

# **Aviation = Aircraft + Airspace**

## *Consumerizing Airspace*

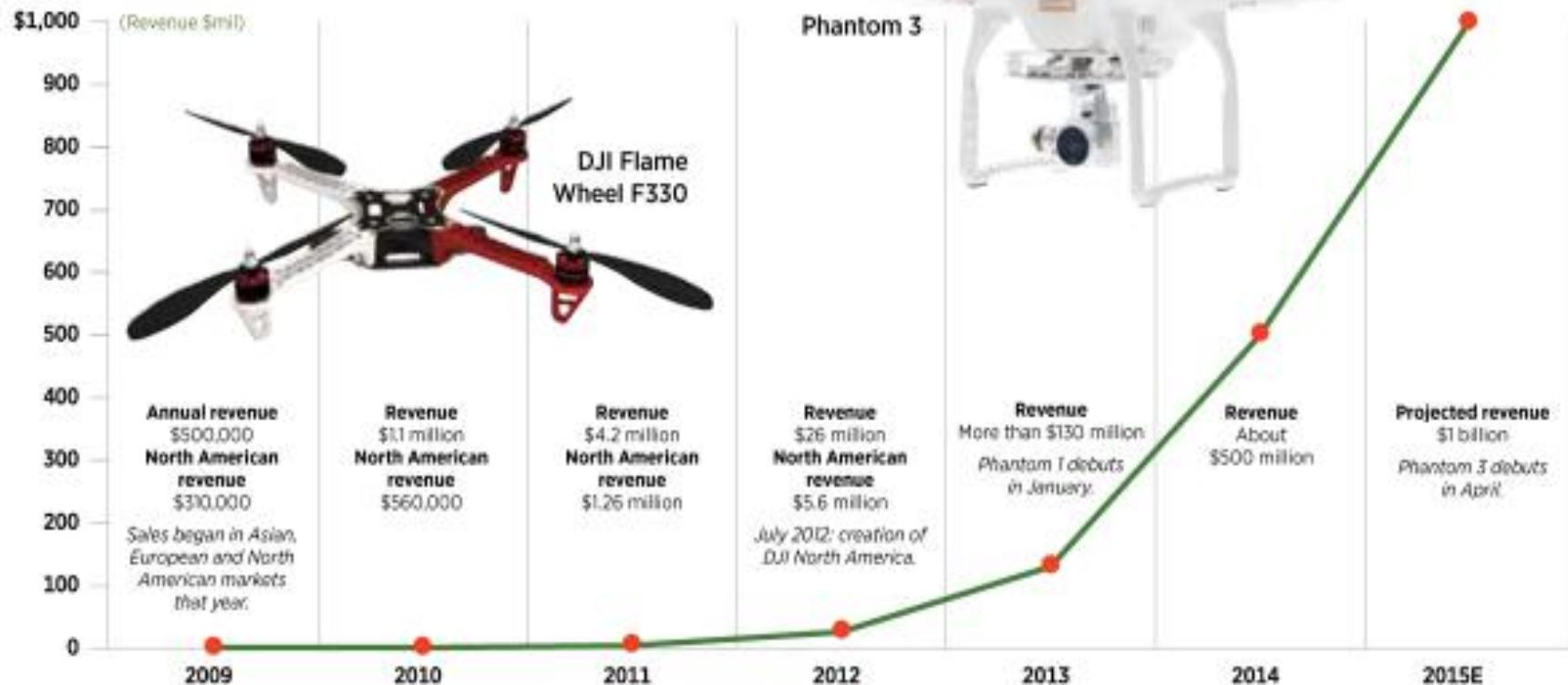
Raja Sengupta, Professor  
University of California, Berkeley

# Consumerization!

## Aircraft not Airspace

### PROPELLERS ARE SPINNING UP

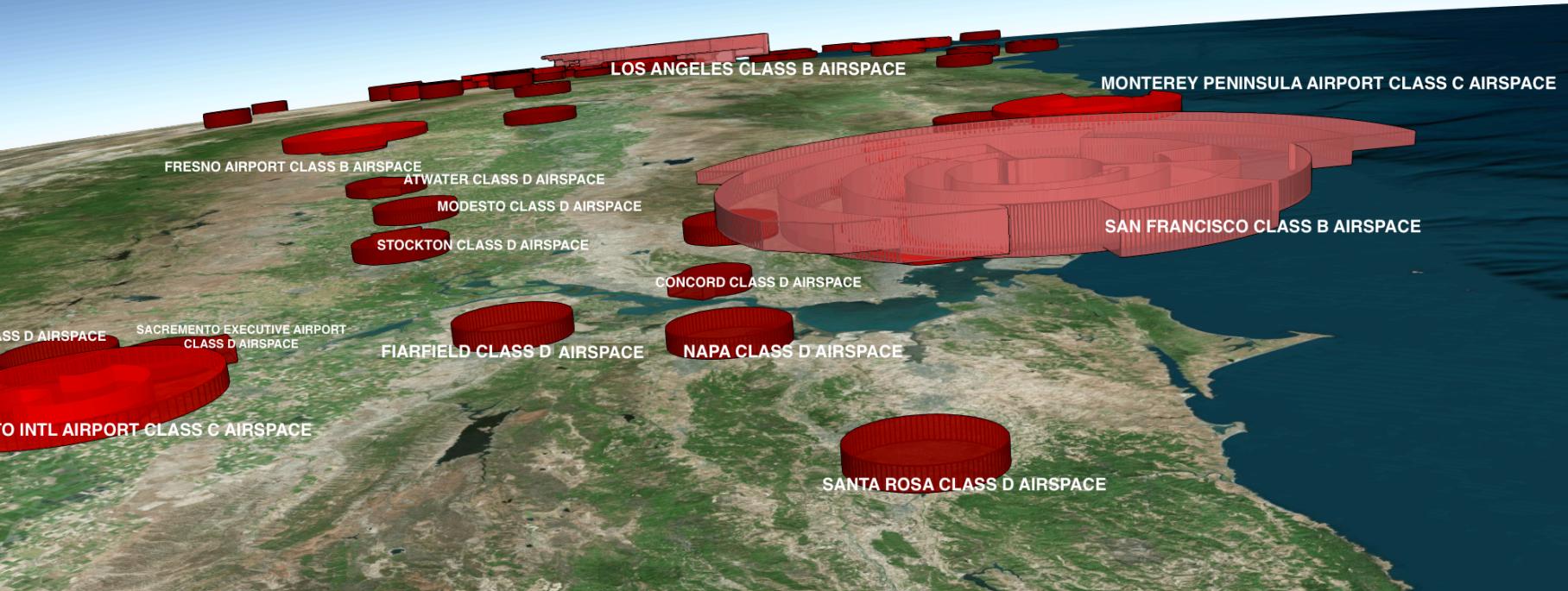
DJI came from out of nowhere (a Hong Kong dorm room, actually) to become one of China's few global consumer technology brands.



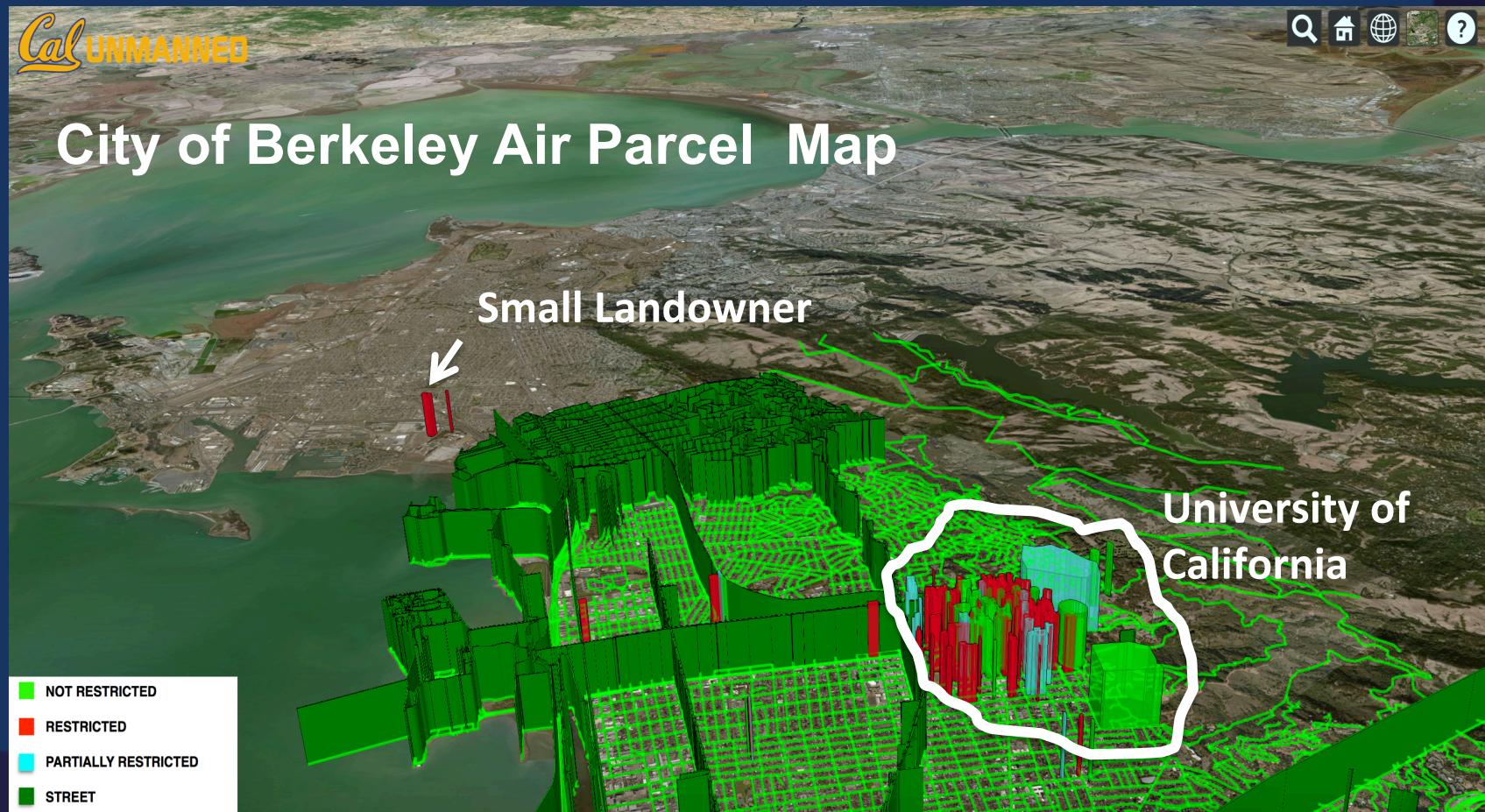
# The Air Parcel Idea, mid-2014

## Berkeley Airspace Platform

3D, Holds the NAS Airspaces



# Based on Land Parcel Maps - County Assessors Office Extruded to Air Parcels



# Landowners, Cities, and States want to open their airspace for business ...

- Agribusiness
- Utility Companies
- Powerline Inspection
- Oil & Gas ocean exploration, pipeline inspection
- Movie Studios

*But with part 333 exemptions instead of focusing on empowering owners of airspace, the FAA focused on licensing drone operators.*



**... and Pay to Secure it.**

**Who flies on my property?  
*Berkeley Drone license plate***

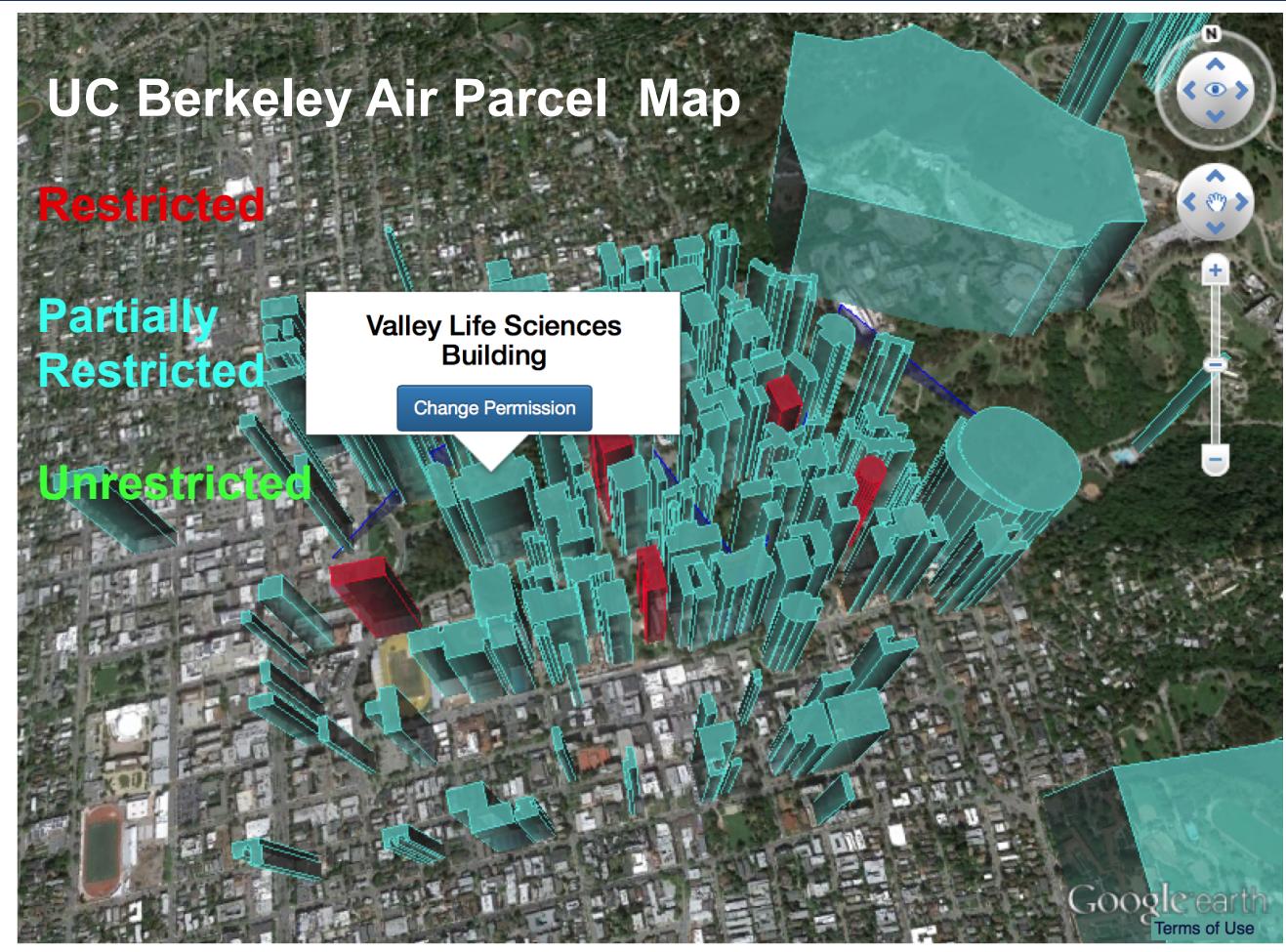


# The Aviation Business = Aircraft + Airspace

As of March 2015, the FAA is moving to empower the owners of Airspace

*“ All operations shall be conducted over private or controlled-access property with permission from the property owner/controller or authorized representative. Permission from property owner/controller or authorized representative will be obtained for each flight to be conducted.”*

# Designed for Property Managers to Open or Close Airspace



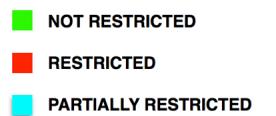
# Useful to Drone Operators

## Enter an Address, Enter a Flight Plan

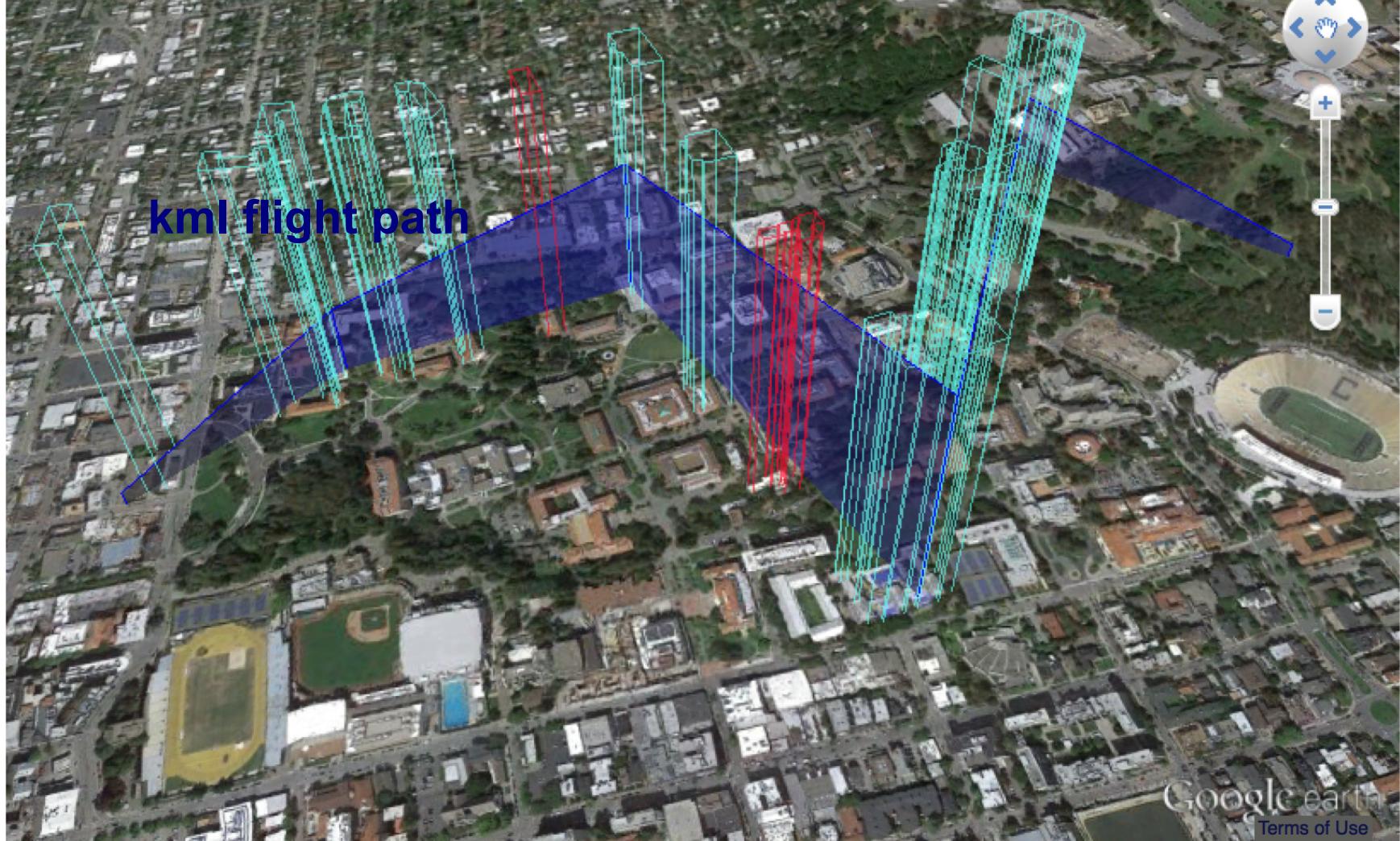
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564 Oak Street → Landowner rules  
Newark,  
CA  
USA → City rules  
→ County rules  
*Intersection  
of polyhedra* → State rules  
→ FAA rules

CITY	
Permission	Not restricted
Authoritative Postings	
Non Authoritative Postings	
Post Authoritative	Post Non-Authoritative!
FAA: Moffett Federal Airfield	
Permission	Restricted
Authoritative Postings	
Non Authoritative Postings	
FAA: Palo Alto Airport of Santa Clara County	
Permission	Restricted
Authoritative Postings	
Non Authoritative Postings	
COUNTY: Alameda	
Permission	Not restricted
Authoritative Postings	
Non Authoritative Postings	



# Useful to Drone Operators *Where can I fly?*

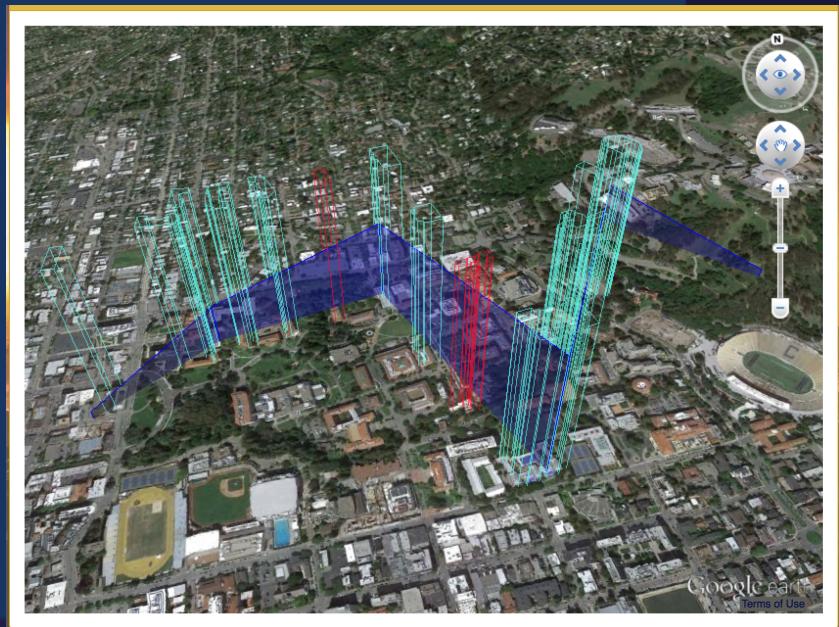


# Each there for the other

I am a Property Manager.  
**Manage my Air**



I am a Drone Operator.  
**Where can I fly?**



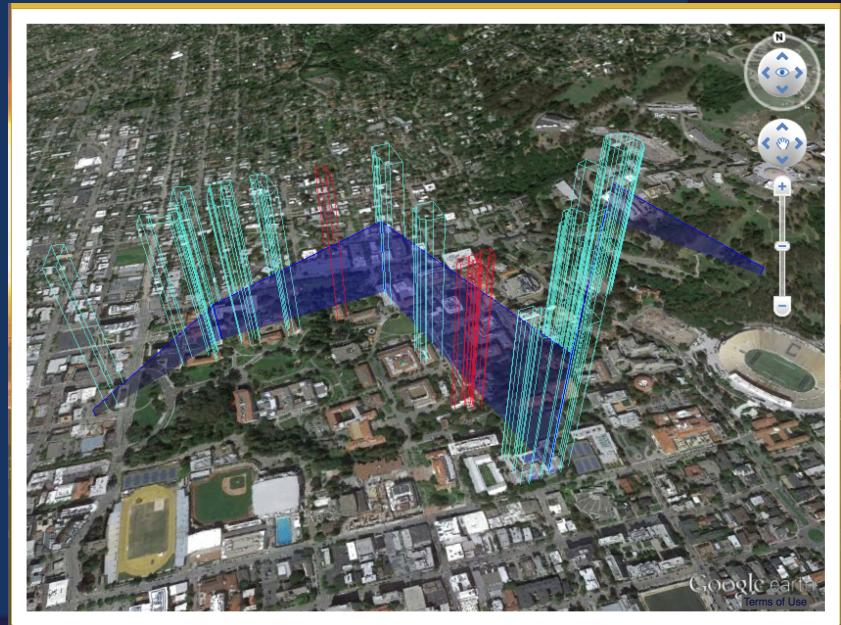
# A Facebook of the Air

## *Eyeballs, Eyeballs, Eyeballs*

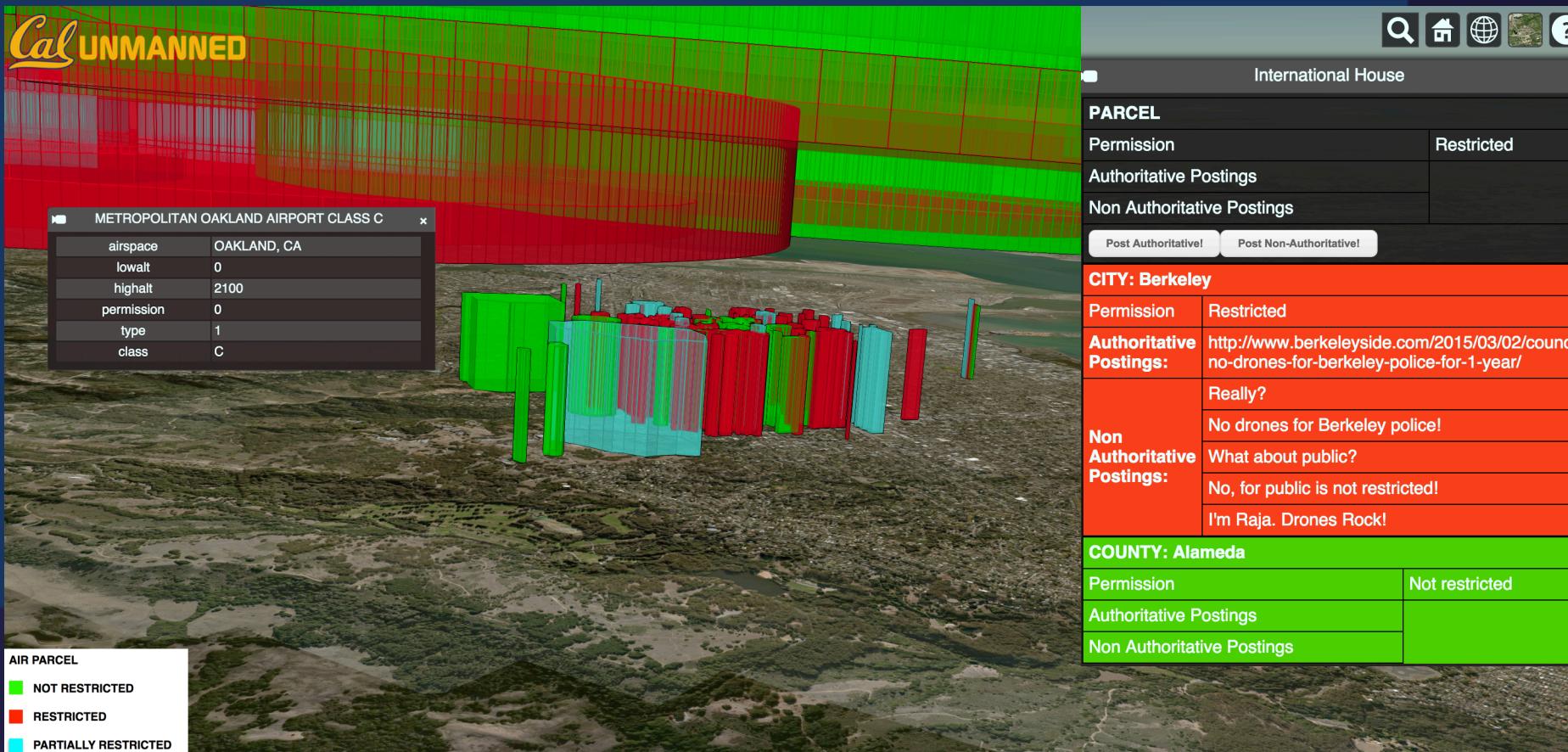
I am a Property Manager.  
**Manage my Air**



I am a Drone Operator.  
**Where can I fly?**



# Holds the High NAS and Low NAS



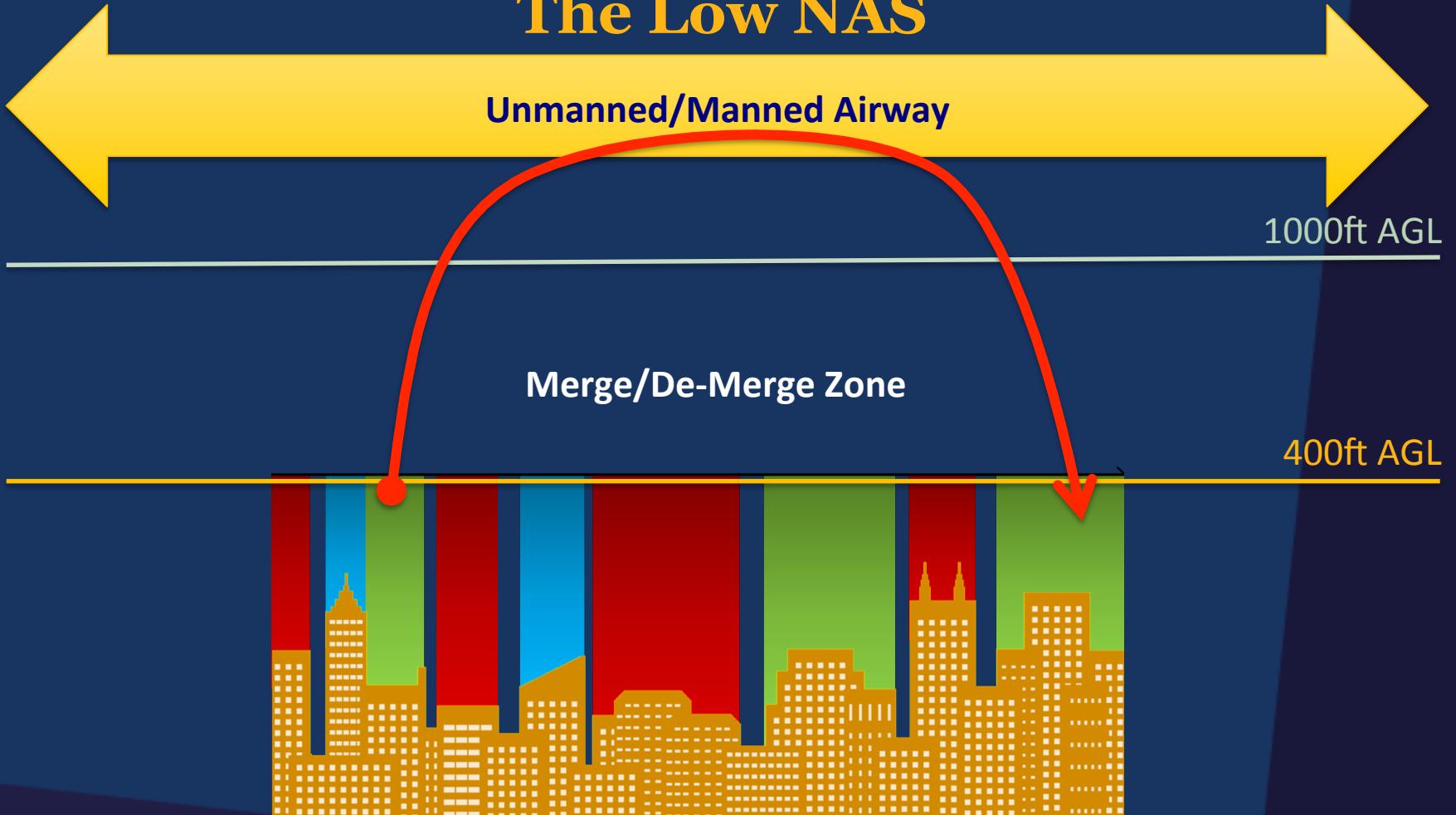
# The Low NAS : 10 to 20 mile flights of the future

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Berkeley Airway Planning Tool  
Estimated paths from Amazon  
Center to Bay Area Cities



## Generation 2: The Low NAS



# Disrupting the ATM Business Order of Growth: 10 x 10

## The FAA's NAS Today

- 220,000 registered aircraft
- 87,000 flights per day
- 20,000 airports
- 15,000 Controllers

Berkeley  
UNIVERSITY OF CALIFORNIA

## The Business Tomorrow

- 20 million registered aircraft
  - Sales: 200,000/month
- 2.5+ million flights per day
  - 10% of UPS/FedEx
- 125 million airports
  - 125 million homes
- Managed by 1.5 million Air Traffic Controllers?

# Points of Reference

250,000  
Registered  
Aircraft



90 million  
Laptops  
sold



250 million  
Registered  
Automobiles



Drones

# Governance & Markets at Consumer Scales

## Airspace Routing Services

Jeppesens valued at 1.5 billion in 2006

Google maps valued at 37 billion (US) in 2014

## Airspace / Airway Mapping Services

FAA/ Jeppesens/Rockwell...

Costs to update low altitude obstacles, airways, regulations, etc., orders of magnitude higher

## Communication Services

FAA Spectrum, ADSB

Consumer Scale Cellular, WiFi

# Cal Unmanned Lab

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End