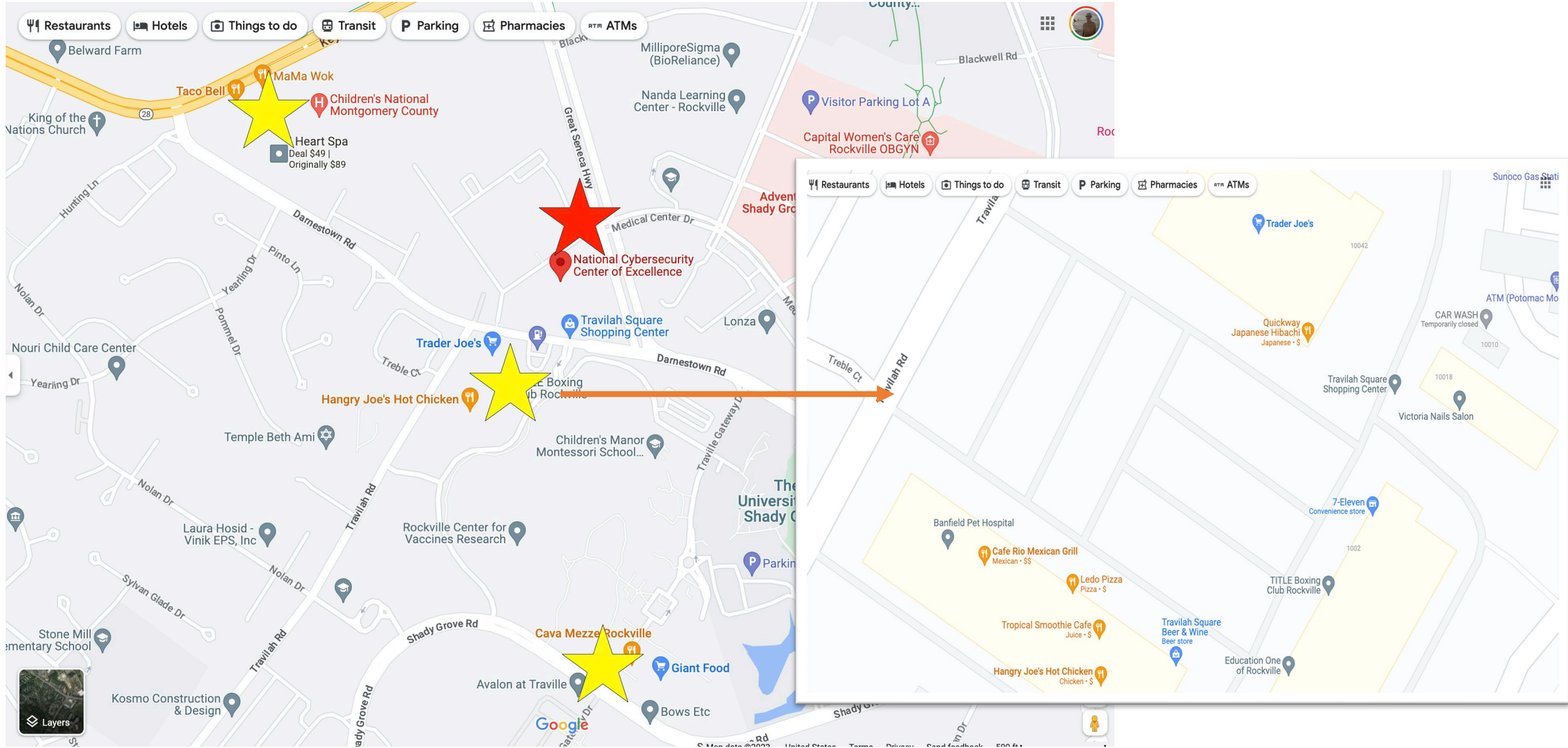
- Severe weather (hurricanes, tornadoes, etc.)
- chemical, biological, or radiological contaminants released into the environment

What Will Happen During an Evacuation Event?

- A building-wide alarm will sound
- Verbal instructions over the building's public address (PA) system will follow shortly after the alarm
- Exit the conference room and head for the nearest SIP hallway or room (**Yellow Signs – Upper Right Map**)
- If the Security Guard is close by and accessible, ask for further instruction

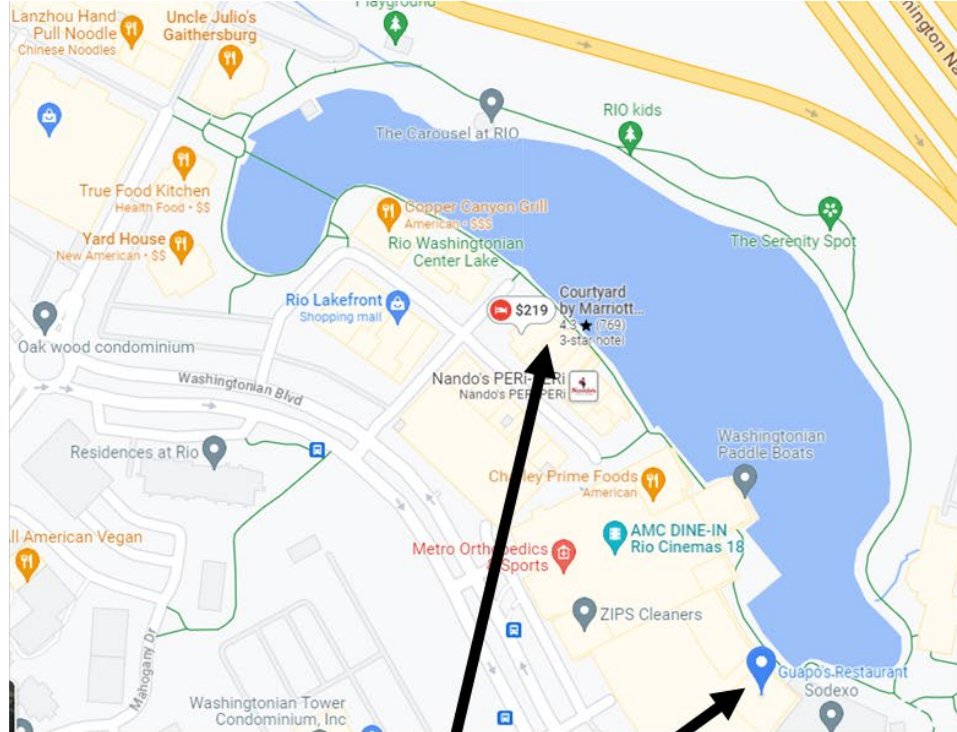
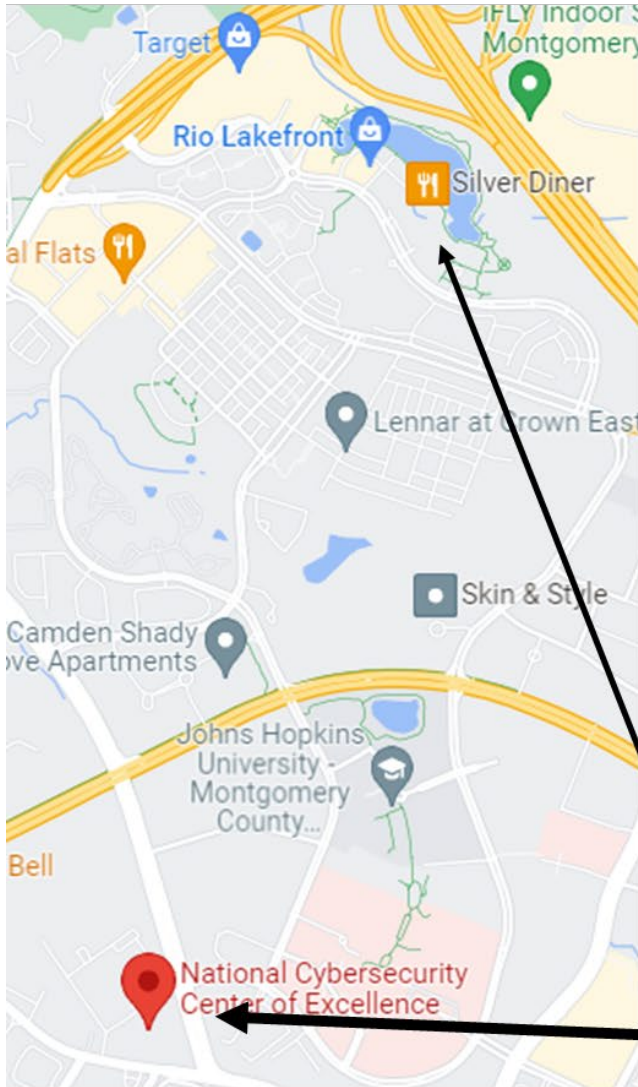


Lunch Options



No-Host Reception – Guapo Catina 6:30pm, June 6, Tuesday

9811 Washingtonian Blvd, Gaithersburg, MD 20878



Courtyard by Marriott
GUAPO's Cantina
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