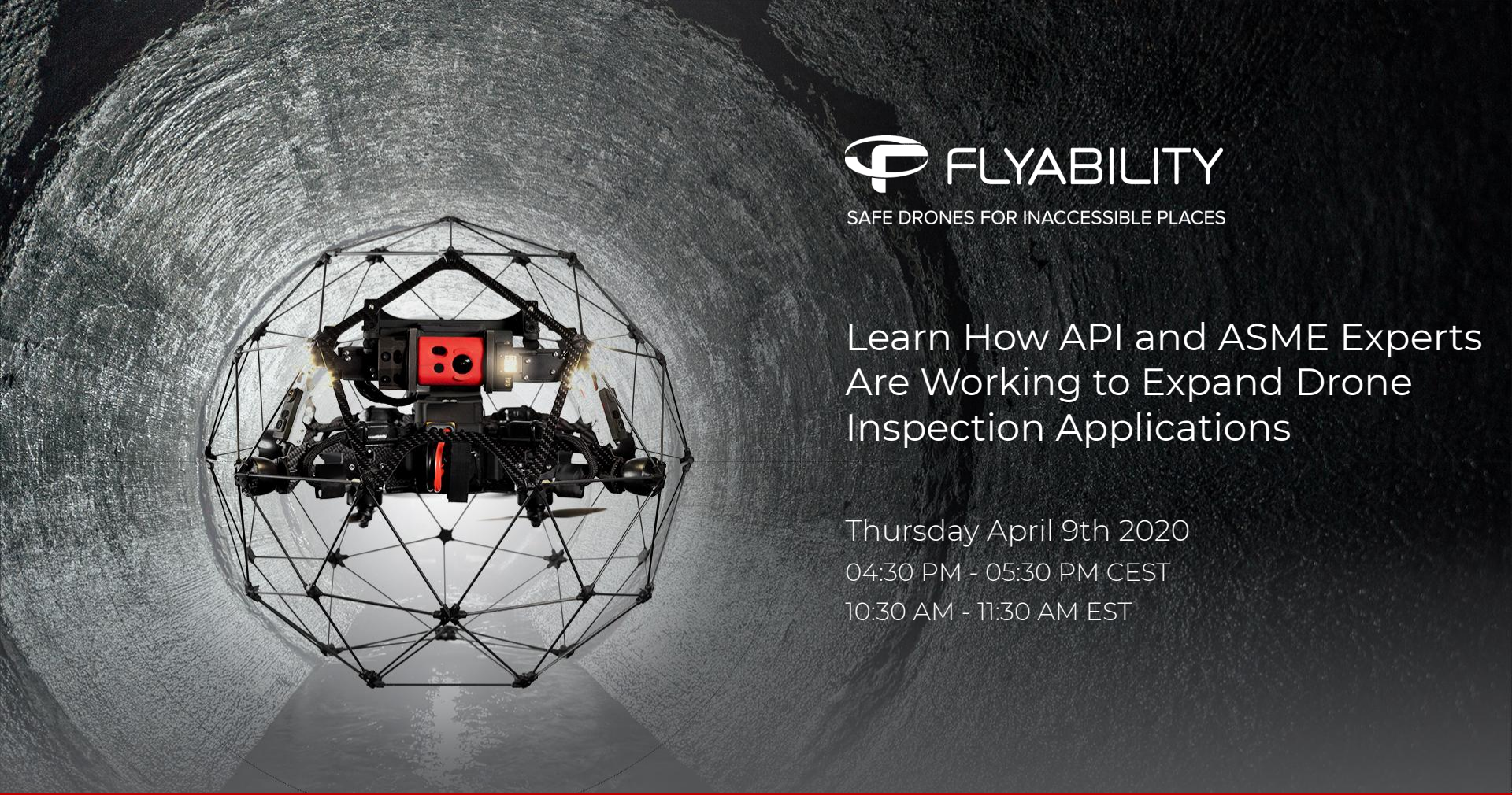


FLYABILITY

SAFE DRONES FOR INACCESSIBLE PLACES

Learn How API and ASME Experts Are Working to Expand Drone Inspection Applications

Thursday April 9th 2020

04:30 PM - 05:30 PM CEST

10:30 AM - 11:30 AM EST

MODERATOR

Marc Gandillon
Head of Marketing
—Flyability—

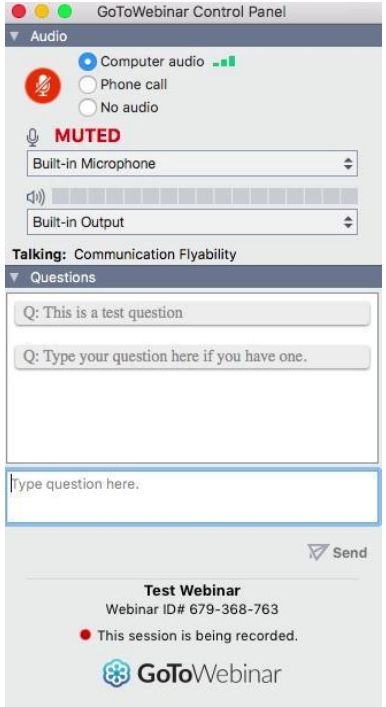
PANELISTS

Suzanne Lemieux
Manager, Operations Security & Emergency Response Policy
—API—

Luis Pulgarin
Project Engineering Advisor
—ASME—

WEBINAR ENGAGEMENT

Ask questions during the webinar.



AGENDA

1 5’ Introduction

2 10’ Suzanne Lemieux, API

UAS operations in the Oil & Natural Gas Industry

3 20’ Luis Pulgarin, ASME

ASME Robotics Standards Development

4 20’ Q&A

UAS operations in the Oil & Natural Gas Industry

Suzanne Lemieux

Manager, Operations Security & Emergency Response Policy

UAS operations in the Oil and Natural Gas Industry

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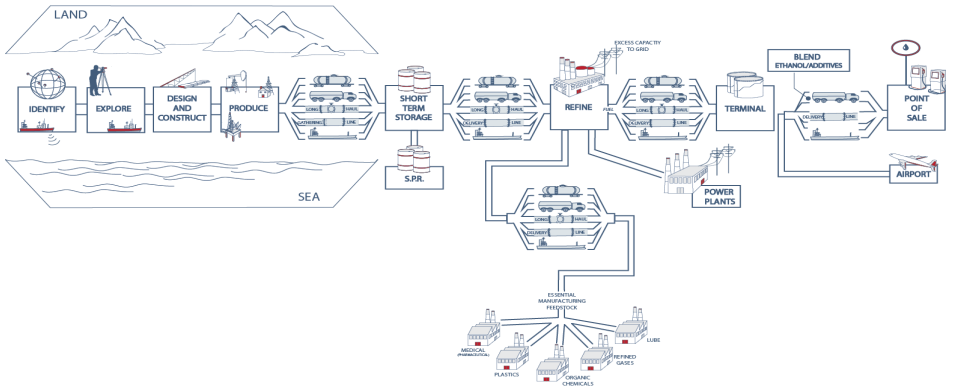
American Petroleum Institute (API) Overview

- National trade association covering all aspects of the oil and natural gas industry
- Established as standards setting organization in 1919
  - Nearly 700 standards spanning industry operations
  - More then 300 incorporated by reference in regulation
- Over 600 members, from large integrated companies to service and supply firms
- Primary activities are standards development, policy development, and advocacy

energy API

A Complex Operating Environment

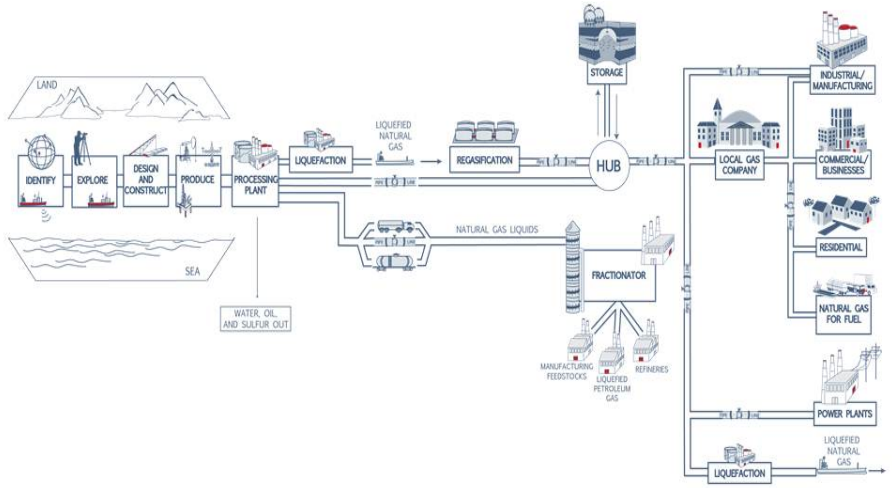


The Opportunity

The case for using UAS in the oil and natural gas industry has grown significantly over the last few years and continues to grow as new systems, applications, sensors, and techniques are developed to make UAS operations more tailored to the industry.

The Challenge

The phenomenal growth in the commercial UAS industry can create a challenging environment for oil and natural gas companies attempting to determine what skills, abilities, and operations are real versus promised, and what systems and operators meet the level of safety, expertise, and experience they require.



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API's Guide for UAS

- Manned aviation is accepted and incorporated into operations in the natural gas and oil industry
- UAS integration into complex operations is an unknown factor:
  - What are the tested uses?
  - What do contingency plans look like?
  - How are risks judged, ranked and mitigated?
- Safety is the number one priority in the natural gas and oil industry, so what do we do to take advantage of the potential benefits of UAS?

https://www.api.org/news-policy-and-issues/safety-and-system-integrity/api-guide-for-developing-a-uas-program-in-the-oil-and-natural-gas-industry

Components of the Guide

Safety is the Core Value

Why and Who

- Define use cases
- Assess internal vs external vs hybrid capability

What's in a program

- Develop SOPs & safety manuals
- Determine risk tolerance & security procedures

Learning from experience

- Develop contingency plans
- Incorporate lessons learned

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How can it be used?

Intent of Guide:

- Intended to be used as a resource of common questions, considerations, and areas that a company may need to dig more deeply into as they consider how to develop or improve a UAS program.
- Provides a path for organizations to consider UAS who may not have aviation experience
- Shares good practices from organizations who have already begun to incorporate UAS into natural gas and oil operations
- Creates a baseline of program elements for UAS within the natural gas and oil industry

The audience should include not only in the oil and natural gas sector that are considering developing a UAS program, but also service providers and others in the commercial UAS industry that are interested in working in the oil and natural gas industry.

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How does all this relate to inspections?

- The industry can be slow to adopt new technologies
- Market conditions are challenging all companies
- API standards can take months to years to write or update
- But…….
- Companies will find new and novel ways to save money

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Where API Members Are

Current Needs:

- Remote ID & tracking
- UTM
- Section 2209
- BVLOS
- Operations over people
- Data security best practices
- Cyber security of software and hardware
- CUAS

Future State:

- Long range pipeline overflights for inspection
- Autonomous inspections
- High quality sensors for SUAS
- Integration of UAS and robotics into standard operating procedures
- Standardized data sets for specific applications across industry
- Certifications and standards for systems, operators, and processes

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Utilizing API Standards

- No API standards currently address the use of UAS to meet requirements
- This does not preclude the use of UAS to meet standards' requirements
- Operators/service providers can make a request for interpretation to API Standards Committees to determine whether a UAS meets the requirements
  - https://www.api.org/products-and-services/standards/standards-inquiries
- Flyability demonstrated that UAS can be used to meet inspection requirements
  - https://www.flyability.com/articles-and-media/can-a-drone-be-used-as-a-formal-inspection-tool

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Conclusion

- API members are always looking for new a novel ways to use technology to increase efficiency and reduce risks
- Safety is the #1 goal of the oil and natural gas industry
- Service providers should have the information and knowledge in place to demonstrate capability and prove results

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Thank You

Suzanne Lemieux
Manager, Operations Security & Emergency Response Policy
lemieuxs@api.org

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ASME Robotics Standards Development

Luis Pulgarin
Project Engineering Advisor

SETTING THE STANDARD

ASME Robotics
Standards Development

Flyability Webinar

April 9, 2020

ASME
SETTING THE STANDARD

Agenda

- ASME Overview
- Robotics Standards Development
- Robotics for Inspection & Maintenance Event
- Closing Remarks

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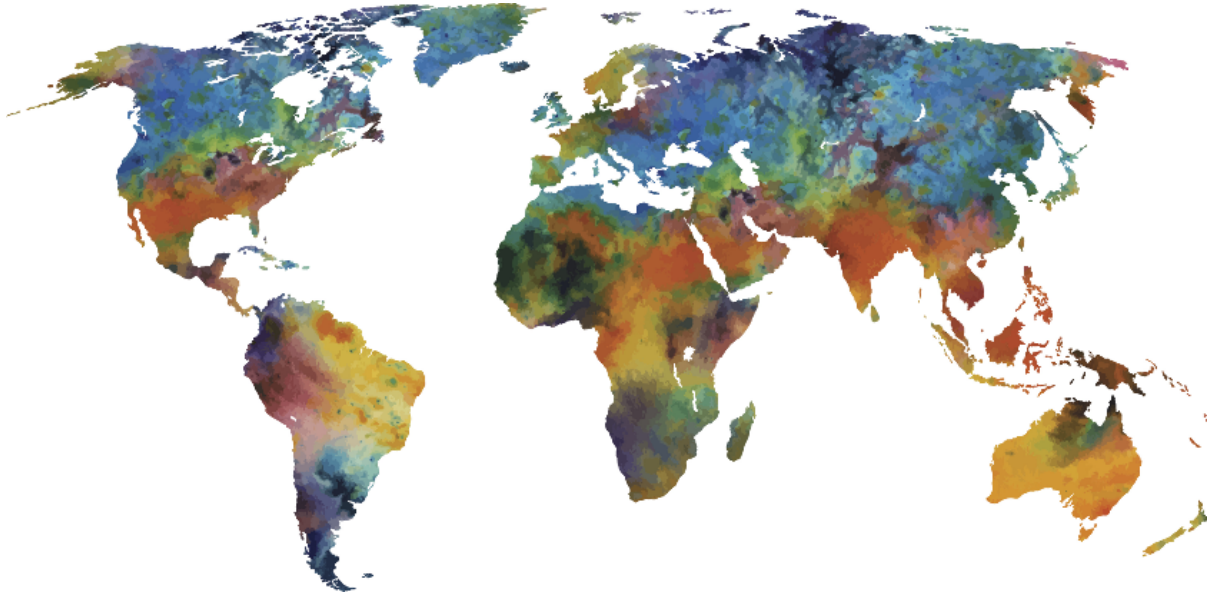
What is ASME?



- Standards
- Certification
- Conformity Assessment
- Courses
- Conferences
- Publications
- ASME.org
- Education
- Membership

ASME helps the global engineering community develop solutions to real-world challenges

ASME
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ASME at a Glance

- **100,000+ members in 140+ countries**
  - Includes 28,000+ students
- **500+ standards in 100+ countries**
- **Offices: US – Europe – Asia**
  - Main Office: New York City
  - Little Falls (NJ); Houston (TX); Washington DC
  - Brussels (EU); Beijing (China); New Delhi (India)
- **Digital Library with journals, proceedings & ASME Press e-books, including**:
  - 244,753 technical papers (~1.8 million pages)
- ~25 conference proceedings published annually (70-100 volumes, 7,000-10,000 papers, 70,000-100,000 pages)

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ASME Standards Initiatives for Robotics

ASME Contact: Luis Pulgarin
Project Engineering Advisor,
Standards and Certification, Initiatives

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New Standards Committees for Robotics

No.	Name of Committee	Started	Reports to Standards Committee
1	Mobile Unmanned System (MUS) Standards Committee	July 2019	MUS is a new Standards Committee
2	Use of Unmanned Aerial Systems (UASs) for Inspection Subcommittee	May 2017	Currently reporting to BPV Committee on Nondestructive Examination (BPV V) In process of moving under MUS Standards Committee
3	Use of Crawler/Ground Robots for Inspection Subcommittee	March 2019	
4	B30.32 Unmanned Aircraft Systems (UAS) used in Inspection, Testing, Maintenance and Material Lifting Operation	June 2017	B30 Standards Committee on Safety Standards for Cableways, Cranes, Derricks, Hoists, Hooks, Jacks, and Slings
5	B30.31 Self-Propelled, Towed, or Remote-Controlled Hydraulic Platform Transporters	Sept 2017	
6	Subcommittee on Robotic Arms (Manipulators)		Manufacturing and Advanced Manufacturing (MAM) Standards Committee

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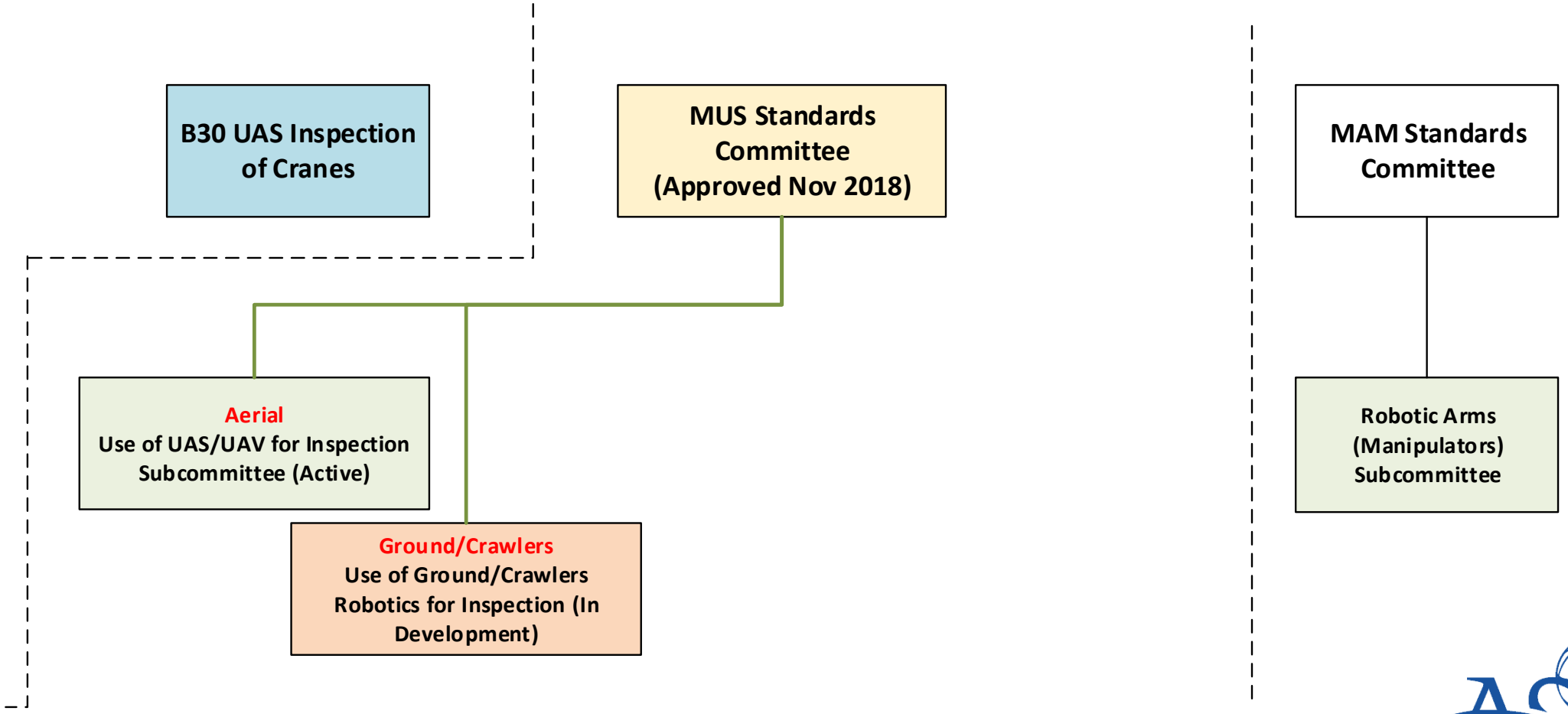
Where we are now

ASME Standards Committees for Robotics



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Mobile Unmanned Systems (MUS) Standards Committee

- **Charter:** Application of Mobile Unmanned Systems (MUS) for inspections, monitoring, and maintenance of industrial facilities and power plants as well as equipment, transmission lines, and pipelines.
- **Members:** Currently have 10 members;
- **Meetings:** 2-3 year via teleconferences

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Use of UAS/UAV for Inspections Subcommittee

- **Standards Document:** Developing guidance document to provide "how to" utilize Unmanned Aerial Systems to safely and reliably perform Visual Inspections and obtain quality data
  - Estimate to publication in 1 year or so.
- **Members:** 20 members; Owner/Operators, UAS OEMs, sensor manufacturers, service providers, and research entities. Plus 40 + interested parties.
  - Meets in-person 4 times a year at ASME Boiler Code Week; Monday 5 - 7 pm.
  - Hold 1-2 teleconferences in between in-person meetings

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Use of UAS/UAV for Inspections Subcommittee

ANSI UAS Standard Collaborative-

- Critical Infrastructure WG
- Revision 2 for Review and Comment. Estimates to be published in Summer 2020.

ASME Record Number: 18-2052: Review of ASME BPVC Section V Article 9, UAS/Robotic VT examination

- Amend Remote Visual to accommodate deployment mechanisms like UAS/UAV & robots. Allowing exception for Direct Visual Equivalence. HOIS JIP study presents the USAF 1951 Resolution Chart.

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Affiliations: Use of UAS/UAV for Inspections Subcommittee

Applied Technical Services

BASF Corporation

Chevron

Con Edison of NY

FAA

EPRI

Exelon

Entergy

Framatome

Flyability

Genova Power Advisors, LLC

Hartford Steam Boiler

Interactive Aerial

Ontario Power Generation

Plains Midstream Canada

Skypersonic

TVA

Shanghai Institute of Special Equipment and Technical Research

Shell

Virtual Media Integration

Westinghouse Electric

ZETEC

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UAS for Inspection Standard

Non-Destructive Examination Methodology and Acceptance Criteria, *i.e., ASME Section V (VT)*

Robotic Equipment (Platform and Sensors)

Qualified Inspector

Asset (New Construction, Post Construction, In-service)

Pilot/Driver and Owner/ Operator Responsibilities

Use of UAS for Inspection Standard

High Quality and Repeatable Robotic Inspection Results

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UAS for Inspection Standard – Table of Contents

As of April 2020, the status of the sections are:

- Foreword
- Section 1 Introduction
  - 1-1 Scope
  - 1-2 Definitions
  - 1-3 References
- Section 2 Purpose of Inspection
- Section 3 Preparation for Inspection
- Section 4 Equipment for Inspection
- Section 5 Duties and Responsibilities
- Section 6 Conducting Inspections
- Section 7 Documentation for UAS/UAV
- Nonmandatory Appendix A Uses of UAS

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UAS for Inspection Case Studies

Topics

- Case 1 Boiler - Completed
- Case 2 Nuclear Dome - In Process
- Case 3 Stack - In Process
- Case 4 Inside Nuclear Plant - In Process
- Case 5 Piping - Next to review

Goals/emphasize

- Increase in safety
- Time savings
- Cost saving
- Technology agnostic – pro drone in general

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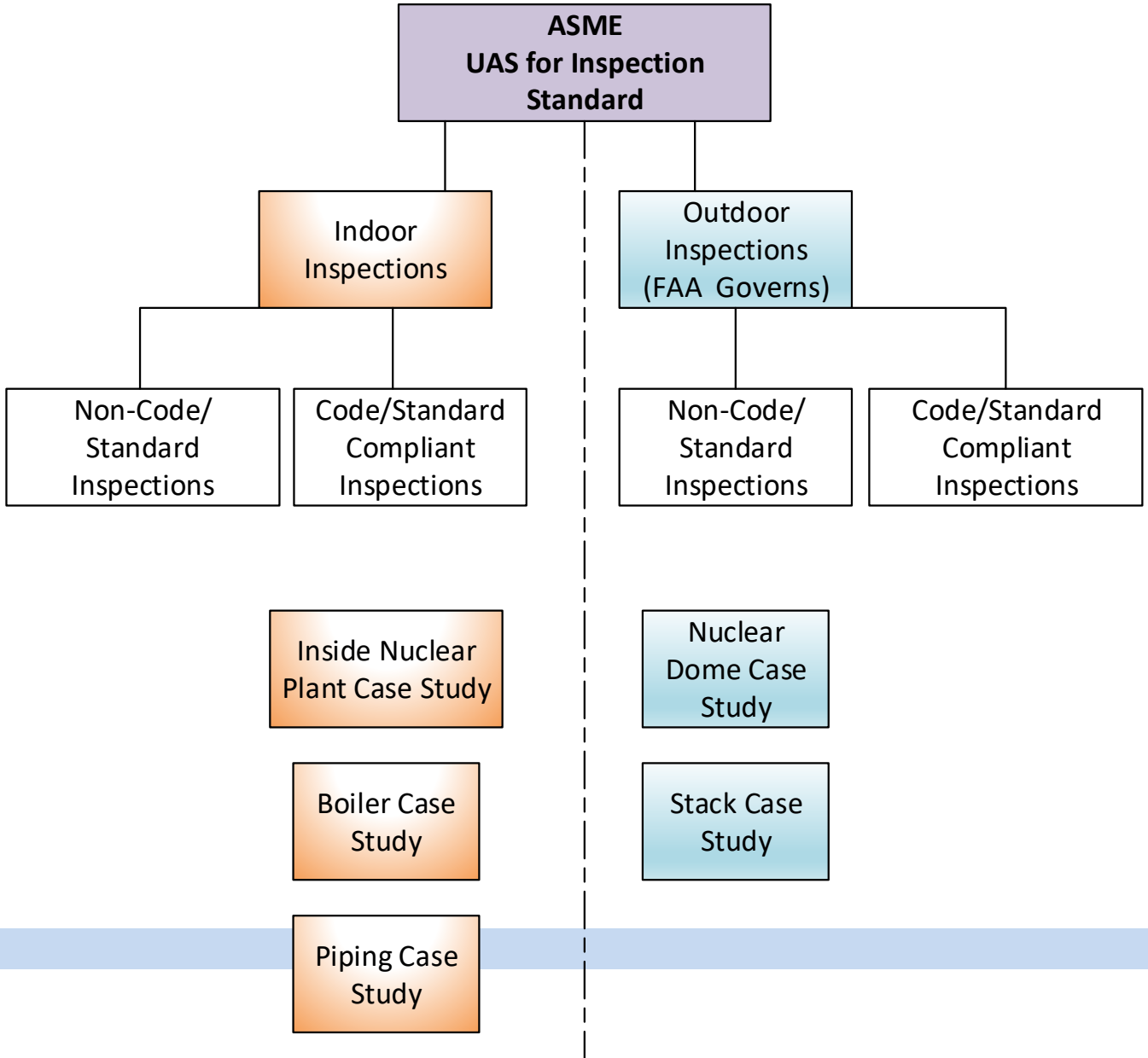
Use of UAS/UAV for Inspections – Standard Structure



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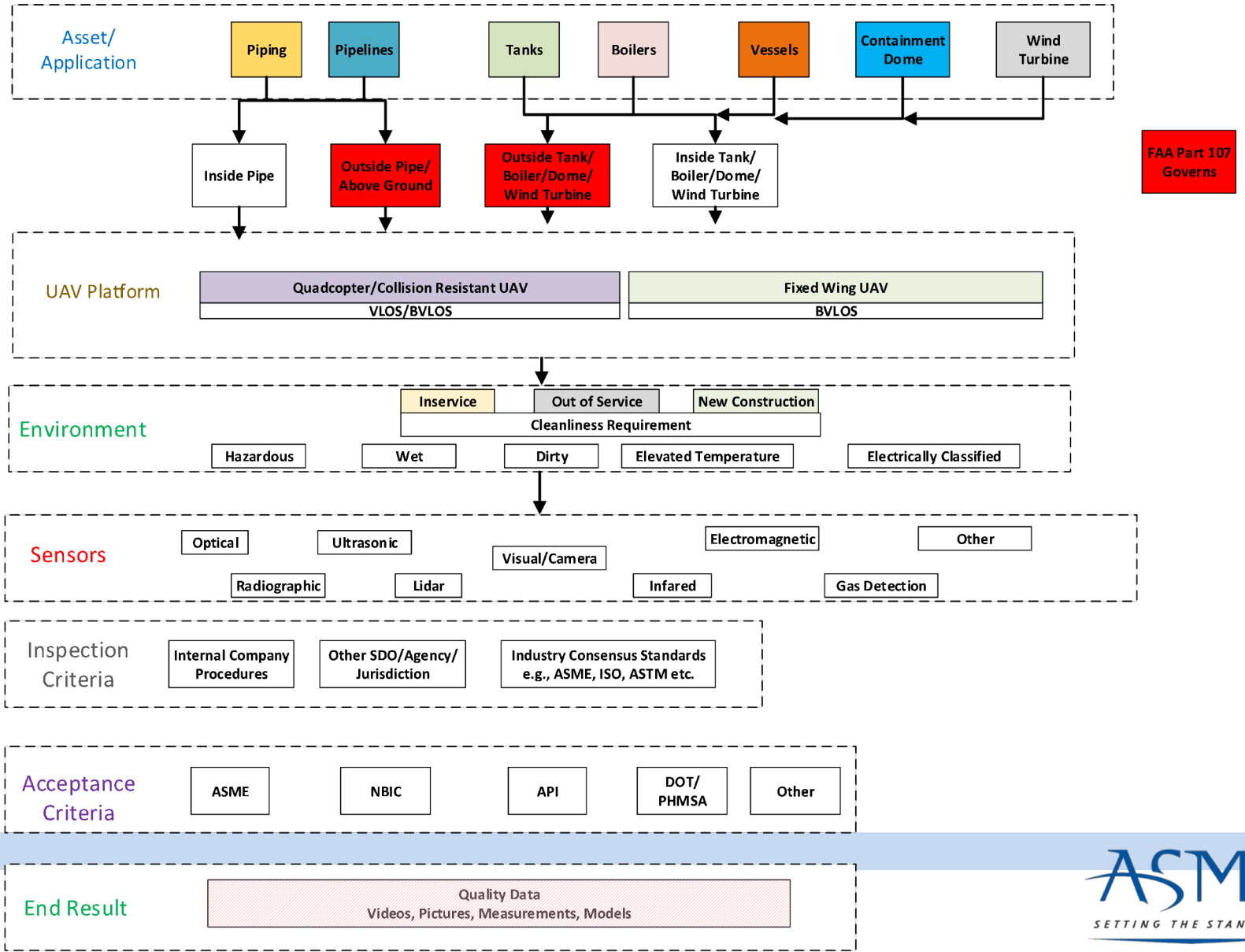
Use of UAS for Inspection Landscape

R1

UAS for Inspection – Landscape by Asset/Application



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Use of Crawlers/Ground Robotics for Inspection Subcommittee

- **Members:** In the process of forming the membership for the Use of Crawlers/Ground Robotics for Inspection subcommittee.
  - Currently have 13 potential members
- **Meetings/Teleconferences:** 5 teleconferences - March, April, Jun, Oct and Nov 2019

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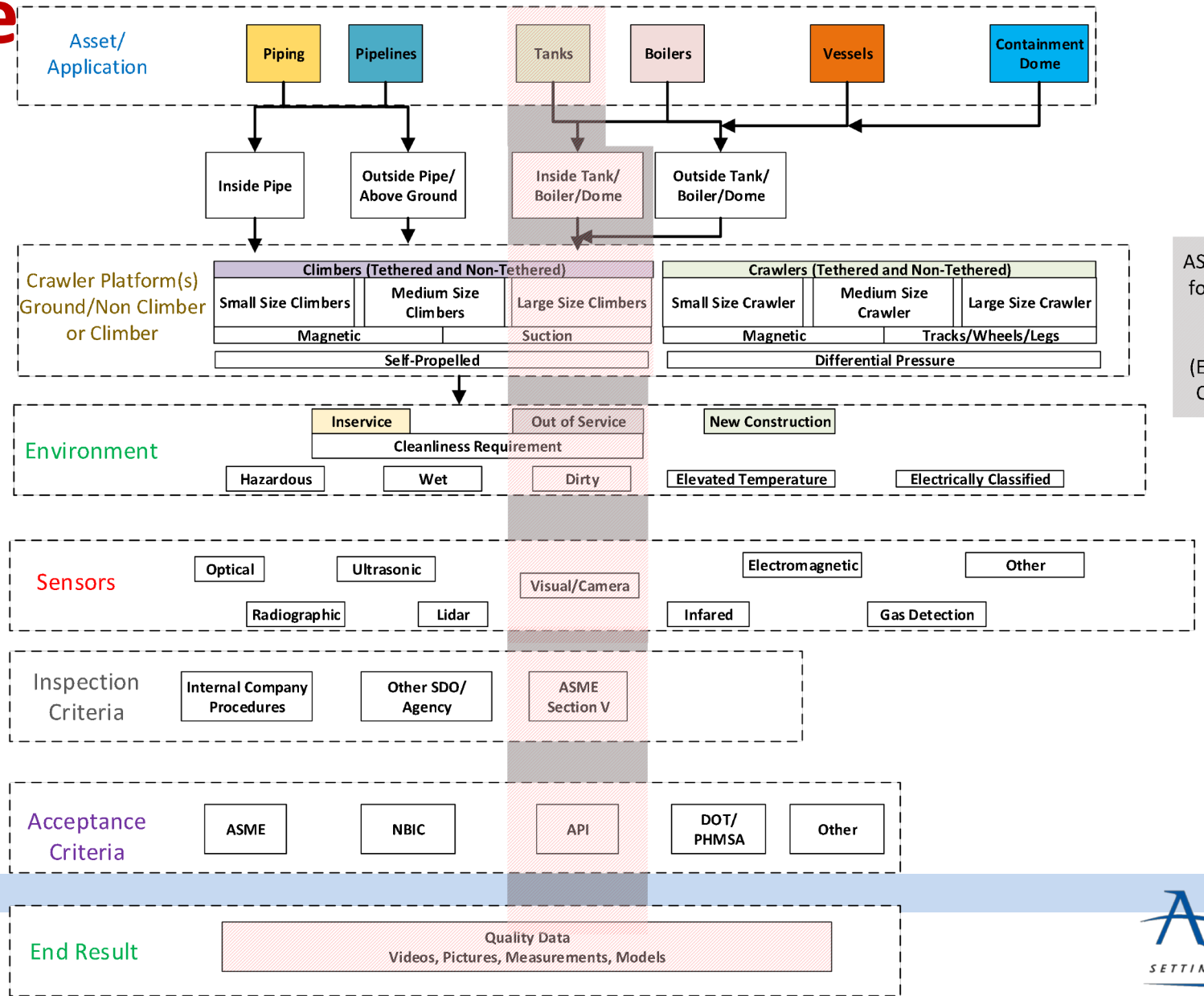
Use of Crawlers/Ground Robotics for Inspection Update

Crawlers for Inspection – Landscape by Asset/Application



ASME Crawlers for Inspection Guidance Document (EXAMPLE) or CASE STUDY

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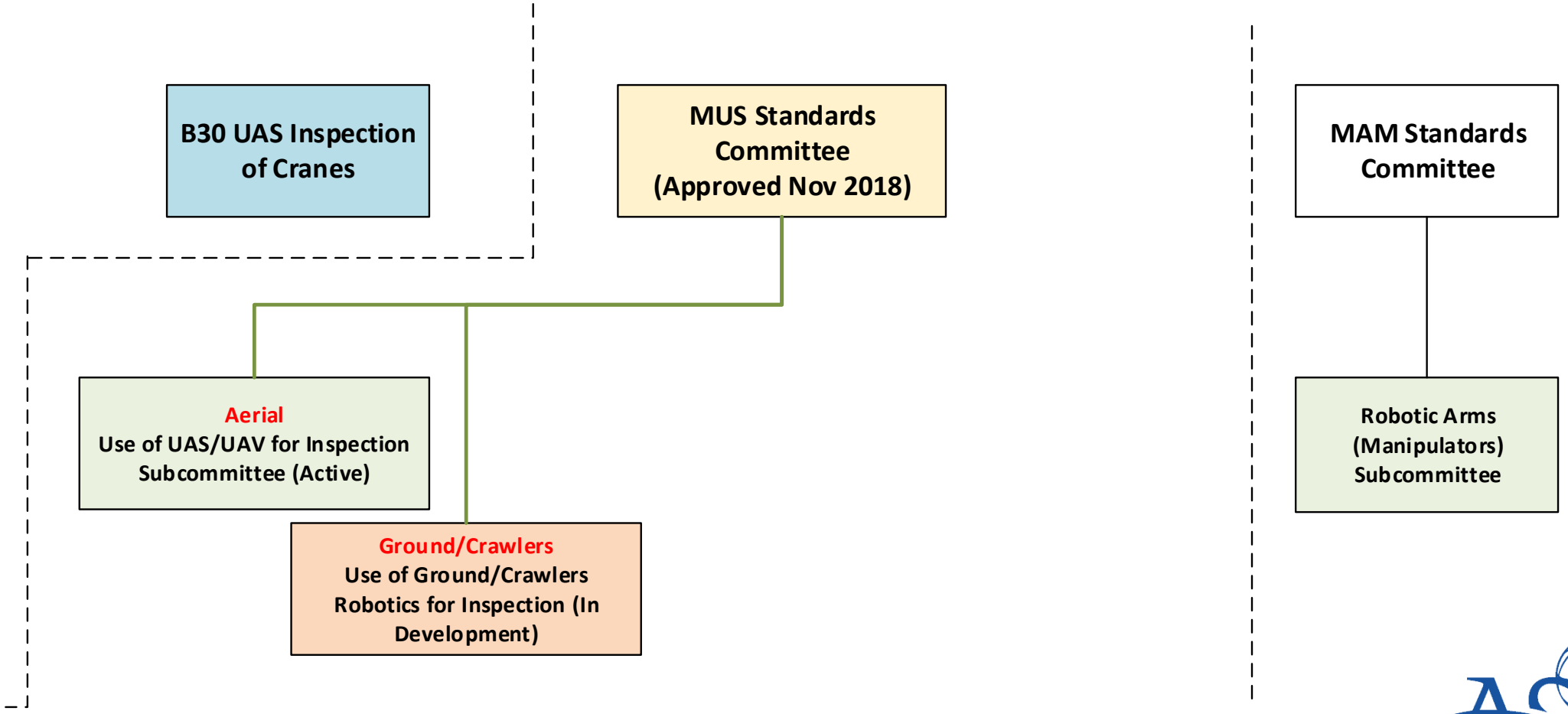
Where we are now

ASME Standards Committees for Robotics



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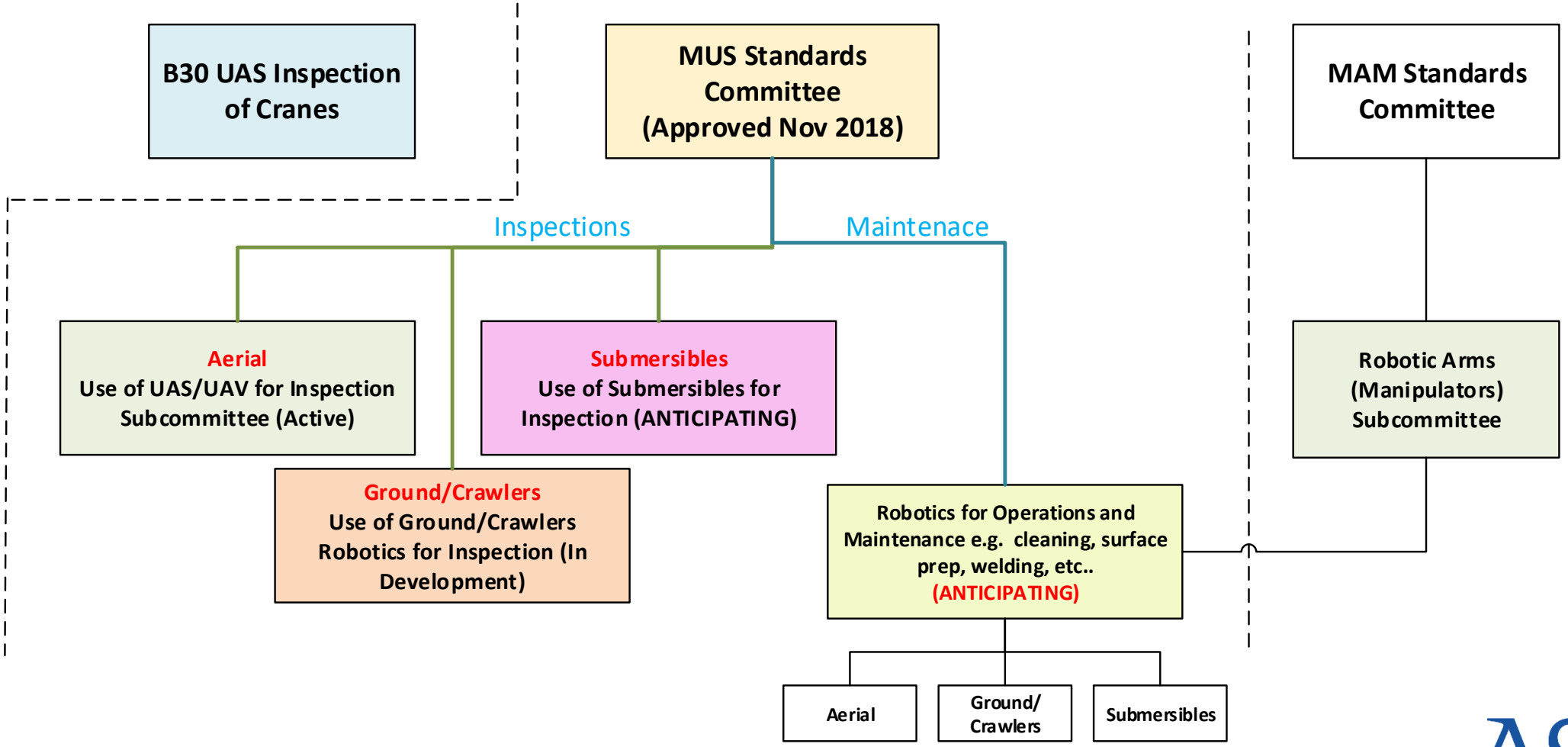
Where we may go

Potential Structure: Mobile Unmanned Systems with Robotic Arms



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This Year's Event

event.asme.org/Robotics

robotics@asme.org

Note: ASME is monitoring the Coronavirus (COVID-19) situation to ensure the health and safety of our meeting and conference participants, as well as our staff. If there are any changes to these plans, we will provide updates on website: **event.asme.org/Robotics**

What You Will Experience…

A cross-industry experiential showcase of the latest technologies for performing asset inspections and maintenance.

Hear from industry leaders & experience live demonstrations on:

Robotic Platforms: UAS (drones) | Crawlers | Mobile | Submersible

Challenges: Hazardous Environments | Confined Spaces | Elevated Work and more

Data: Workflow | Analytics | Machine Learning | Digital Twin and more

Industries: Oil & Gas | Chemical | Power Generation | Pipeline | Nuclear and more

Program Agenda:

Two Highly Interactive Days

- **Over 15 Case Studies**
- **11 Live Demonstrations**
- **30 Exhibits**
- **Lessons from Asset Owners Talks**
- **Panel: Analytics/Big Data**
- **Panel: Regulatory/Standards**

Standards & Regulatory Discussion: Program Element

Recurring Panel Topic: Ways robotics inspection can meet future industry and regulatory compliance

2018 RFIM

- Pipeline and Hazardous Materials Safety Administration, US DOT
- Authorized Inspection Agency (AIA)
- UL LLC

2019 RFIM

- Chief Boiler Inspector, Texas
- American Petroleum Institute (API)
- SPRINT Robotics
- ASME

Again, the Panel will be part of the 2020 RFIM program

2019 Recap

Companies that participated in 2019:

APELLIX
CYBERHAWK Aerial Inspection and Surveying Specialists
FLYABILITY
Avitas Systems a GE venture
SARCOS
Westinghouse INNOVATION YOU CAN BE SURE OF
interactive aerial BUILDING DRONES FOR CONFINED SPACES
energy API
Xcel Energy
GE Global Research
IBM Research
BAKER HUGHES a GE company
intero
ROSEN empowered by technology
Quest Integrity
EPRI ELECTRIC POWER RESEARCH INSTITUTE
pipetel TECHNOLOGIES
INVERT ROBOTICS
DIAKONT
RTT Robotic Technologies of Tennessee LLC
NVIDIA

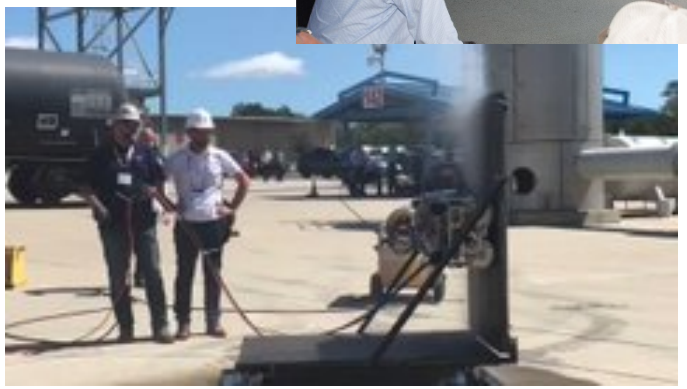
2019 Recap

9 Live Demonstrations

Apellix
Invert Robotics
Interactive Aerial

Baker Hughes
Flyability
Robotic Technologies of Tennessee

GE Inspection Robotics
Sarcos Robotics



Closing Remarks

1. What is ASME doing to expand and understand drone uses cases and how they integrate into inspection standards?
   - May 2017, Subcommittee for Use of UAS for Inspection and July 2019 MUS Standards Committee
   - Active Member of UASSC
   - Growing an industry event and network of users / experts to share knowledge
2. Can a drone be used as a formal inspection tool?
   - Inspection Methodology: Need robotics approved in ASME and other SDOs inspection methods standards (i.e., ASME BPVC Section 5, Article 9)
   - Acceptance Criteria: Need robotics approved in ASME and other SDOs acceptance standards (i.e., API 563)
   - Use of UAS for Inspection: Need industry acceptance of upcoming ASME standard

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Thank You

MUS Standards Committee and Subcommittees

Actively seeking additional committee members. Contact Luis Pulgarin.

2020 Robotics for Inspection & Maintenance Event

Visit events.asme.org/robotics to learn more and sign up for 2020 event updates

Luis Pulgarin
Project Engineering Advisor,
Standards and Certification, Initiatives
212.591.8584 | Pulgarinl@asme.org

John Grimes
Product Development Manager, Robotics
Industry Events
212.591.7558 | grimesj@asme.org

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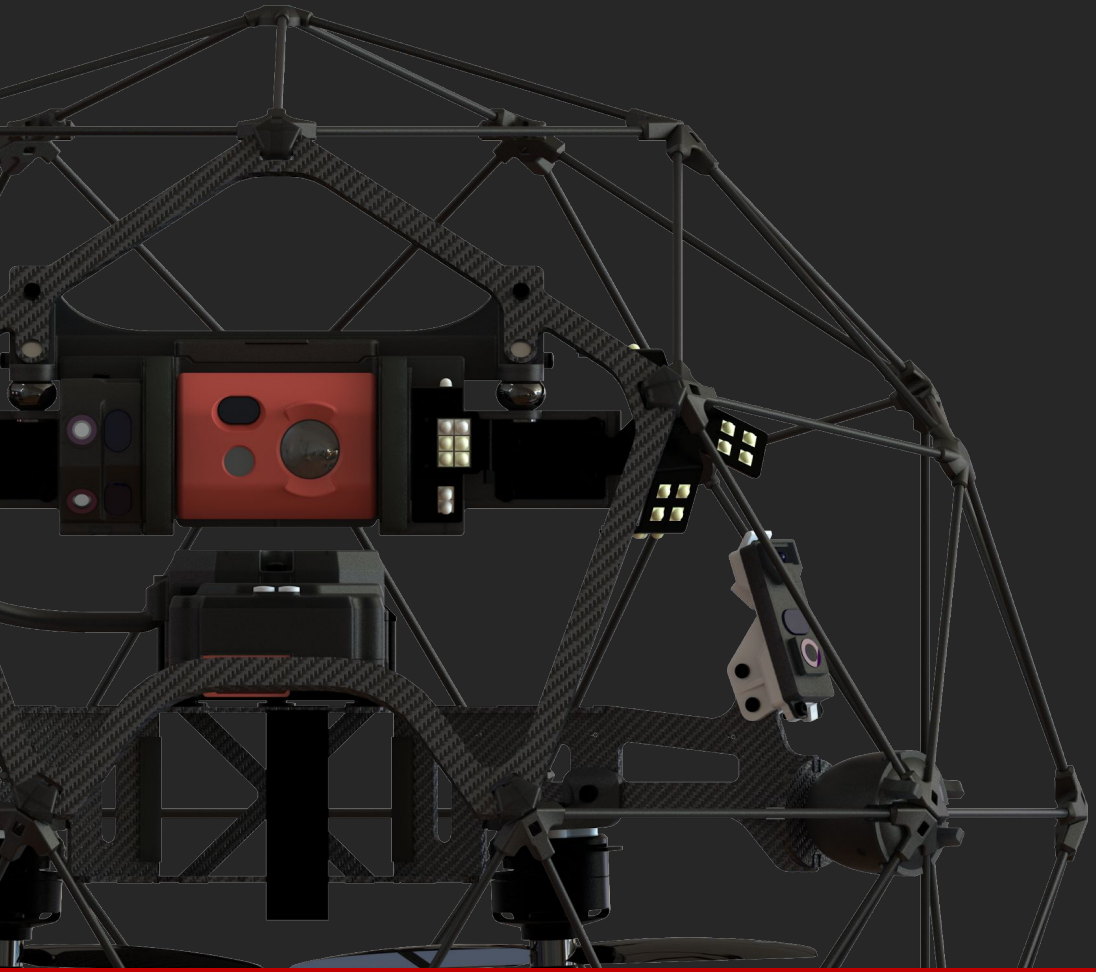


REPLAY

The recording of this webinar will be sent to you afterward.

UPCOMING WEBINARS

Tuesday April 14
11:30 AM EST / 05:30 PM CEST

How Country-of-Origin Drone Bans Impact U.S. Companies & Agencies Including Public Safety Agencies Fighting COVID-19

- Jordan Gross, Senior Government Relations Lead at DJI
- Romeo Durscher, Senior Director of Public Safety Integration at DJI

Tuesday April 21
10:30 AM EST / 04:30 PM CEST

3D Modeling with Indoor Drones: Applications and Implications

- Andrew McIntyre, Technical Trainer and mapping expert at Pix4D
- Marc Gandillon, Head of Marketing at Flyability

Wednesday April 22
10:30 A.m. EST / 04:30 PM CEST

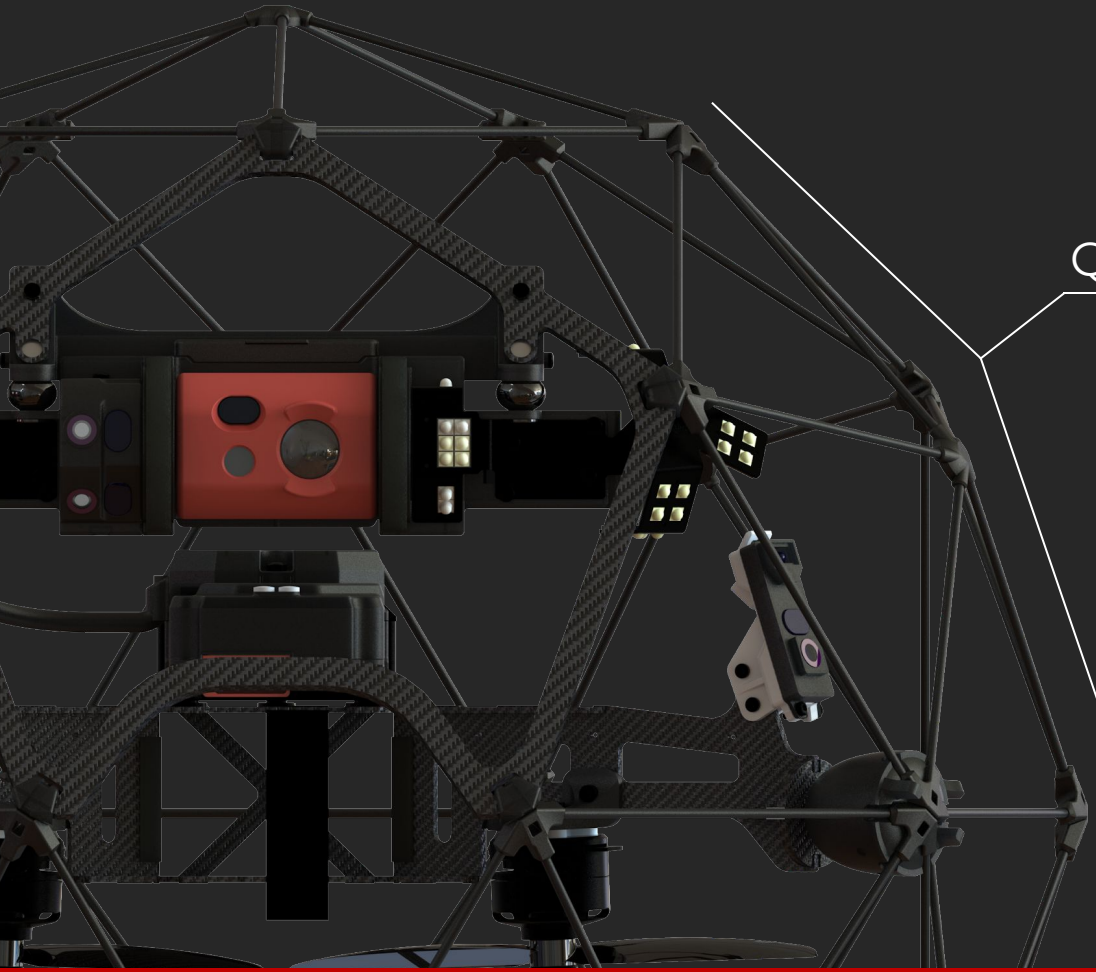
How to Build and Scale a Drone Program at Your Company

- Calvin Rieb, Head of Global Unmanned Systems at Cargill

https://www.flyability.com/news/user-conference-webinars

AND A LOT MORE

Examples of use case of indoor 3D modeling
How Indoor Drones Are Being Used in Oil & Gas
How Indoor Drones Are Being Used in Mining
How Indoor Drones Are Being Used in Power Generation
How Indoor Drones Are Being Used in Chemicals



Q&A

You can also send your questions to:

Suzanne Lemieux, API - LemieuxS@api.org
Luis Pulgarin, ASME - PulgarinL@asme.org
Alexandre Meldem, Flyability - ame@flyability.com
Johan Mlouka, Flyability - jm@flyability.com