

# ANSI Unmanned Aircraft Systems Standardization Collaborative (UASSC)

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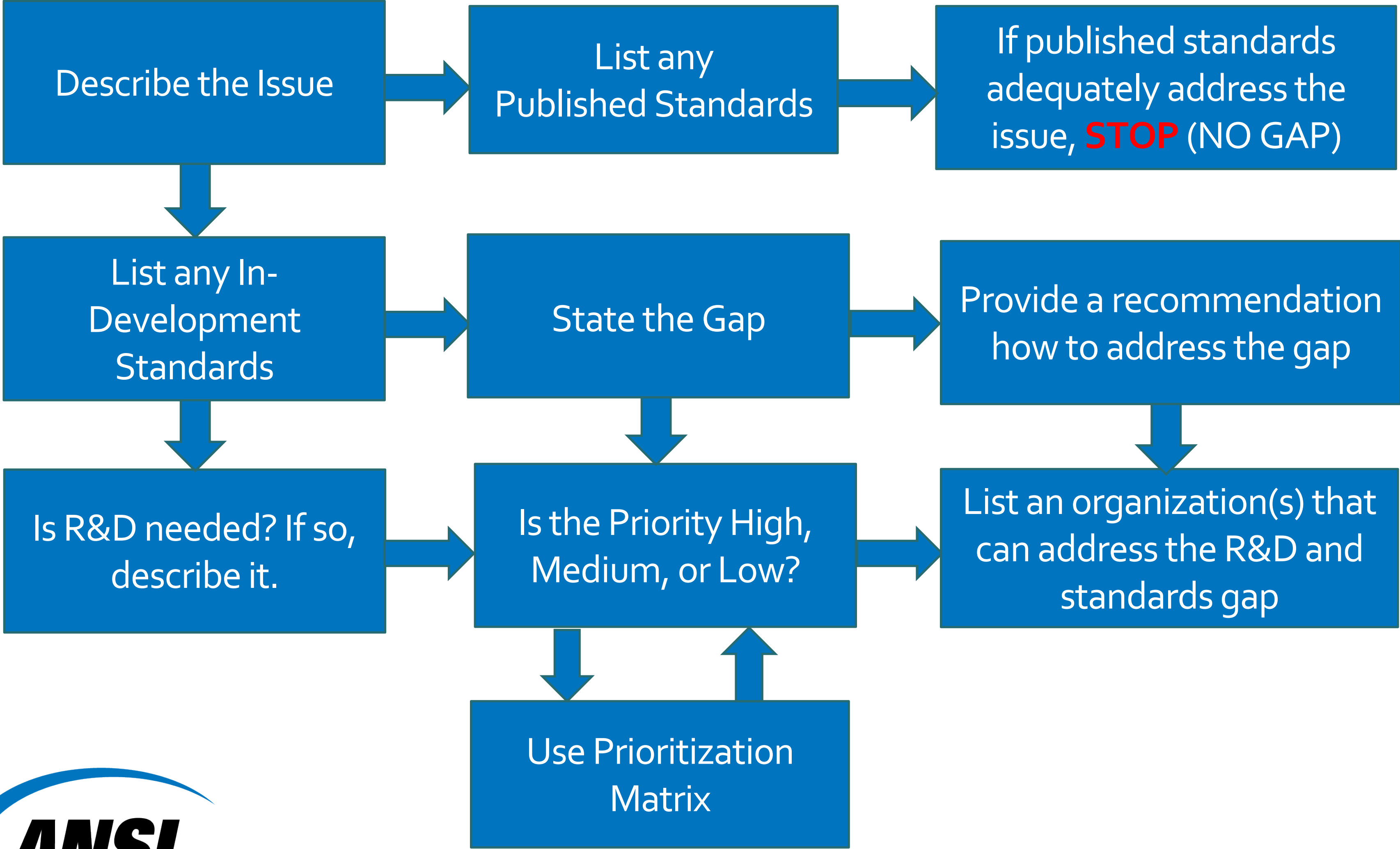
Setting the Stage for Roadmap Version 2.0 /  
Preparation for Breakout Groups



# Roadmap Layout

- ◆ Summary Table of Gaps and Recommendations
- ◆ Introduction
  - Situational Assessment, Background, Objectives, Audience, Structure, Definitions
- ◆ FAA and Inter-governmental Cooperation
- ◆ Other Federal Agency Activities
- ◆ SDO Activities
- ◆ Industry Activities
- ◆ Gap Analysis of Standards and Specifications
  - WG<sub>1</sub> – Airworthiness
  - WG<sub>2</sub> – Flight Operations: General Concerns and Personnel Qualifications
  - WG<sub>3</sub> – Infrastructure Inspections and Commercial Services Operations
  - WG<sub>4</sub> – Public Safety Operations
    - ◆ A “gap” means no published standard or specification exists that covers the particular issue in question

# WGs' Approach to Gap Analysis



# Sample Version 2 Gap Statement

- **Gap: Crane Inspection Using UAS**. Standards are needed to cover requirements for the use of UAS in the inspection, testing, maintenance and operation of cranes and other material handling equipment covered within the scope of ASME's B30 volumes.
- **R&D Needed**: No
- **Recommendation**: Complete work on ASME B30.32 to address crane inspections using UAS.
- **Priority**: Medium\*
- **(NEW) Status of Progress**: Options: Closed (completed), Green (moving forward), Yellow (delayed), Red (at a standstill), Not Started, Withdrawn, or Unknown
- **(NEW) Update**: Narrative statement summarizing any significant changes from version 1
- **Organization**: ASME

\* For any NEW gaps refer to prioritization matrix on next two slides



# Prioritization Matrix: Making the CASE for the Gap Priority Level

## Criteria

- **Criticality (Safety/Quality Implications)** How important is the project? How urgently is a standard or guidance needed? What would be the consequences if the project were not completed or undertaken? A high score means the project is more critical.
- **Achievability (Time to Complete)** - Does it make sense to do this project now, especially when considered in relation to other projects? Is the project already underway or is it a new project? A high score means there's a good probability of completing the project soon.

## Scoring Values

- 3 - critical
  - 2 - somewhat critical
  - 1 - not critical
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- 3 - project near completion
  - 2 - project underway
  - 1 - new project

# Prioritization Matrix (contd.)

## Criteria

- **Scope (Investment of Resources)** - Will the project require a significant investment of time/work/money? Can it be completed with the information/tools/resources currently available? Is pre-standardization research required? A high score means the project can be completed without a significant additional investment of resources.
- **Effect (Return on Investment)** - What impact will the completed project have on the industry? A high score means there are significant gains for the industry by completing the project.

## Score Rankings

- High Priority (a score of 10-12)
- Medium Priority (a score of 7-9)
- Low Priority (a score of 4-6)

## Scoring Values

- 3 - low resource requirement
- 2 - medium resource requirement
- 1 - resource intensive
  
- 3 - high return
- 2 - medium return
- 1 - low return

# Roadmap Gaps Breakdown

Section	High (0-2 years)	Medium (2-5 years)	Low (5+ years)	Total
WG1 Airworthiness	16	2	1	19
WG2 Flight Operations	8	2	1	11
WG3 Infrastructure Inspections/ Commercial Svcs	4	7	1	12
WG4 Public Safety Operations	4	5	0	9
WG2 Personnel Qualifications	8	1	0	9
Total	40	17	3	60

36 gaps need Research & Development



# V1.0 High Priority Gaps Breakdown – SC Rankings

Section	High (0-2 years)	Tier 1 (Most Critical)	Tier 2 (Critical)	Tier 3 (Least Critical)
WG1 Airworthiness	16	7	5	4
WG2 Flight Operations	8	5	3	0
WG3 Infrastructure Inspections/ Commercial Svcs	4	0	1	3
WG4 Public Safety Operations	4	1	1	2
WG2 Personnel Qualifications	8	1	4	3
Total	40	14	14	12





# Steering Committee Survey to Rank 40 High Priority Gaps

## Tier 1 – Most Critical (14)

- ◆ Gap A1: UAS Design and Construction (D&C) Standards
- ◆ Gap A5: Command and Control (C2)/Command, Control and Communications (C3) Link Performance Requirements
- ◆ Gap A7: UAS Navigational Systems
- ◆ Gap A8: Protection from Global Navigation Satellite Signals (GNSS) Interference Including Spoofing and Jamming
- ◆ Gap A9: Detect and Avoid (DAA) Systems
- ◆ Gap A10: Software Dependability and Approval
- ◆ Gap A12: UAS Cybersecurity
- ◆ Gap O2: Operational Risk Assessment and Risk Mitigation
- ◆ Gap O3: Beyond Visual Line of Sight (BVLOS)
- ◆ Gap O4: UAS Operations Over People (OOP)
- ◆ Gap O8: Remote ID and Tracking: Direct Broadcast
- ◆ Gap O9: Remote ID and Tracking: Network Publishing
- ◆ Gap S9: Counter-UAS/Drone (C-UAS) Operations
- ◆ Gap P8: Flight Control Automation and System Failures

# Survey to Rank High Priority Gaps (contd.)

## Tier 2 – Critical (14)

- ◆ Gap A<sub>4</sub>: Avionics and Subsystems
- ◆ Gap A<sub>6</sub>: Technical support for C<sub>2</sub>/C<sub>3</sub> link performance requirements in telecommunications standards
- ◆ Gap A<sub>16</sub>: Mitigation Systems for Various Hazards
- ◆ Gap A<sub>18</sub>: Maintenance and Inspection (M&I) of UAS
- ◆ Gap A<sub>19</sub>: Enterprise Operations: Levels of Automation/ Autonomy/ Artificial Intelligence (AI)
- ◆ Gap O<sub>5</sub>: UAS Operations and Weather
- ◆ Gap O<sub>7</sub>: UTM Service Performance Standards
- ◆ Gap O<sub>10</sub>: Geo-fence Exchange
- ◆ Gap I<sub>12</sub>: Occupational Safety Requirements for UAS Operated in Workplaces
- ◆ Gap S<sub>1</sub>: Use of sUAS for Public Safety Operations
- ◆ Gap P<sub>2</sub>: Manuals (tie tier 2/3)
- ◆ Gap P<sub>3</sub>: Instructors and Functional Area Qualification
- ◆ Gap P<sub>5</sub>: UAS Maintenance Technicians
- ◆ Gap P<sub>9</sub>: Crew-Composition, Selection, and Training (tie tier 2/3)

# Survey to Rank High Priority Gaps (contd.)

## Tier 3 – Least Critical (12)

- ◆ Gap A13: Electrical Systems
- ◆ Gap A14: Power Sources and Propulsion Systems
- ◆ Gap A15: Noise, Emissions, and Fuel Venting
- ◆ Gap A17: Parachute or Drag Chute as a Hazard Mitigation System in UAS Operations over People (OOP)
- ◆ Gap I9: Inspection of Power Transmission Lines Using UAS
- ◆ Gap I10: Pesticide Application Using UAS
- ◆ Gap I11: Commercial Package Delivery
- ◆ Gap S3: Transport and Post-Crash Procedures Involving Biohazards
- ◆ Gap S5: Payload Interface and Control for Public Safety Operations
- ◆ Gap P1: Terminology
- ◆ Gap P6: Compliance and Audit Programs
- ◆ Gap P7: Displays and Controls

# Working Group 1 – Airworthiness (Roadmap Chapter 6)

- ◆ Design and Construction
- ◆ Safety
- ◆ Quality Assurance/Quality Control
- ◆ Avionics and Subsystems
- ◆ Command and Control Link
- ◆ Navigational Systems
- ◆ Detect and Avoid Systems
- ◆ Software Dependability and Approval
- ◆ Crash Protected Airborne Recorder Systems
- ◆ Cybersecurity
- ◆ Electrical Systems
- ◆ Power Sources and Propulsion Systems
- ◆ Noise, Emissions, and Fuel Venting
- ◆ Mitigation Systems for Various Hazards
- ◆ Parachutes for sUAS
- ◆ Maintenance and Inspection
- ◆ Enterprise Operations: Level of Automation/Autonomy/ Artificial Intelligence (AI)
- ◆ **Spectrum (new)**

# Working Group 2 – Flight Operations: General Concerns and Personnel Qualifications (Roadmap Chapters 7 & 10)

- ◆ Privacy
- ◆ Operational Risk Assessment
- ◆ Beyond Visual Line of Sight
- ◆ Operations Over People
- ◆ Weather
- ◆ Data Handling & Processing
- ◆ UAS Traffic Management
- ◆ Remote ID & Tracking
- ◆ Geo-fencing
- ◆ Terminology
- ◆ Manuals
- ◆ UAS Flight Crew
- ◆ Additional Crew Members
- ◆ Maintenance Technicians
- ◆ Compliance/Audit Programs
- ◆ Human Factors in UAS Operations

# Working Group 3 – Infrastructure Inspections and Commercial Services Operations (Roadmap Chapter 8)

- ◆ Vertical Infrastructure Inspections
  - Boilers & Pressure Vessels
  - Cranes
  - Building Facades
  - Low-Rise Residential and Commercial Buildings
  - Communications Towers
- ◆ Linear Infrastructure Inspections
  - Bridges
  - Railroads
  - Power Transmission Lines
- ◆ Wide Area Environment Infrastructure Inspections/Precision Agriculture
  - Environmental Monitoring
  - Pesticide Application
  - Livestock Monitoring and Pasture Management
- ◆ Commercial Package Delivery
- ◆ Occupational Safety Requirements for UAS Operated in Workplace
- ◆ **Urban Air Mobility (new)**

# Working Group 4 – Public Safety Operations (Roadmap Chapter 9)

- ◆ sUAS for Public Safety Operations
- ◆ Hazardous Materials Incident Response and Transport
- ◆ Transport and Post-Crash Procedures Involving Biohazards
- ◆ Forensic Investigations Photogrammetry
- ◆ Payload Interface and Control for Public Safety Operations
- ◆ Search and Rescue
  - sUAS FLIR Cameral Sensor Capabilities
  - sUAS Automated Waypoint Missions
- ◆ Response Robots
- ◆ Law Enforcement Tactical Operations
- ◆ Counter UAS
- ◆ **Recreational Operations (new)**

# Concurrent Breakout Groups - Questions

## Questions Related to the Roadmap and Roadmap Update

- ◆ What are the top UAS issues of concern for your organization?
- ◆ What issues, activities, or initiatives are missing from the roadmap or not adequately covered in your view?
- ◆ Please provide any comments that you have on the roadmap's organization.
- ◆ Who is not here today who should be involved in this effort?

## Questions Related to UAS Standardization

- ◆ What topics are not being adequately addressed in UAS standardization?
- ◆ What overlap or duplication exists in UAS standardization?



# Breakout Group Orchestration

- ◆ Try to Answer All Questions Especially Relating to Roadmap Update
- ◆ Keep Discussion High Level – Stay Out of the “Weeds”
- ◆ Breakout Facilitators will ensure the Group answers the questions
- ◆ Note-taker should be identified to capture key points of discussion
  - Provide any notes to staff at the end
- ◆ Decide who will do the Report Back in the afternoon
- ◆ Boxed Lunch available outside this room at 1 pm
- ◆ Report backs in this room at 2 pm

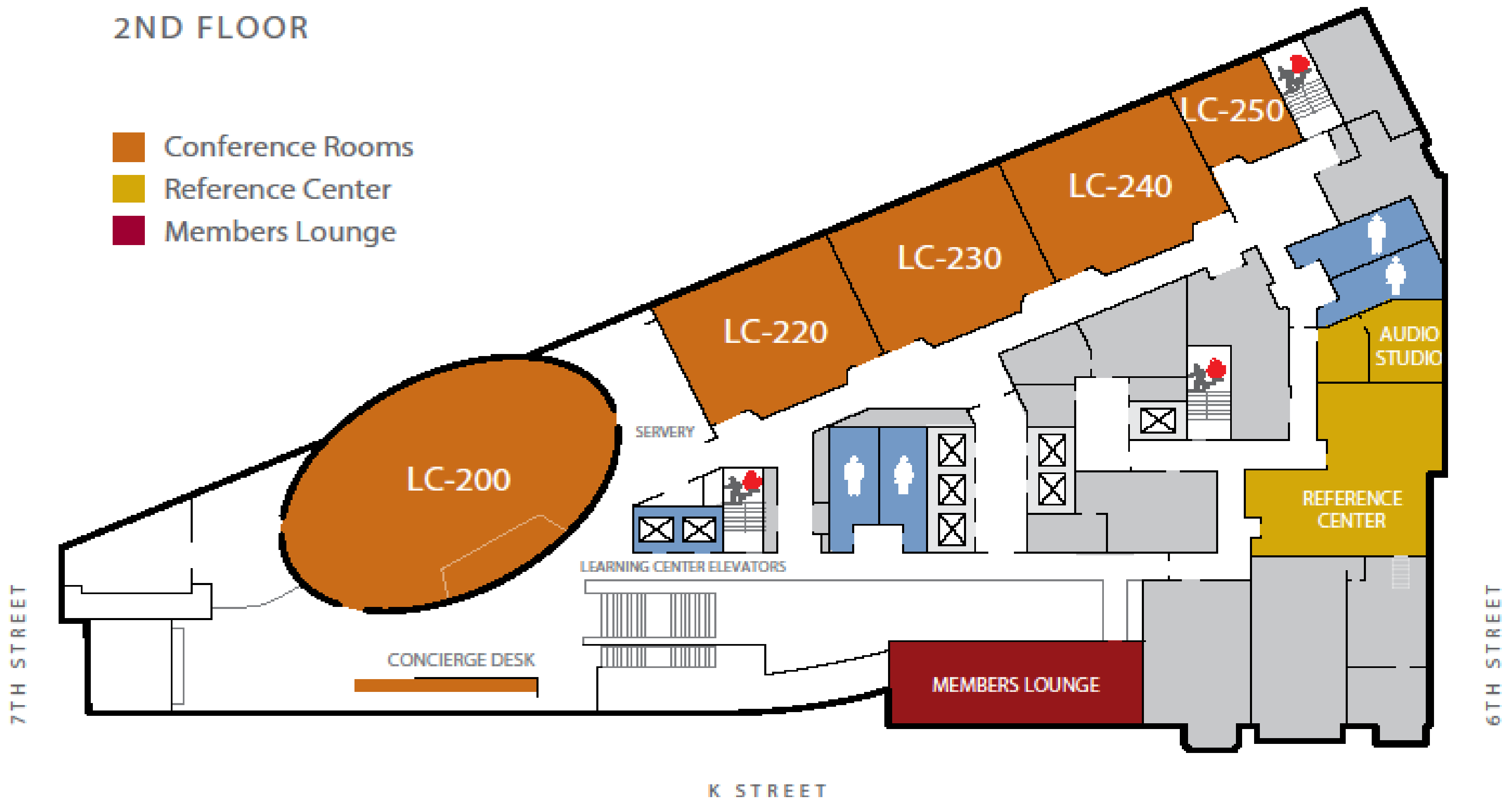
# Today's Breakout Group Facilitators / Room #

- ◆ **WG1 – Airworthiness** (Room LC 200)
  - Ritesh Ghimire, Federal Aviation Administration
  - Logen Johnson, SAE International
- ◆ **WG2 - Flight Operations: General Concerns and Personnel Qualifications** (Room LC 220)
  - Joe Valasquez, DroneScape
  - Mark Reichardt, Open Geospatial Consortium
- ◆ **WG3 – Infrastructure Inspections and Commercial Services Operations** (Room LC 230)
  - Peter Musgrove, AT&T
  - Chris Martino, HAI
- ◆ **WG4 – Public Safety Operations** (Room LC 240)
  - Eric Schwartz, Florida Power & Light Company
  - Phil Mattson, DHS S&T Directorate



# LEARNING CENTER 2ND FLOOR

- Conference Rooms
- Reference Center
- Members Lounge



# Questions

