

CURRENT AND NEAR TERM COMMERCIAL UAS OPERATIONS



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MY TASK AND MY DISCLAIMERS

- **QUICKLY GET US THROUGH A THREE YEAR FUTURE VIEW**
- **ASSUME THAT NOT EVERYONE IS AN EXPERT**
- **DO THIS IN A NEUTRAL WAY (MY DISCLAIMERS)**

- TODAY- Definitional issues mean that there is wide degree of confusion over what one means when they refer to a “drone” (this is changing)
- TODAY- Most of the domestic drones that are driving news headlines are sUAS under 55 pounds, and in fact most are under 5 pounds



- \$15-30 million
- Pilot and camera operator
- At least 3 ground crew members
- Lengthy logistics tail



- \$1,300-\$40,000
- Enhanced RC helicopter





**TODAY
THROUGH
2018**



Capability Timeline



WHY DRONES?

SAFETY

- REMOTELY PILOTED
- CAN ACCESS HARD TO REACH PLACES
- VANTAGE POINTS
- INSURANCE LESS COMPLEX
- EASIER TO OPERATE

COST

- MORE ACCURATE IMAGERY AND DATA THAN GROUND BASED SENSORS
- RESULTS AVAILABLE SAME DAY AS COMPARED TO SATELLITES WHICH MAY TAKE WEEKS
- INCREASINGLY CAPABLE FLIGHT ENDURANCE
- ACTIONABLE DATA REDUCES EXPENSES

5 MOST POPULAR USES OF DRONES

Number of permits issued:



SOURCE: Association for Unmanned Vehicle
Systems International
George Petras, USA TODAY



TODAY

CAPABILITIES LARGELY FOCUSED ON GATHERING IMAGERY FROM ABOVE

**TODAY CONSUMER/COMMERCIAL
LINE IS NOT A CLEAR LINE**



Lockheed Martin	Draganfly	Lehmann Aviation	Boeing Insitu
Indago	X6	LP960	ScanEagle
4.8 lbs	2 kilograms	1.25 kilograms	22 kilograms
45 minutes	~20 minutes	25 minutes	24-28 hours



**TODAY WE ALREADY SEE AERIAL
IMAGING CAPABILITIES IN USE**



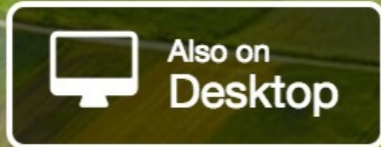
83 feet



400 feet



Instant Aerial Data for Agriculture





3D TERRAIN MAPPING

PLANT HEIGHT

WEED DETECTION

PLANT COUNTING

CANOPY COVER

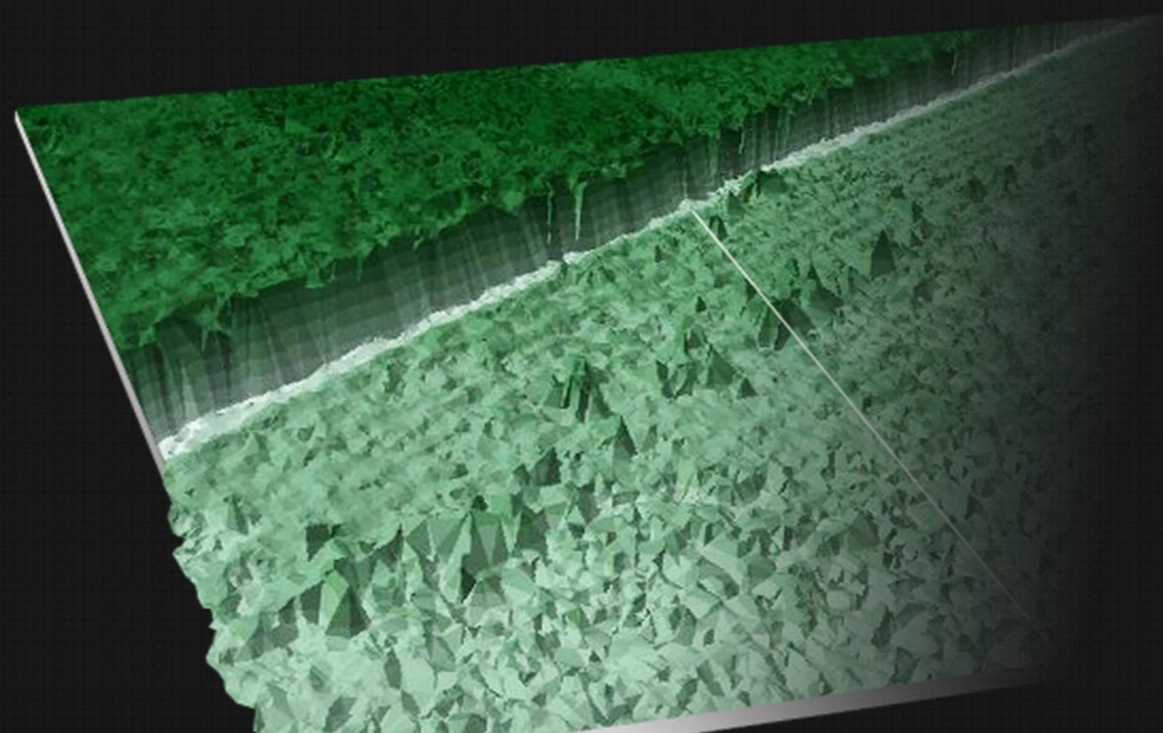
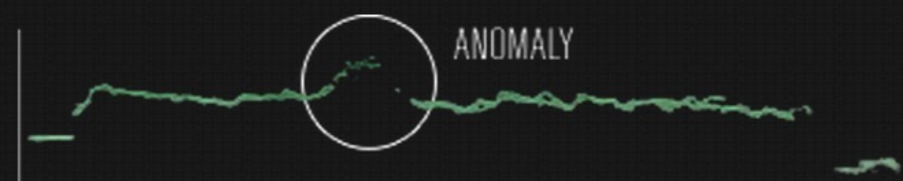
CROP HEALTH INDEXES

SEASON MONITORING

WEED DETECTION

Another benefit of 3D data is the ability to see anomalies in the field commonly associated with weeds.

AUTOMATED ANOMALIES
DETECTION



PRECISIONHAWK

AND INSPECTING CAPABILITIES









Capability Timeline



Capability Timeline



Entertaining/ Recording

- Toys
- Hobbyists
- Aerial Photography

....2014

Protecting/ Inspecting

- Military
- Public Safety
- Wildlife
- Oil Rigs/Wind Farms
- Cell Towers
- Agriculture
- Mining
- Bridges

2015/16

Evaluating/ Managing

- Situational Awareness
- Operations Management
- Asset Tracking
- Employee Oversight
- Modeling/Mapping
- Environmental Monitoring

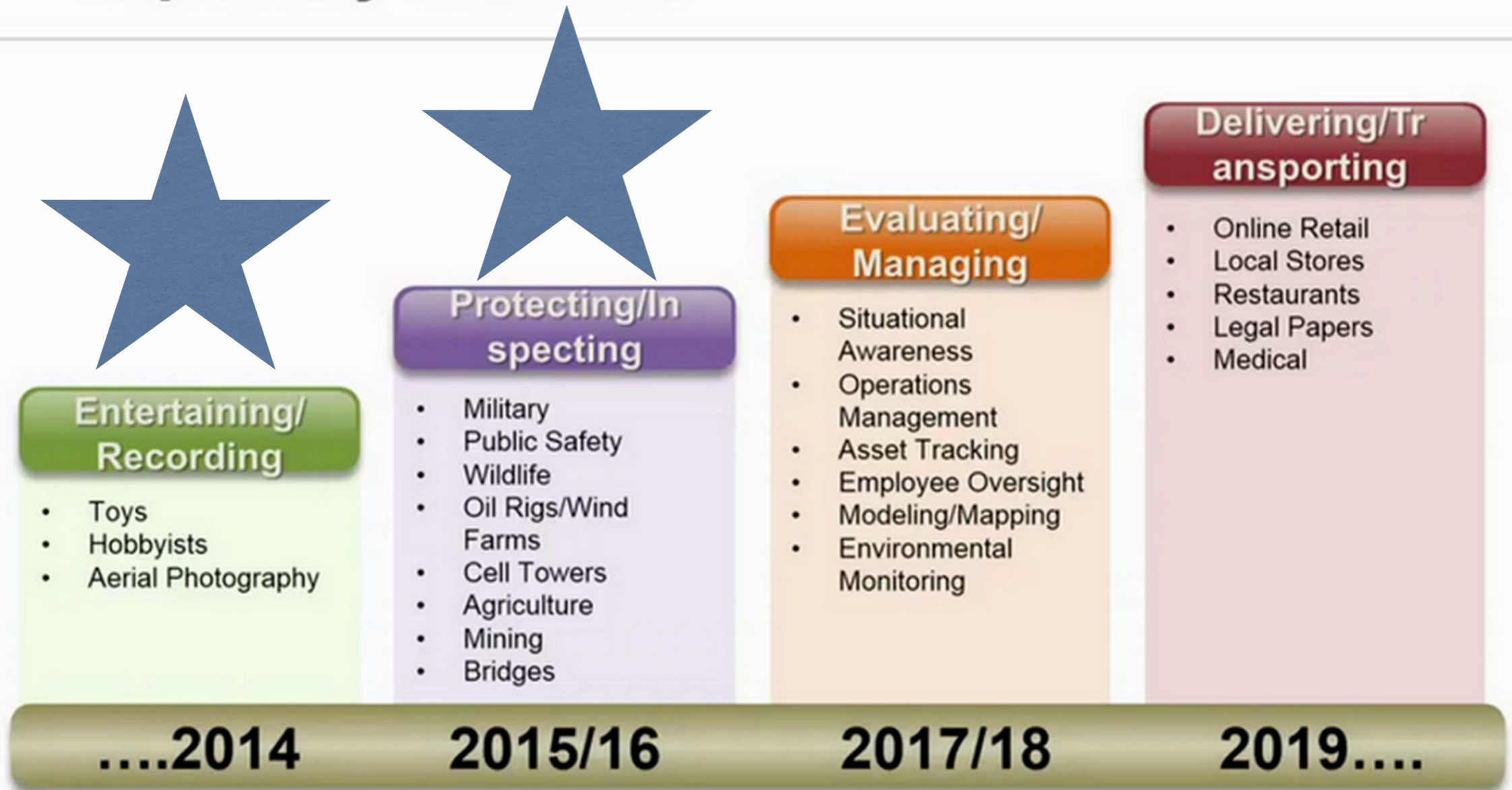
2017/18

Delivering/ Transporting

- Online Retail
- Local Stores
- Restaurants
- Legal Papers
- Medical

2019....

Capability Timeline



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2019....

DELIVERY?

AUTONOMOUS FLEETS?

LESSONS LEARNED FROM
FMRA SECTION 332 (ARCTIC OPERATIONS)
FMRA SECTION 333 (EXEMPTION PROCESS)
FMRA SECTION 336 (COMMUNITY BASED GUIDELINES)





amazon
PrimeAir

amazon
PrimeAir





Flirtay
stuff by air anytime anywhere



NOTIONAL SCENARIO

Agricultural Application

Rail Surveillance

Search & Rescue

Cargo Delivery

Low Altitude Radar

Pictures

**PORTABLE
SYSTEM**

**PERSISTENT
SYSTEM**

- **Near-term Goal** – Enable initial low-altitude airspace and UAS operations with demonstrated safety as early as possible, within 5 years
- **Long-term Goal** – Accommodate increased UAS operations with highest safety, efficiency, and capacity as much autonomously as possible (10-15 years)

