New Applications for Unmanned Aircraft Systems

Dr. Brandon Stark, Director
Unmanned Aircraft System Safety
University of California



Center of Excellence on

Unmanned Aircraft System Safety

Mission Statement

The Center of Excellence on Unmanned Aircraft System Safety provides system-wide expertise, support and training for regulatory compliance, risk management and the safe operation of Unmanned Aircraft Systems, commonly known as drones, across the University of California system.

UNMANNED AIRCRAFT SYSTEM SAFETY

Policy Development

- Compliance with Federal, State, and Local Laws
- Long-term Policy development and assessment
- Guidance on local enforcement

Risk Management

- Fleet management for monitoring and assessing UAS usage
- Data collection for safety metric assessments

UAS Operations & Authorizations

- FAA Authorization Services
- Hazard & Risk Identification
- Flight Operation and Management Support

Brandon Stark, *Director*
E: bstark2@ucmerced.edu
W: uassafety.ucmerced.edu

Overview

- Getting started with Drones
- Drone Regulations
- Safety Guidelines
- What's on the horizon?

Getting started with Drones

- Identify why you want to use drones
  - Be clear with your data goals
  - Find a drone that meets your budget
  - Determine whether you could operate a drone at the location
- Purchase and register your drone
- Obtain a Part 107 license
- Identify any additional authorization or permits
- Obtain Drone Insurance
- Practice, Practice, Practice
- Have fun!

Where are we seeing Drones?

Engineering

Field Research

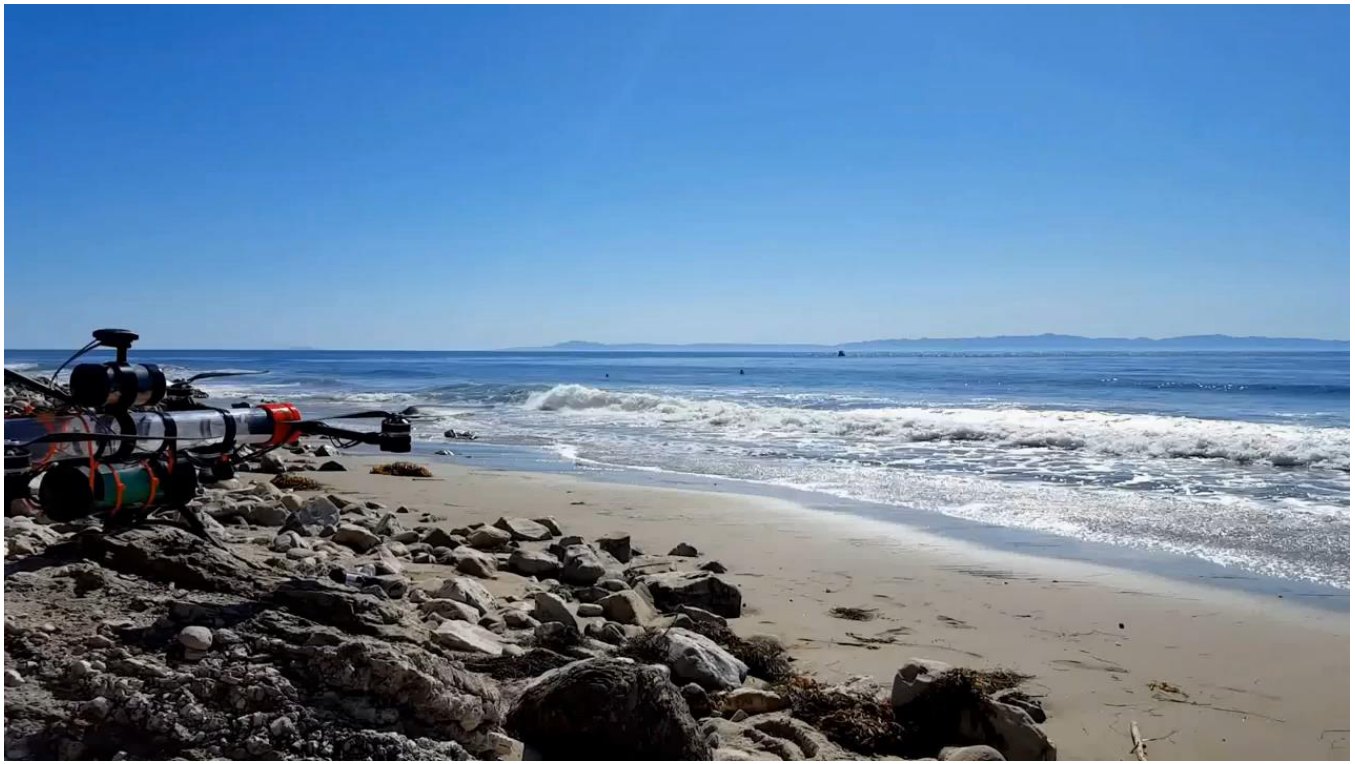
Students

Visitors

Film & Media

Campus Facilities

Water Sampling



UC Santa Barbara

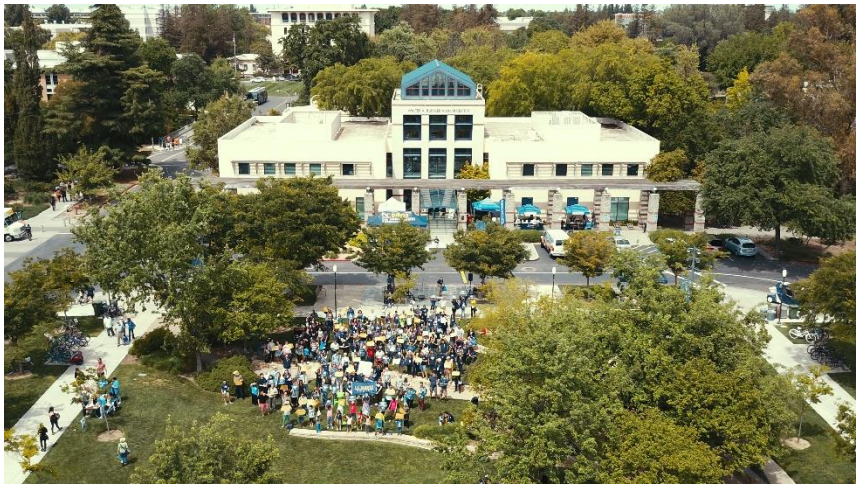
Palm Tree Inspections

UC Riverside

Dorm Inspections

UC San Diego

Other Drone Activities



Drone Service Providers

- New drone startups offer a specific service

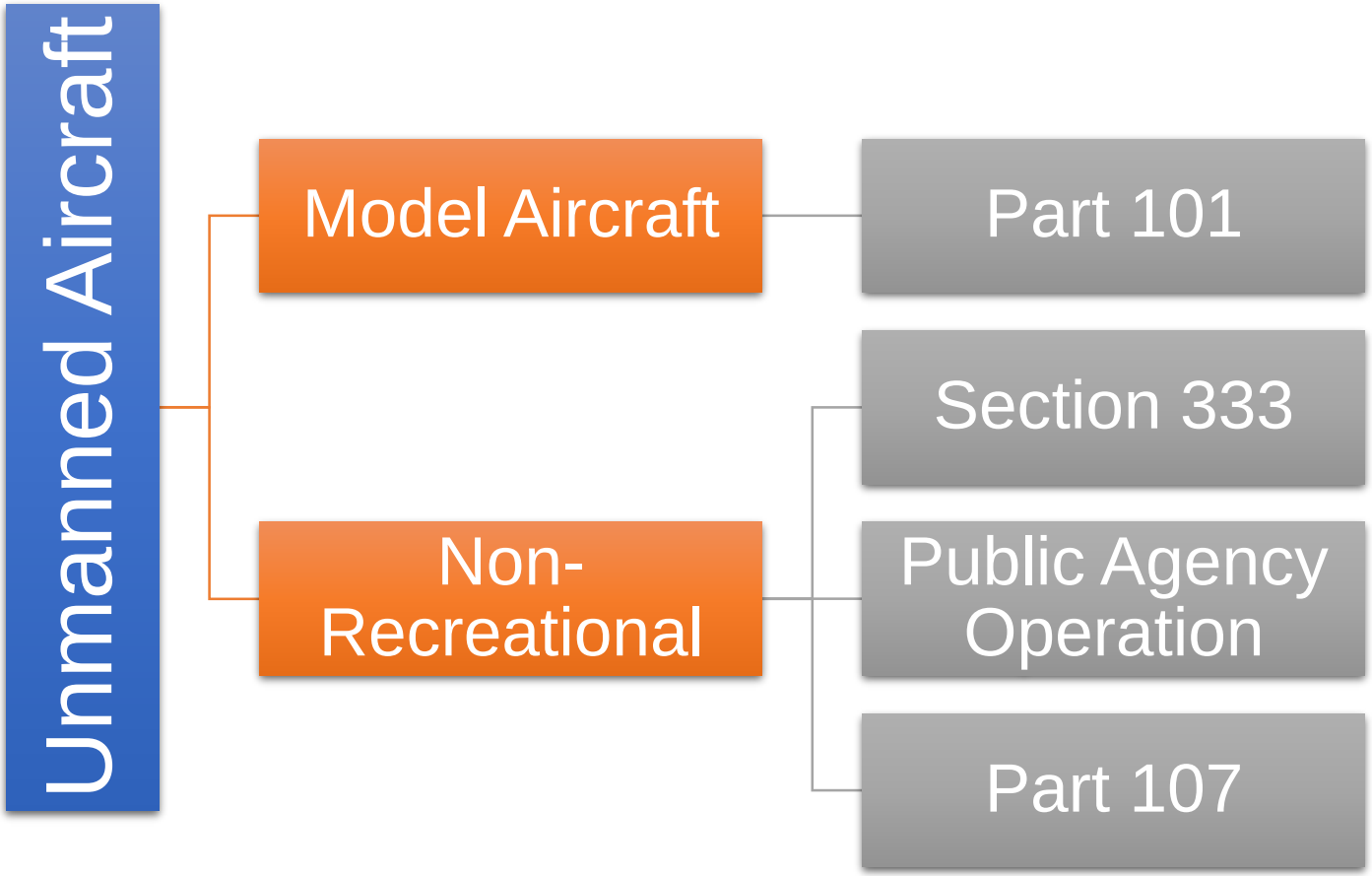
- Common Services
  - Aerial Cinematography
  - Real-Estate Marketing
  - Mapping or Surveying
  - Crop or Environmental Monitoring

Drone Service Connectors

- Some companies exist to connect ‘qualified’ operators or services to it’s customers

- Drone Pilot Database
  - DroneConnector
  - Dronemeisters
- Drone Service Connector
  - DroneBase
  - Measure

Drone Regulations - US



Am I exempt from Regulations?

Model Aircraft

- Must be for recreational purposes only
- Must be flown within Visual Line of Sight
- Must follow community-based set of safety guidelines
- Must notify every airport within 5 miles
- Cannot receive money or compensation
- Cannot be used in furtherance with a business or official duty regardless of compensation

Non-Recreational

- Everything else

AMA®
ACADEMY OF MODEL AERONAUTICS

Education

- “A student may conduct model aircraft operations in furtherance of his or her education at an accredited educational institution.” – FAA, May 4th, 2016

- This applies to students in
  - Traditional Coursework
  - Art/Media/Film Classes
  - Senior Projects
- It does not apply to
  - research for credits (undergraduate or graduate)
  - work for credits

UAS Regulations

14 CFR 107

- Everything
  - Commercial
  - Research
  - Recreation
  - Public Agency
- Aircraft must be under 55 lbs
- Pilot must have a Drone Pilot License

Public Agency Operations

- Only for
  1. public agencies with
  2. public aircraft for
  3. public purposes
- Public Universities – OK
- Public Purposes
  - Law Enforcement
  - Search & Rescue
  - Biological and Natural Resource Research
  - Aerospace Research

14 CFR 107 - SUAS

- Requires an FAA license
- Requires an SUAS Registration Certificate
- May require Airspace Authorization

NO DRONE EXPERIENCE NEEDED

- Knowledge on how to operate small UAS is not part of the exam nor a prerequisite

14 CFR 107 – SUAS Regs

- Under 55 lbs
- Under 400 ft AGL*
- No flying over people*
- No flying beyond visual line of sight
- No flying at night*

Recreational vs Part 107

Recreation

- Individual recreation
- Coursework
  - Includes Senior Projects*
- Recreational club activities
  - Drone Racing
  - Drone Demos
  - Drone Photography

If it is plausible that someone would pay for a UAS to do it, then it is not

Part 107

- Research projects
- University business
  - Promotional Filming
  - Facility Management
- Commercial activity
- Club activity where SUAS is providing a service
  - Drone filming a club event
  - Drone delivery

FAA Regulatory Jurisdiction

- All FAA regulations apply to anywhere reachable to the sky
  - Includes in between buildings, below the trees, under 5 ft
  - Does not include inside a building, inside a cage, inside a fully enclosed net
- Model Aircraft – The FAA cannot create new regulations for model aircraft
  - Does not mean model aircraft cannot be regulated.
  - Congress, state, local agencies can still create regulations

State/Local Laws

- FAA has jurisdiction of the air
- State and Local powers have jurisdiction of the ground

- Most states also have drone regulations
  - No ‘complete’ database
  - https://jrupprechtlaw.com/drone-laws-state

Example State Laws

- Florida
  - No city may enact or enforce an ordinance related to unmanned aircraft systems (exception – nuisance, voyeurism, harassment, etc)
  - Law Enforcement may not use a drone to gather evidence
- California
  - Paparazzi laws apply to drones
  - Emergency responders are not liable if they damage a drone during the course of an emergency situation
- Minnesota
  - All UAS must be registered with the state
  - Insurance is mandatory

Common Violations

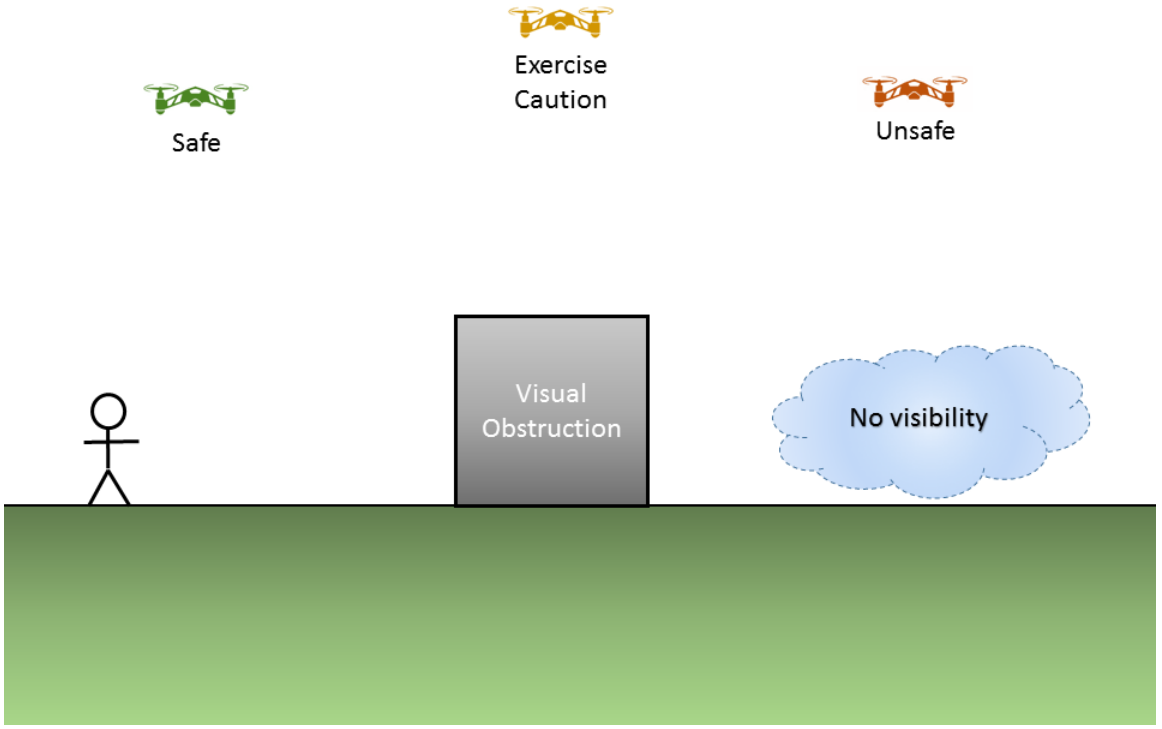
- Visual Line of Sight Operations (14 CFR 107.31)
- Visual line of sight is defined by being able to:
  1. Know the unmanned aircraft's location;
  2. Determine the unmanned aircraft's attitude, altitude and direction of flight;
  3. Observe the airspace for other air traffic or hazards
  4. Determine that the unmanned aircraft does not endanger the life or property of another

Visual Line of Sight

- If you can't see the sky around the aircraft, its unsafe

Visual Line of Sight

- If you can't see the ground below the aircraft, its unsafe



Common Violations

- Operation over human beings (14 CFR 107.39)
- No person may operate an SUAS over a human being unless he/she is
  - Directly participating in the operation
  - Located under a covered structure or inside a stationary vehicle that can provide reasonable protection from a falling SUAS

Operation over Human Beings

- PPE and prior notice does not absolve your operators responsibility to comply with 14 CFR 107.19 (c) or 14 CFR 107.39.

Airspace Authorization

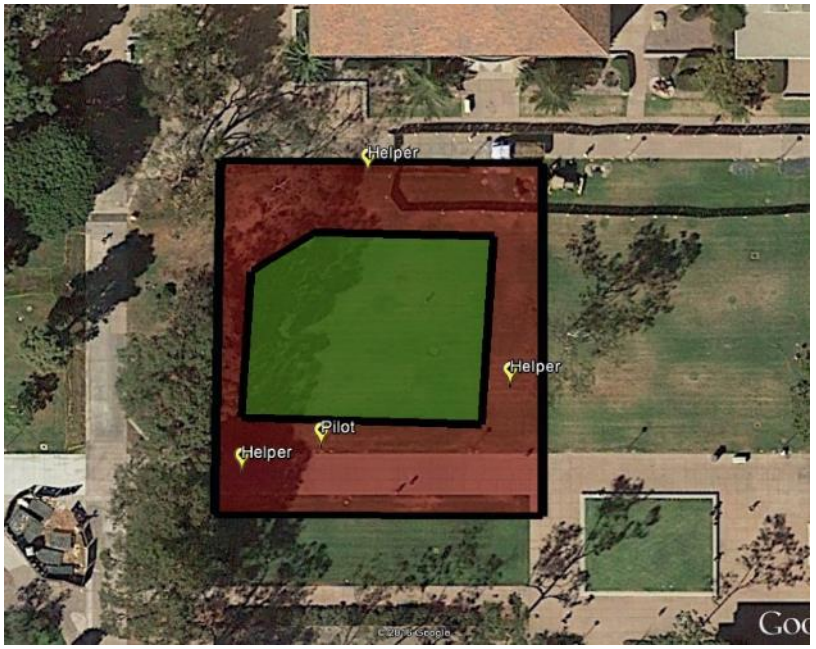
- SUAS operations in controlled airspace requires a COA (Form 7711)
  - Airspace Authorization (14 CFR 107.41)
  - Airspace Waiver (14 CFR 107.200)
- Approval from ATC or the airport manager is not sufficient

Temporary Flight Restrictions

- No SUAS may be operated within a TFR
  - Falls under 14 CFR 91 (applies all aircraft)
- Permanent TFRs
  - White House, Disneyland, Disneyworld, etc
- Sports TFRs – No flying within 3nm, under 3000 ft and within 1 hr of the start time to 1 hr after.
  - Baseball games (Angels Stadium, Padres, Giants)
  - Football games (Cal, UCLA)

Safety Guidelines

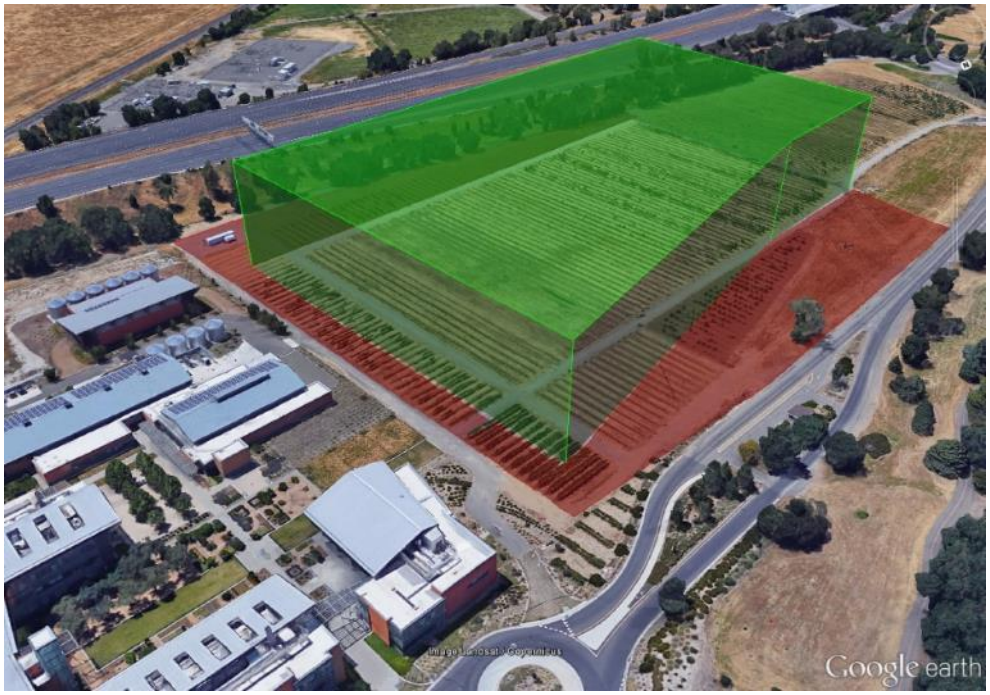
- Incorporate visual observers and supporting ground crew
  - Maintain situational awareness of intruding traffic (including pedestrians)
  - Maintain focus on the mission, not answering questions for onlookers



Drone Presentation Demo in public quad – UC Santa Barbara

Safety Guidelines

- Plan for operational safety buffers
  - Good rule of thumb – ¼ of flight altitude
  - Extra space near busy roads or intersections

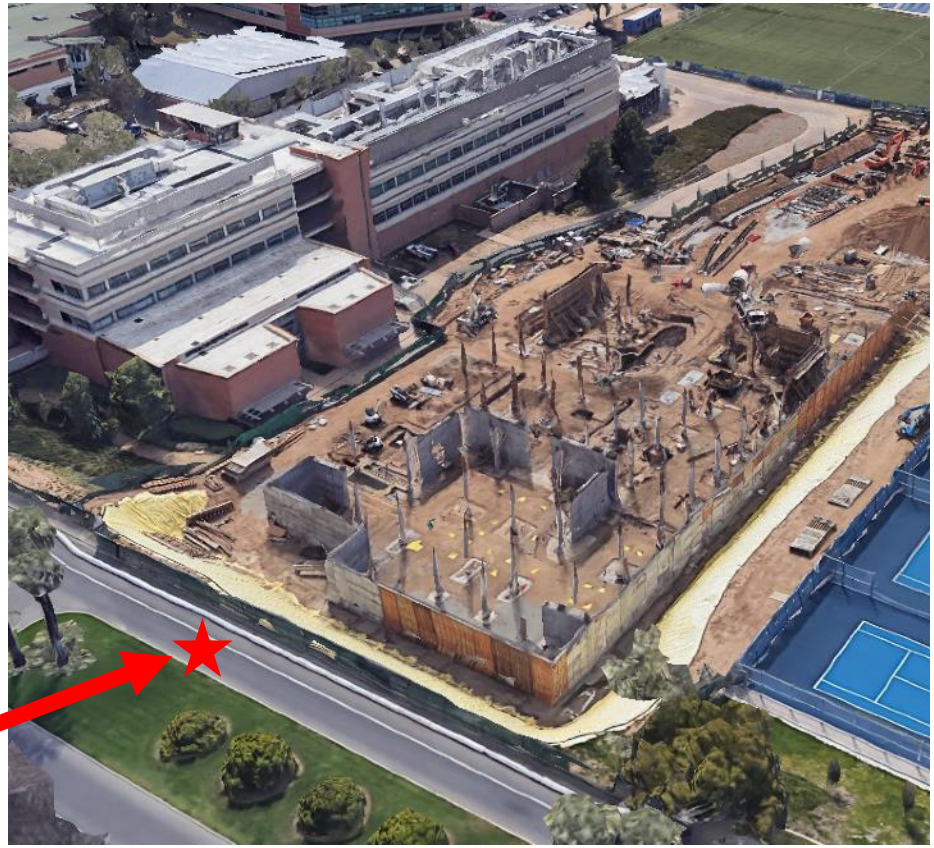


UC Davis Demo – Fully loaded S1000 in front of donors and senior administration

Safety Guidelines

- Road Safety
  - Avoid causing distractions and causing secondary accidents
  - Place support crew for emergency retrieval

Place support on the other side of the fence



Construction site at UC Riverside – proposal reviewed 6/28/2017

Privacy & Operations in Public

- Opinion on SUAS usage varies dramatically
- Avoid the perception of invasion of privacy
- Act professional
- Follow ‘Good Neighbor’ guidelines

Dorm inspection at UC San Diego

FAA Extension, Safety and Security Act of 2016

- FAA was instructed to develop regulations regarding the remote identification of Unmanned Aircraft Systems
- Conduct pilot projects for counter UAS technology and UAS Traffic Management
- Mandate inclusion of safety information with small UAS sold in the US
- Establish a $20k find for interfering with wildfire suppression

July 15, 2016 – Prior to the release of Part 107

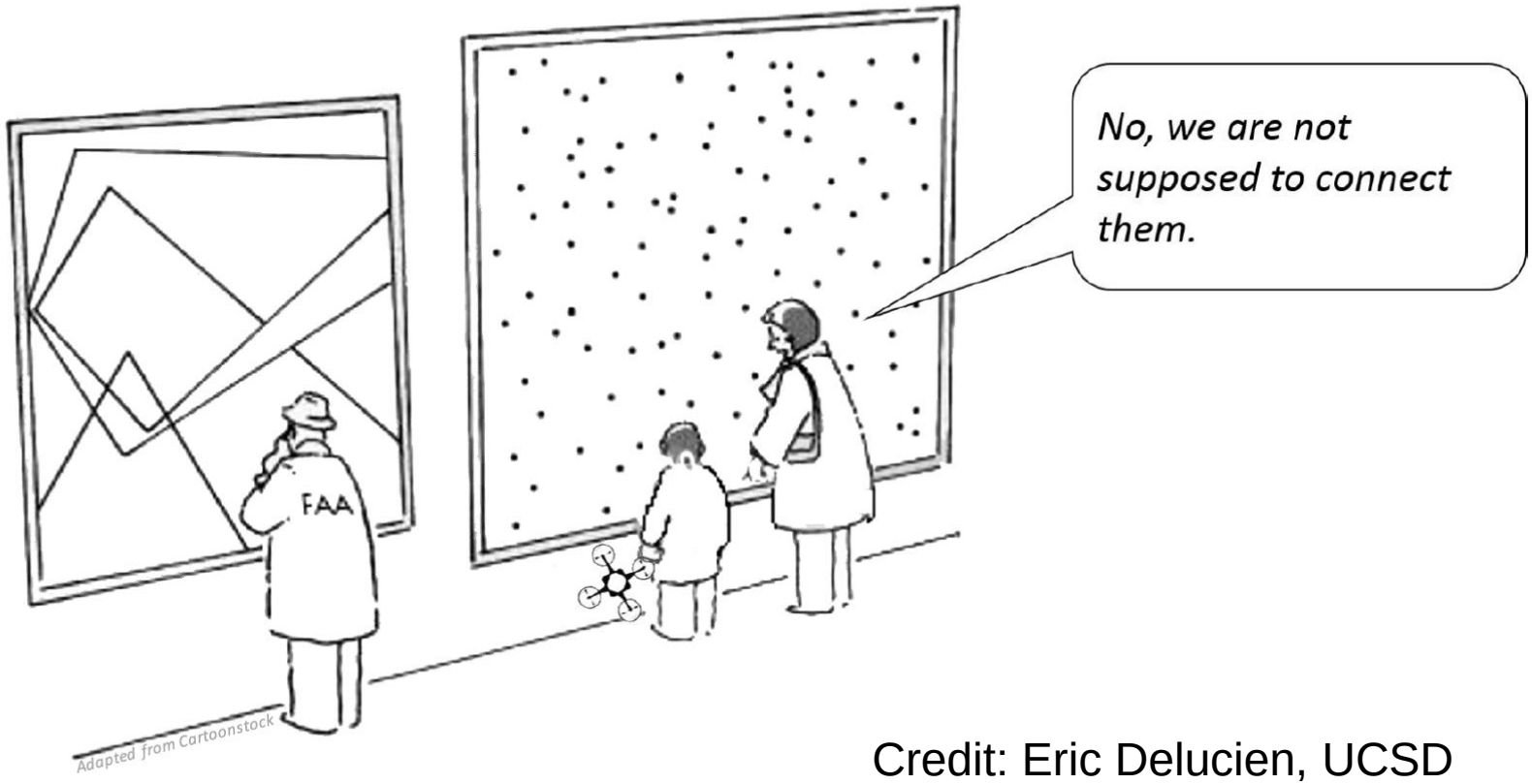
UAS Identification and Tracking

- Goal
  - Identify, categorize and recommend available and emerging technology for remote identification and tracking of UAS
  - Identify the requirements for meeting the security and public safety needs
  - Evaluate the feasibility and affordability of available technical solutions
- Deadline October 31, 2017

Legislative Actions

- FAA Authorization Act 2017 - (Air Traffic Privatization Act)
  - Proposed bills contain new regulations for UAS
- Other Proposed Bills
  - Drone Federalism Act
  - Drone Privacy Act
  - Drone Innovation Act
  - Safe Drone Act

The Future of Drone Regulations



Credit: Eric Delucien, UCSD

Center of Excellence on

Unmanned Aircraft System Safety

For more information

Email: bstark2@ucmerced.edu
UASSafety@ucmerced.edu
http://tinyurl.com/UC-UAS-COE
http://uassafety.ucmerced.edu/

Facebook page:
https://www.facebook.com/UC.UAS.Safety/

Phone: (209) 201 - 2051

Please sign up for the UC UAS Listserves if you'd like to be kept in the loop of the latest developments

Other Presentations:

UAS Safety Management System
SUAS Remote Pilot Certificate Exam
Drones for Student Clubs
Drones for Researchers
Drones for Staff