

The Sky's the Limit

Big Data, Drones, and the Internet of Things

Michigan Association of Planning Conference
Grand Rapids, MI

2018



Quantifly

Urban data analytics

The Quantifly Team



**Zachary
Halberd**

Digital Imaging
& UAS



**Dr. Javad
Roostaei**

Data Science &
Civil Engineering



**Daniel
Brooks**

Urban Planning &
Mobility



**Adrianna
Jordan**

Urban Planning &
Transportation
Engineering



GENIUSNY



INCEPTION PROGRAM



DRONES!



(AKA - UAS)



What is an UNMANNED AERIAL VEHICLE (UAV)?

UAV = the aircraft

FIXED WING VS MULTI-ROTOR

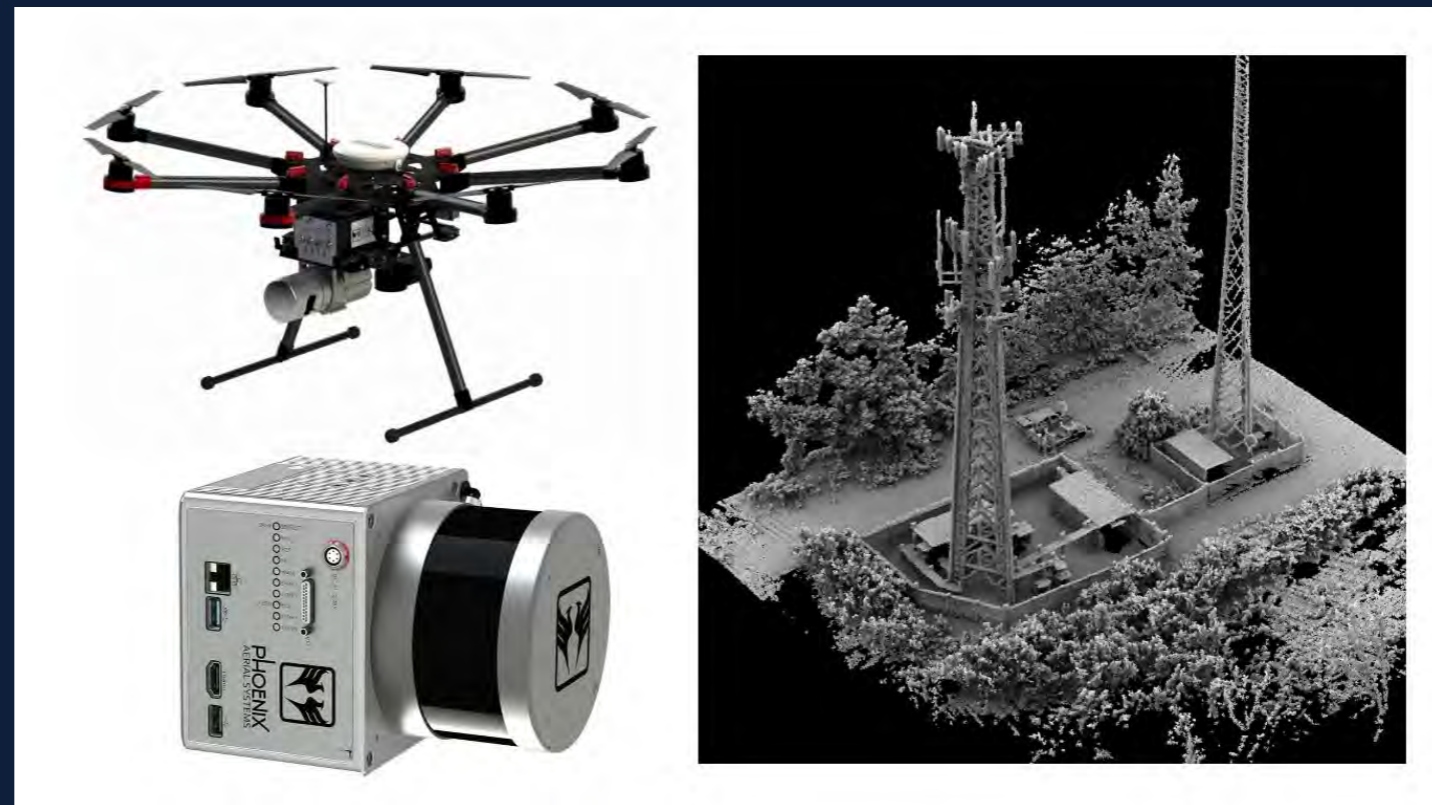
		
Projects	Mapping	Small area mapping & inspection
Applications	Land surveying (rural), agriculture, GIS, mining, environmental mgt, construction, humanitarian	Inspection, cinematography/videography, real estate, surveying (urban), construction, emergency response, law enforcement
Cruising speed	High	Low
Coverage	Large	Small
Object resolution	cm/inch per pixel	mm per pixel
Take-off/landing area	Large	Very small
Flight times & wind resistance	High	Low

© senseFly 2015



What are UNMANNED AERIAL SYSTEMS (UAS)?

- UAV (is the aircraft)
- Ground control
- Communications equipment

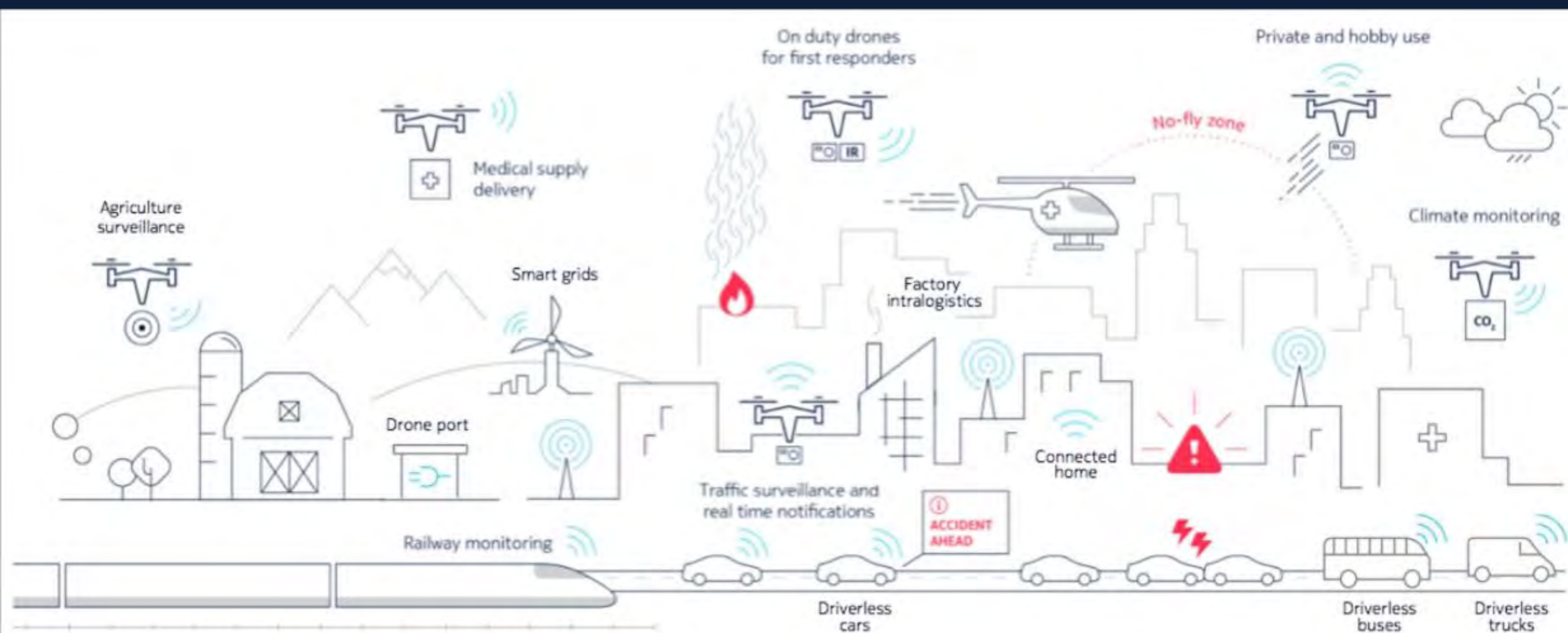


Source: phoenix aerial systems



What is the INTERNET OF THINGS (IoT)?

- IoT - The network of everyday objects that can send and receive data
- A UAV is part of the IoT. So is a cell phone or handheld GPS device.



What are some types of PAYLOADS used in urban planning work?

- Payload - the physical load carried by a UAV
- Payload Capacity - the amount of weight that a UAV can carry



How to fly UAVs legally

FAA UAS website:

www.faa.gov/uas

- Hobbyist
 - Cannot fly commercially
 - FAA Section 336 - register UAV over 0.55 lbs (\$5)
- Commercial UAV pilot
 - Classes are available, usually about \$200 or less
 - Register for FAA Part 107
 - Test requires about 2 weeks of prep + FAA \$ fee



Source: www.skyward.io

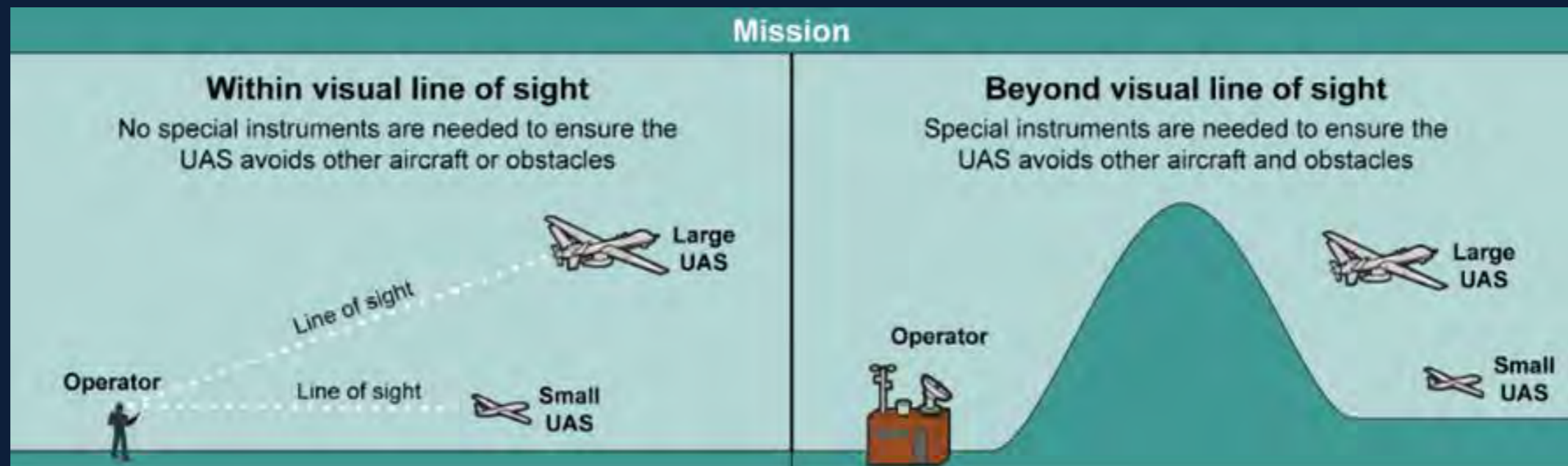


How to fly UAVs legally

For Info on Where You Can Fly:

www.faa.gov/uas/where_to_fly/

- All UAV pilots:
 - Cannot go *Beyond Visual Line of Sight* (BVLOS)
 - Cannot fly directly over people
 - Cannot fly at night
 - Cannot fly near airports, hospitals, over schools, or police and fire
 - ... or just forget everything and apply for a **waiver**



Source: GAO www.gao.gov/assets/680/671469.pdf



How to fly UAVs legally

- **Part 107 Waiver**
 - **Waivers must be specific**
 - **Submit through FAA DroneZone Portal**
 - **FAA response in 90 days**
 - **First responders may receive expedited**
 - **List of granted waivers on FAA site**
- **Public sector COA**
 - **Two Types - blanket and jurisdictional**
 - **Cert. of Authorization**
 - **Issued for specific activities**
 - **FAA response in 60 days**
 - **Good for 2 years**

Part 107 Waivers Granted

To apply for a waiver to Part 107, please complete a Part 107 Operational Waiver Application in the [FAA DroneZone](#).

Show waivers Search:

Date of Issuance	Expiration Date	Company Name	Responsible Person	Waivered Regulation
8/23/2018	8/31/2022	Avalon Park and Reserve	Kayla Kraker (PDF)	107.29
8/23/2018	8/31/2022	Wayne N Coates Jr D.B.A. Guco Internet Services	Wayne Coates (PDF)	107.29
8/07/2018	8/31/2022	MC Consultants Inc	James Marsh (PDF)	107.29
8/07/2018	8/31/2022	Paladin Drones	Trevor Pennypacker (PDF)	107.29
8/07/2018	8/31/2022	Jose Resendiz	Jose Resendiz (PDF)	107.29
8/07/2018	8/31/2022	Fly UAS AZ	Randall Eary (PDF)	107.29
8/06/2018	8/31/2022	Nicholas P Nelson Consulting, LLC	Nicholas Nelson (PDF)	107.29
8/06/2018	8/31/2022	Mose Highsmith	Mose Highsmith (PDF)	107.29
8/03/2018	8/31/2022	Jacksonville Fire & Rescue sUAS Unit	Christopher McKeown (PDF)	107.29
8/03/2018	8/31/2022	Eagle Eye Aerial Photography & Video, Inc.	Jeff Mack (PDF)	107.29
8/02/2018	8/31/2022	Josh Thompson Media, LLC	Josh Thompson (PDF)	107.29
8/02/2018	8/31/2022	Gordon Schluderberg	Gordon Schluderberg (PDF)	107.29
8/01/2018	8/31/2022	Cecil County Department of Emergency Services	Dylan Griffith (PDF)	107.29
8/01/2018	8/31/2022	The Kansas City Star	Todd Feedback (PDF)	107.29
8/01/2018	8/31/2022	National Transportation Safety Board (NTSB)	William English (PDF)	107.29, 107.51(c), 107.51(d)
8/01/2018	8/31/2022	Chris Fischer	Chris Fischer (PDF)	107.29
8/01/2018	8/31/2022	Hiroyuki Murakami	Hiroyuki Murakami (PDF)	107.29

Source: www.faa.gov



Privacy Rights & Ethics

The national airspace is a federal jurisdiction.

Legally, no one can tell you not to fly.

Obey local police, security, and/or landowner anyway.

Federal law

- Prohibits sharing or divulging of public info w/o the prior consent of concerned public
- Strict adherence to cyber security protocols

Michigan Law

- No hunting with a drone (sorry)
- No bothering a hunter with a drone
- No bothering people with a drone
- No infringing on people's privacy



Source: www.newsok.com



Privacy Rights & Ethics

Aerial imagery best practices

1. Block it out if unsure
2. Always block/blur people and license plates
3. What about private street addresses?



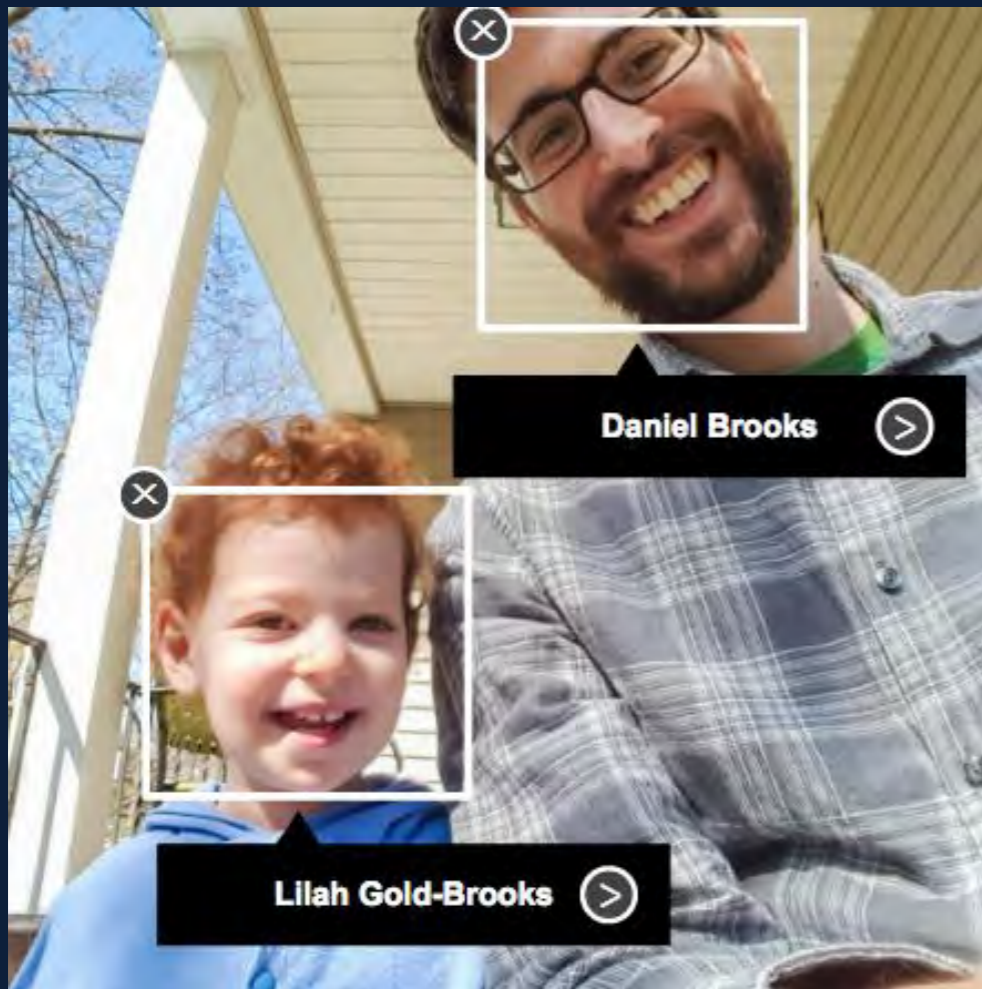
Source: Google maps

If you're not sure - general rules of thumb

1. Consult legal council
2. When practical, inform the public in advance of a flight or flight series
3. Securely store the data you've collected
4. Don't share collected data without permission



What we will do, how we'll do it



UAS & Data Analytics Applications

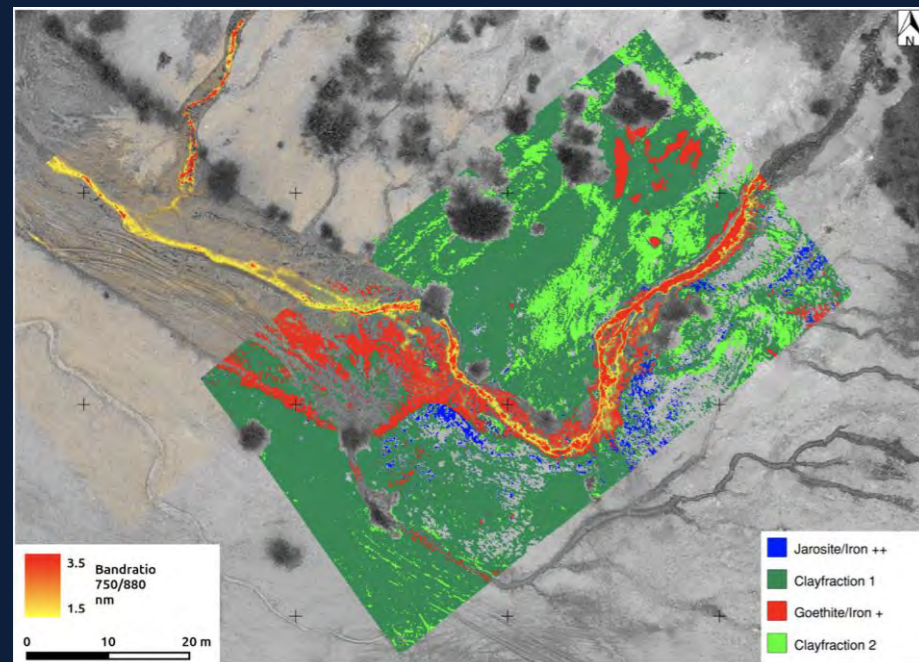
parking



disaster response



brownfield remediation



air pollution



Source: Jackisch, et. al., 2018.



UAS & Data Analytics Applications

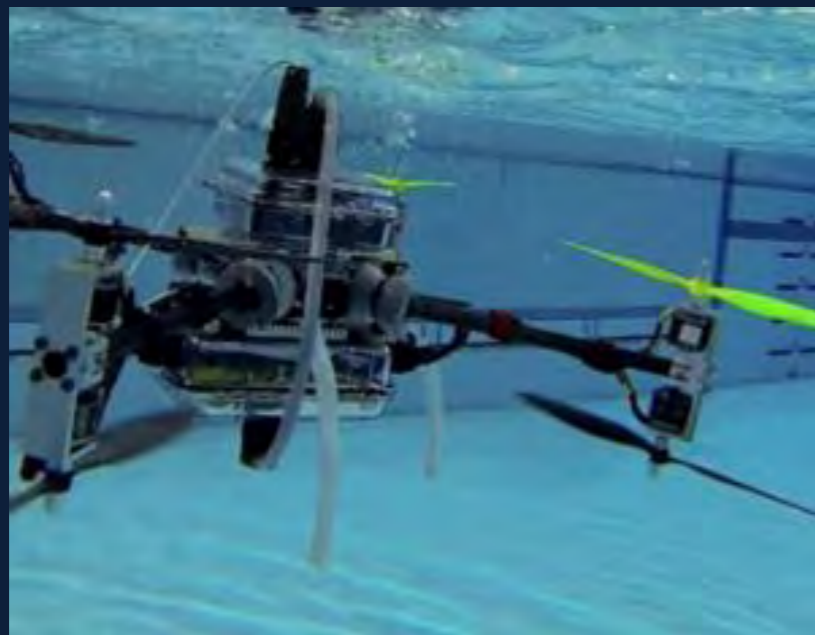
coastal erosion



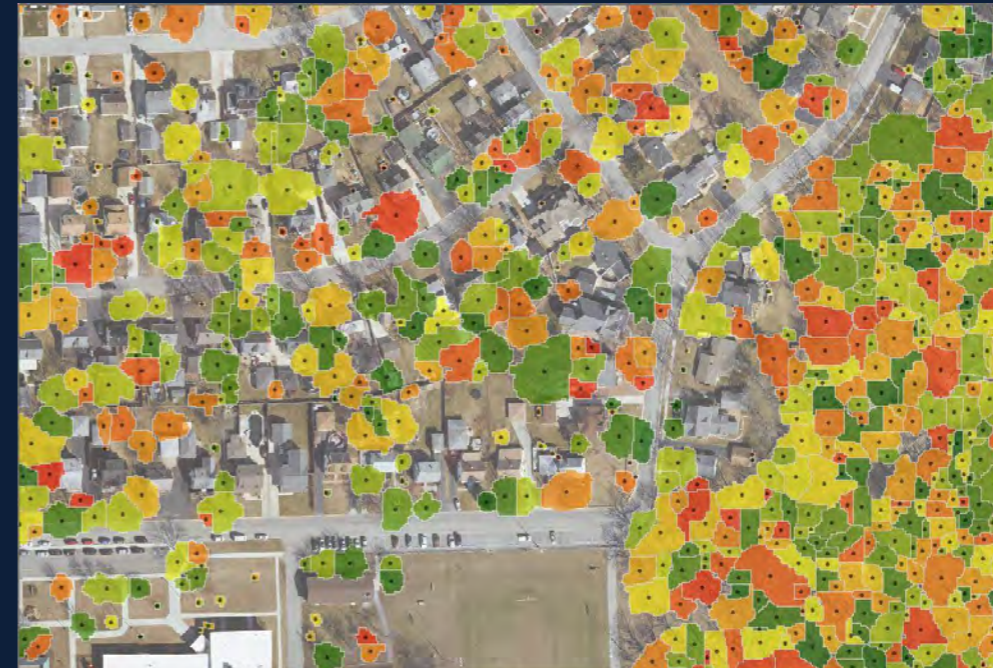
heat island/energy loss



water analysis



urban tree canopies



Source: The Environmental Monitor



Case study 1

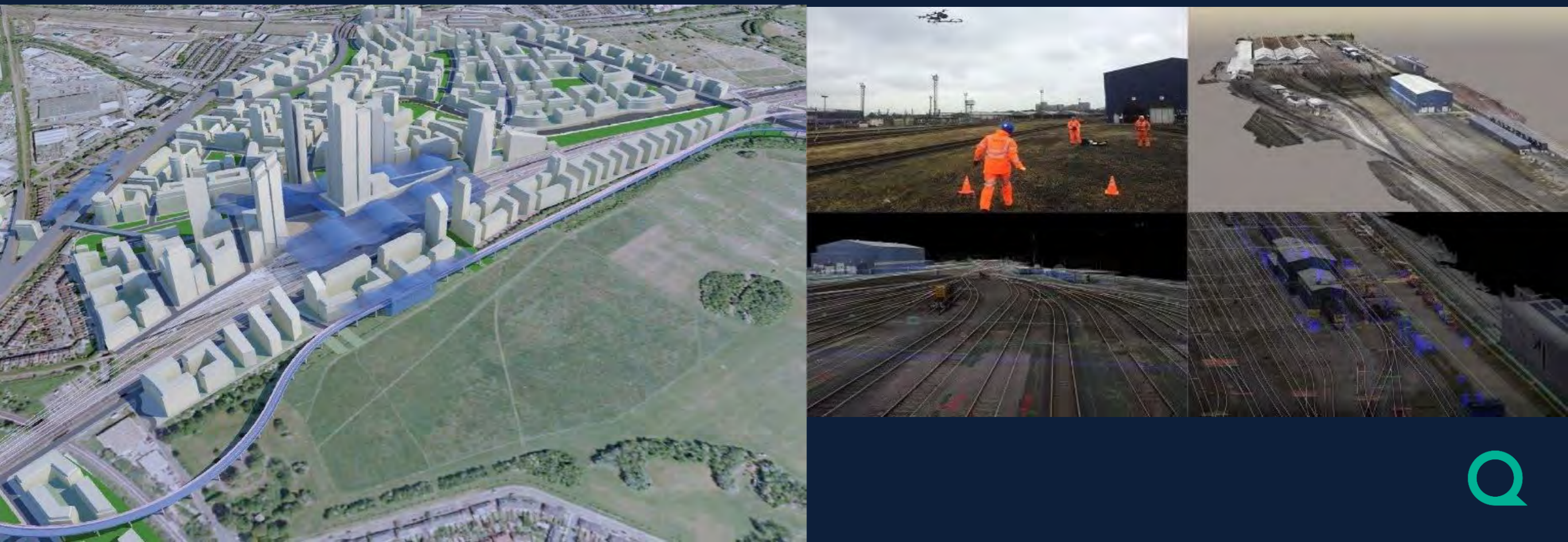
AECOM, Old Oak Common, London, 2016

Problem - Gather site data for 10,000 home / 8,000 job multimodal development in only 2 days

Solution - 3,000 pics captured at 100-130 ft in 6 hrs by DJI Mavick UAVs

Deliverables - Fully BIM (Building Info Modeling) compliant 3D model compatible with BIM software such as Revit

Useful Tidbits - Traditional data collection would have taken 8 weeks



Case study 2

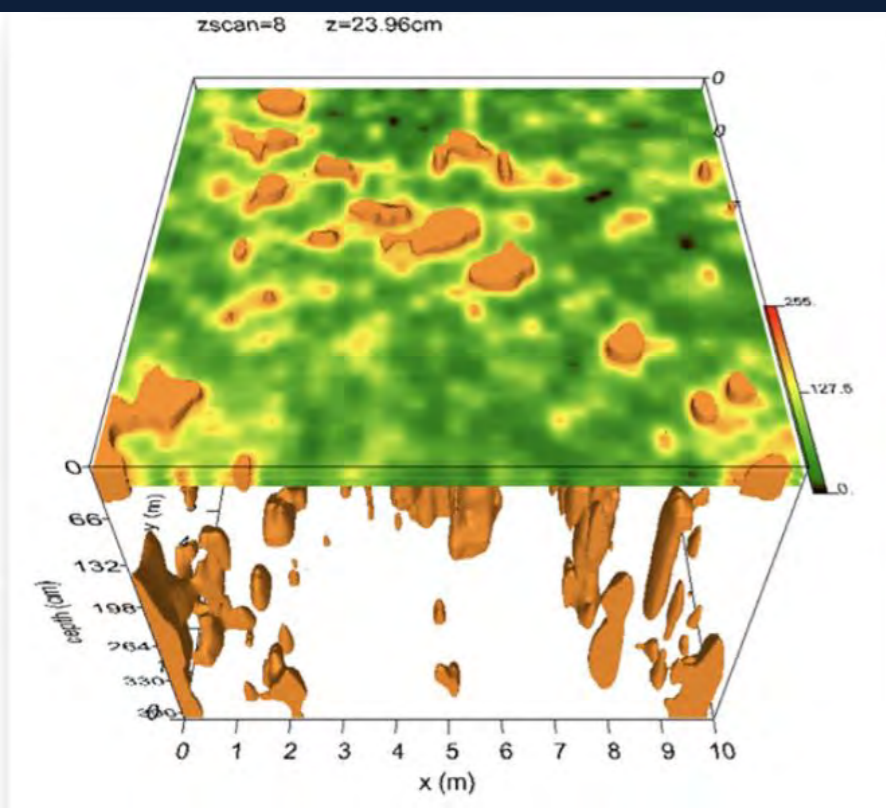
Esi Consulting/Stantec, UK, 2016

Problem - Need accurate estimates of site size, area features and measure the amount of material to be treated.

Solution - Combine UAS with radar and multispectral remote sensing and vegetation mapping with GIS to create a data rich analysis and map of high problem areas on site.

Deliverables - 3D interactive topographic map and radar and vegetation map.

Useful Tidbit - Able to map problem spots and predict problem areas and viability of the site before comprehensive in-situ analysis.



Photogrammetry software applications



Orthomosaics

A quilt of aerial photos stitched together



“Just imagine if a city could **reclaim a third of its land**. Imagine the new homes and apartments that could take their place. Imagine all the new schools and playgrounds and parks and bike paths.”

Andrew Salzberg, Head of Transportation Policy and Research, Uber





Thank you.

hello@quantifly.io

