Jet Packs & Auto-maps

“A week in the life of a Surveyor in 2030”
Pressure-cooker innovation is set to shake our concepts of Post-Labor Age work, value, reward and society...

- My 5 year old daughter will never learn how to drive
- My 2 year old son will never open a map

- Drones with smart vision and e-Loran will ortho-map every point on Earth
  - Human operators will NOT be required

- How will you and your profession fare?
Welcome & Intro
Who remembers these?
Then & Now
APIs and the Post-work Revolution
Surveying in the Auto-World
The Future is Coming (😊)
Next Steps: Fight or Flee?
Qs

Some Random Geeky Points of Interest to boot...
Possibly a First?
... the Other Side...
Speaker Intro
Who remembers these?

NICE JACKET. HEY-THE SEVENTIES CALLED.

OH? WHAT'D THEY WANT?

I DON'T KNOW. THEY DIDN'T LEAVE A MESSAGE.

WEIRD.

1974:

IF YOU'D LIKE TO LEAVE A MESSAGE, PRESS "1."
Remember these?

Nostalgia
...or these?
Fun Fact 1

Lines of Code

- F-22 Raptor: 1.7 million
- F-35 Lightning II: 5.6 million
- B-787 Dreamliner: 6.5 million

- S-Class Mercedes: 20 million
  - 70% developmental time
  - 45% sticker price
  - 50% warranty issues
Then and Now

Some Examples

Hi neighbor. Can I borrow some sugar?

C’mon dude. Stop changing your WiFi password!

1950s

2010s
Remote Approach

Now
Bridge Inspections
MN DOT Program
Transmission Inspections

Then
Tower & Bundle Inspection

...Now
Battery Dead! Drone returning Home!
Frantically trying to stop Disaster!
Accident Reconstruction

Then
Aerial Forensics

Now

30 meters
Aerial Measurements
NIJ Trial Results

• Team: Scout  S800  LEA
• Time at Risk: 7 min 22 sec  8 min  35 min 42 sec
• RMS Error:  12mm  12mm  15mm
• Blunders:  0  0  2
Mapping & Surveying

Then
3D Ortho-mapping
Now?
Fun Fact 2
The Media Frenzy

Google’s autonomous cars have been in 11 accidents

BY TODD HASELTON | MAY 12, 2015

• 6 years
• 1.7 million miles
• All under 10 mph
• All due to 3rd party humans
Computing Power

Moore’s Law

- Human Processor speed = 1.7 million MHz Pentium
- Human Memory = 100 million Mb

Recent evidence suggests that Moore’s Law has been EXCEEDED by 18%
Futurist Fails?

• “Aviation is fine as a sport. But as an instrument of war, it is worthless.”
  — General Ferdinand Foch, Professor of Strategy, Ecole Superiure de Guerre, 1911.

• “But executing a left turn against oncoming traffic involves so many factors that it is hard to imagine discovering a set of rules that can replicate a driver’s behaviour”
  — Why People Still Matter, Levy & Murnane, 2004

• “Despite what Stephen Hawking or Elon Musk say, hostile Artificial Intelligence is not going to destroy the world anytime soon.”
80% of Developed World jobs ‘at risk’ of APIs

Real Estate, Deliveries, Taxies, GIS, DRONE PILOTS

Manufacturing, Middle Mgt
Warning: Statistics

I didn’t have any accurate numbers so I just made up this one.

Studies have shown that accurate numbers aren’t any more useful than the ones you make up.

How many studies showed that? Eighty-seven.

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It gets worse...

- 47% of US jobs at ‘high risk’ of computerization within 20 yrs
- Polarization of jobs (702 studied):
  - Low skill Manual (‘deskilling’)
    - Less ‘artisans’
    - AT RISK by Mobile Robotics
  - High Skill Creative
    - AT RISK by Machine Learning
- Least at RISK:
  - Social, Creative & Intelligent Tasks
  - Non-routine
  - Cognitive
  - Enclosed spaces
- Other Factors:
  - Outsourcing – Abroad and to Cloud

*THE FUTURE OF EMPLOYMENT*  
C. B. Frey & M. A. Osborne  
Sept 17, 2013
Where are you?

- #222. (0.25 Probability) – Geographers
- #262. (0.38) – Surveyors
- #315. (0.55) – Commercial Pilots
- #346. (0.63) – Geoscientists
- #515. (0.88) – Cartographers & Photogrammetrists
- #635. (0.96) – Surveying & Mapping Technicians
- #702. (0.99) – Telemarketers
Aside:
The Ideal Cockpit
Fun Fact 3

Big Data

- 1 Petabyte = 20 million filing cabinets filled with text
- 1 Petabyte = 13.3 years of HD-TV video
- 1.5 Petabytes = Size of the 10 billion photos on Facebook
- 20 Petabytes = The amount of data processed by Google per day
- 20 Petabytes = Total hard drive space manufactured in 1995
- 50 Petabytes = The entire written works of mankind, from the beginning of recorded history, in all languages

Web in 2016

Table: Multiples of bytes

<table>
<thead>
<tr>
<th>SI decimal prefixes</th>
<th>Binary usage</th>
<th>IEC binary prefixes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name (Symbol)</td>
<td>Value</td>
<td>Name (Symbol)</td>
</tr>
<tr>
<td>kilobyte (kB)</td>
<td>$10^3$</td>
<td>kibibyte (KiB)</td>
</tr>
<tr>
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<td>$10^6$</td>
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<td>zettabyte (ZB)</td>
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<td></td>
</tr>
<tr>
<td>yottabyte (YB)</td>
<td>$10^{24}$</td>
<td></td>
</tr>
</tbody>
</table>

See also: Multiples of bits • Orders of magnitude of data
Surveying in the 30’s
Press and Go
Drone Deploy

Instant Aerial Data for Construction

Get it on Play Store
Also on Desktop

Jan 11: Construction Progress
BP Road Mapping
Prudhoe Bay, Alaska

- Puma AE and LIDAR
  - 320km of gravel roads
  - 3D point cloud
  - Grader blade control
Point and Click

SkyCatch

Low cost, fast surveying with drones

> View high precision aerial images of your site
> Use our simple analytics tools to perform measurements
> Track changes over time with automatic change detection

Learn more -- Free Webinar  Learn more -- Free Consultation

FREE QUOTE | NO OBLIGATION

SkyCatch is not a licensed surveyor.

SkyCatch is temporarily not accepting new drone pilot applications due to unprecedented demand. Please visit us at code NOL.

2D MEASUREMENTS & BOUNDARIES

Take accurate 2D measurements (such as distance, area, or circumference) of land, buildings, walls, fences, roofs, and other site features.

3D MEASUREMENTS

Take accurate 3D measurements (such as volume) of stockpiles of dirt, wood, concrete, salt, and other materials. Also get inverse volumetrics of pools, ponds, troughs, and tanks.

ACTIVITY HEAT MAPS

PLAN OVERLAYS
Reality
Augmented Reality
AR as Your Reality
Fun Fact 3
Robo-Ethics

In unavoidable crash scenarios, autonomous cars should:

- Minimize harm to passengers at the expense of pedestrians: 20%
- Minimize harm to pedestrians at the expense of passengers: 13%
- Minimize overall harm to both pedestrians and passengers by spreading out harms: 52%
- Minimize harm (liability) to the manufacturer: 5%
- Other: 10%

(N=40. Analyzed on July 18, 2014 by the Open Roboethics initiative)
Next Steps?

"This problem had been my life’s work. I planned to devote my remaining years to it. It’s just been solved in four seconds."
Career Advice?
Surveyor in 2030

• POB survey:
  – Demographics:
    • 50% of surveyors are 36-56 yo (51-71 in 2030)
    • 40% are 56+ yo (retired, even if it moves!)

• Globalization:
  – Not just local / regional competition
  – Satellite & Cloud-based products

• Disruptive Times:
  – Patent application rates
Option 1: Learn to fly
If you can’t beat them...

• Section 333 Exemption
• Pilot’s license
• Training
• COAs
• Small UAS Rule (Part 107)
Option 2: Go Niche

- Specialist products:
  - GP Radar

- Enclosed Spaces:
  - Underground?

- Unique environments:
  - Waterways?

- Non-robot environments:
  - National Parks?
  - GPS-out?
Option 3: Compete

Fight...

- **Cheaper**
  - Match the cost spiral
  - Automate & minimize overheads

- **Faster**
  - Rapid results
  - Cloud based & Mobile

- **Friendlier**
  - Client engagement
  - A human face in a brief and debrief
Option 4: Give up!?  
...or Flight!

- Ranked #1 LEAST likely to be computerized
  - 0.0028 Probability
- Recreational Therapist

"It’s my knee, Doctor. It’s still giving me problems."

I Am A Recreation Therapist
Option 5: Fight back!
The Robots are Coming...
Fun Fact 4

Packages

• 6 BILLION packages moved in US in 2014
  – Average sub 3 lbs
  – NOT including consumables

• “Google, I forgot beer”  David Vos, Project Wing
Bottom Line

PROBLEM:
• The API Gap is coming...
  – It will take your job!

ACTION:
• Plan, prepare, adapt
  – Move up the value chain
  – ... and MOST importantly...
Questions?
See Contact Details next!
End of Brief
Unmanned Experts Inc.

Consultancy
Advice

Training
Zero to Hero

SAFE FLIGHT OPERATIONS

Managed Services
ISR & UAS Provision
Contact Us

Contact us via any of the media below.
Our UAV consultants are available and will immediately begin helping you define your UAS/RPAS requirements and start to fulfill them.

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We look forward to working with you.
This a time of great opportunity in the unmanned sector, let us help you seize it.