

Use of Technology as a Risk Reduction Tool

NORTHEAST



LIVE LINE

Coutts

Today's Goal



Answer this!

The difference between hazard and risk is _____?



Understand: Hazards, Exposures, Risk, & Residual Risk

Hazard – Potential Source of Harm

- Hazard is one type of risk
- Lower level controls permit the hazard to exist!
- Risk and hazard are not the same
- Absolute Safety (Hazard or Risk Elimination) is not realistic (0,0,0)

Risk:

- Everyone is seeking to manage risk
- They are all guessing – if we knew....we would not be dealing with risk.
- Safety interventions that do not alter people's acceptance of risk simply redistribute the burden of risk, not reduce it.
- Residual risk should be acceptable, as judged by the decision-makers



This is just crazy.....or is it?

First thing we ask workers to do is remove primary safeguard or create the hazard:

- Remove Electrical Panel Cover
- Work energized
- Remove Access Cover on Confined Space
- Dig a big hole (trench) to enter it
- Remove machine guard to make repairs



Our work is
not
inherently safe. People create safety in practice
(Conklin)



Use Risk Centric Thinking

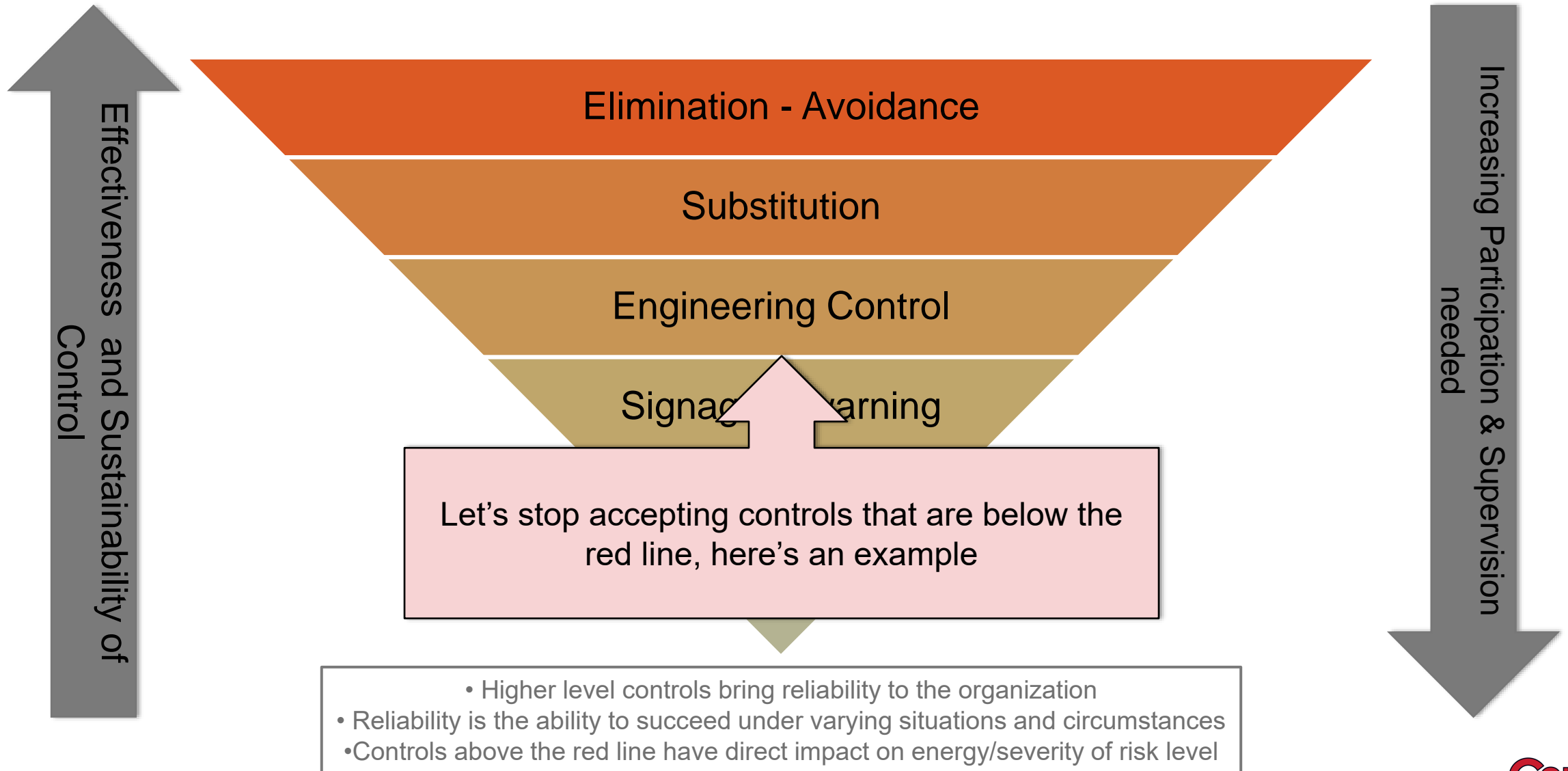
Major risks are Organizational & System based, not people based



Risk centric thinking should help to:

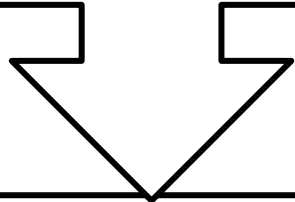
- See risk equal to an event
- Act on risk, in advance of injury/illness
- Have an “Exit Strategy” – SIF Exposures
- Use Risk Assessment – Core Competency
- Celebrate “Proven Solution” Implementation
- **Use investigations, Risk Assessment and Prevention through design – as one system**

Review – Hierarchy of Controls



Work to Zero an NSC Program

Program Mission: To eliminate workplace fatalities by 2050 through the adoption of emerging technology













Approach:

<p>Research: Research the most effective technologies and ways to integrate them into the workplace.</p>	<p>Education: Provide educational resources to increase the adoption of technology.</p>	<p>Partnerships: Foster key partnerships with stakeholders in the field to strengthen everyone's work.</p>
---	--	---



Hazards Situations in NSC Program

 Hot Work +	 Confined Space Entry +	 Loading & Unloading +	 Vehicle Pedestrian Interactions +	 Emergency Response +
 Electrical Work +	 Construction & Installation +	 Repair & Maintenance +	 Workplace Violence +	 Work At Height +

What Technologies can eliminate or reduce risk?

Hover to explore different tech solutions.

Tech Solutions

 Digital Gas Monitors +	 Drones +	 Lone Worker Monitoring +	 Virtual or Augmented Reality +	 Video Behavior Analytics +
 Proximity Sensors +	 Location Geofencing +	 Workzone Intrusion Detection +	 Permit To Work +	 Vital Signs Monitoring +
 Downed Worker Devices +	 Robotics +	 Fatigue Monitoring & Wearables +	<p>Technology Solutions</p> <p>Hover over each technology for a summary, and click for more, including webinars, white papers and case studies when available.</p>	

Let's look at the Work at Height Section!

The NSC Innovation Journey



Resources available for each step:

Which hazardous situations are your workers exposed to? How often? Select all that apply.

Hot Work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Confined Space Entry	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Loading & Unloading	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Vehicle Pedestrian Interactions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Emergency Response	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Electrical Work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Construction & Installation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Repair & Maintenance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Workplace Violence	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Work At Height	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Once Per Month	Once Per Week	Once Per Day	Up To 5 Times Per Day	< 4 Hours Spent Per Shift	> 4 Hours Spent Per Shift

Digital Readiness Assessment

This tool is intended to provide a top-level assessment of an organization's readiness level for implementing safety technology. Organizations are encouraged to use the assessment output as a discussion starter among various levels of leadership or groups with decision-making authority for safety.

[Start Assessment](#)

Resources available for each step:

- Lone Worker Monitoring +
- Virtual or Augmented Reality +
- Computer Vision & Camera Analytics +
- Workzone Intrusion Detection +
- Permit To Work +
- Vital Signs Monitoring +
- Proximity Sensors +
- Location Geofencing +
- Downed Worker Devices +
- Robotics +
- Fatigue Monitoring & Wearables +

Technology Solutions
 Hover over each technology for a summary, and click for more, including webinars, white papers and case studies when available.

Getting To The Finish Line

You're ready to adopt new safety technology, but you still need buy-in from leadership and help overcoming unexpected challenges. These tools will help.

Here's How To Help Sell Your Business Case

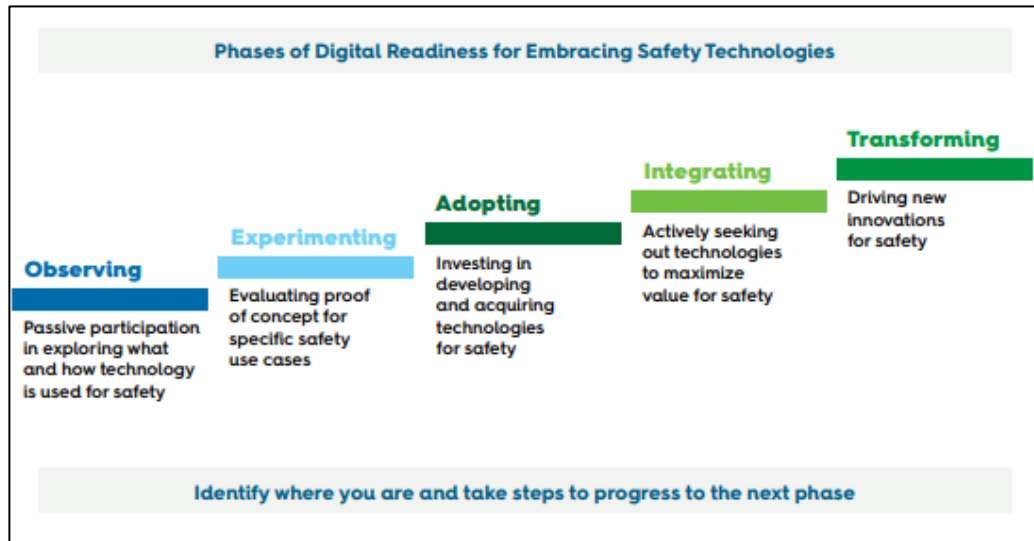
Demonstrate to your employer how adopting new safety technology will provide a return on investment using our ROI calculators and other resources.

[Download Whitepaper](#)

[ROI Calculators](#)



Phases of Digital Readiness



Lofty expectations can exist around the speed and degree of benefits of safety technology. Processes may be

Launching a pilot project is an excellent way to learn, make corrections on a small scale and reduce investment risk.

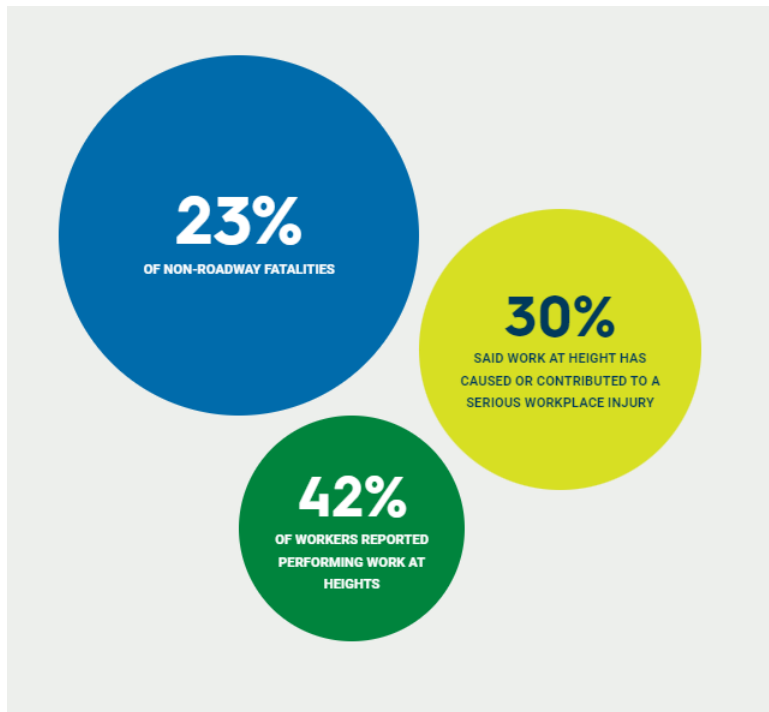
Prior to piloting a technology, it is critical to prepare affected groups for technology and support readiness.



NSC Program has a free Organizational Readiness Assessment for Safety Technology in the Workplace available at nsc.org/DigitalReadiness



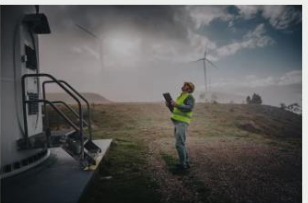



Let's look at the Work at Height Section and Talk about Drones

Work at Height Material



*SOURCE: NSC 2020 SAFETY TECHNOLOGY IN THE WORKPLACE SURVEY

Recommended Technologies To Reduce Risk:

 Drones Learn More >	 VR/AR Learn More >	 Lone Worker Monitoring Learn More >
 Permit to Work Learn More >	 Robotics Learn More >	 Downed Worker Devices Learn More >

PLUS, MORE!



What is a UAS or Drone?

A UAS is: Unmanned Aircraft Systems (UAS), commonly called drones



Other Drones

WORKtoZERO Safety Technology Case Study

Safetytech Accelerator

Drones

What's the Risk?
 In energy generation, boilers produce high-pressure steam necessary to turn the turbine blades. Therefore, inspections and preventative maintenance are routinely carried out to ensure ongoing safety and quality. In the past, many of these tasks were manually performed by employees. In the event of a leakage or inspection, the boiler would be shut down and cooled for 36 to 48 hours. Once safety parameters were met, workers could enter the container to test metal samples, assess the need for replacement tubing, make necessary repairs, etc. Exposure to confined spaces, high temperatures, and poor air quality made this work particularly hazardous. **Potential SIF events included:**

- Fatigue, heat stress, and dehydration
- Ergonomic injury
- Respiratory ailments
- Falls or other injuries from scaffolding

Impacts
 AES has adopted several drone types to minimize the need for employees to enter the boilers, including aerial drones, unmanned vehicles, and Gecko Robotics' wall-climbing robots. Notably, innovation and performance excellence primarily drive AES' adoption of technology, and this represents only one use-case example. Nonetheless, adoption of drones company-wide has contributed to several operational, safety, and performance benefits, including:

- Prevention of 60,000+ hours of high risk work activity
- Improved productivity and reduction in overall job time
- Creation of strategic partnerships with technology vendors
- Estimated savings of at least \$10 million

Lessons Learned
 AES is an industry leader in innovation, having expanded to a variety of drone types across the company. **Lessons learned during this process** included:

- The necessity of regional "Drone Task Force" teams responsible for scaling up use of the technology
- The importance of vendor feedback and its role in tailoring technology for specific use cases
- The impact of measuring safety impacts through man-hour exposure
- The versatility of technology as a means to improve operations, performance, and safety as a linked process

Employer
aes
 The AES Corporation is a Fortune 500 global energy company and a leading generator and provider of electrical power. AES has more than 15,000 employees and 15,000 customers in 14 countries.

Technology
Gecko Robotics
 Gecko Robotics' robots and use headlamps. The company's technology for industrial safety inspections.

WORKtoZERO Safety Technology Case Study

Safetytech Accelerator

Underwater Drones

What's the Risk?
 Nutrien's Trinidad site uses submerged seawater pumps to facilitate the production of nitrogen fertilizer. Every three months, these pumps are inspected for silt and biological build-up, and cleaned if necessary. Before leveraging drone technology, this job was performed by human divers. Along with being physically exhausting, divers often face murky, low-visibility waters and strong currents, increasing the risk of drowning and other serious injury. These serious injury and fatality (SIF) events are possible wherever underwater operations are performed, including work performed to maintain ports, offshore oil & gas operations and in other industries where underwater pumps or cooling towers are used. Another common risk involved in this work relates to inclement weather or passing vessels that can interrupt human dives, which leads to delays and other operational inefficiencies.

Impacts
Benefits of adopting underwater drones include:

- Eliminating the risk of SIF events to human divers
- Streamlining the logistic planning process
- Improved efficiency and reliability of inspections
- Significant reduction in the manpower, equipment, and logistics necessary for each inspection and cleaning.

Lessons Learned
 The use of underwater drones, despite being the first of their kind trialed by the Nutrien Trinidad site, proved to not only increase safety, but also reduced the overall cost and resources associated with tank inspection. The process of adoption, from ideation to vendor demos, to training and implementation inspired the use of new technologies and provided a blueprint for successful adoption. Nutrien has since adopted several different drone types to be used on land, underwater, and in the air to tackle other potentially dangerous tasks.

Employer
Nutrien
 Based in Saskatoon, Saskatchewan, Nutrien is the world's largest provider of crop nutrients, feed, crop protection and services. The company serves over half a million growers across 1,500 stores worldwide.

Technology
DEEP TREKKER
Deep Trekker
 Founded in 2010 and based in Waterloo Region, Ontario, Canada, Deep Trekker is a company focused on delivering fully assembled, tested and ready to use submersible robots and remotely operated vehicles (ROVs). Their technology has been used to solve a variety of environmental and industrial situations.

nsc

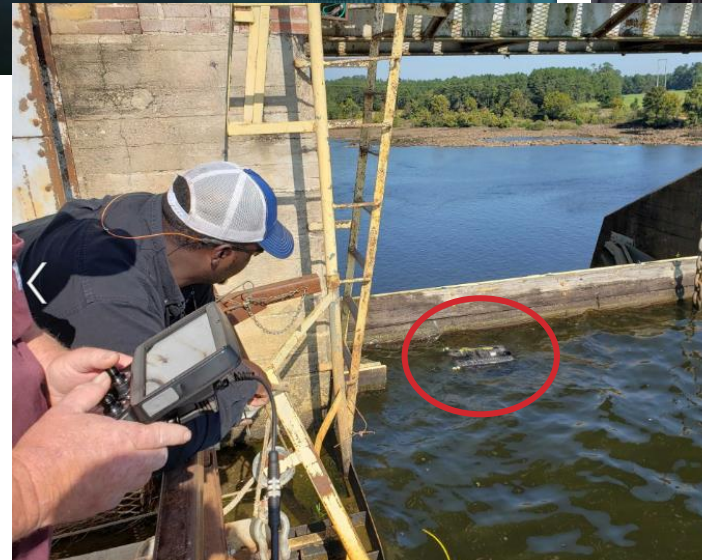
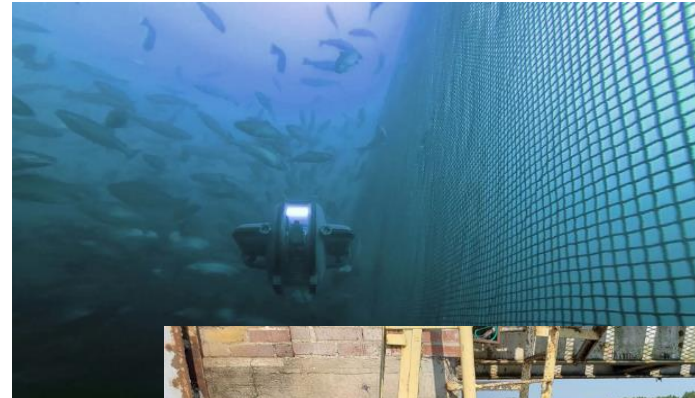


Photo Credit: Deep Trekker & Gecko Robotics

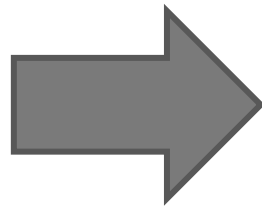
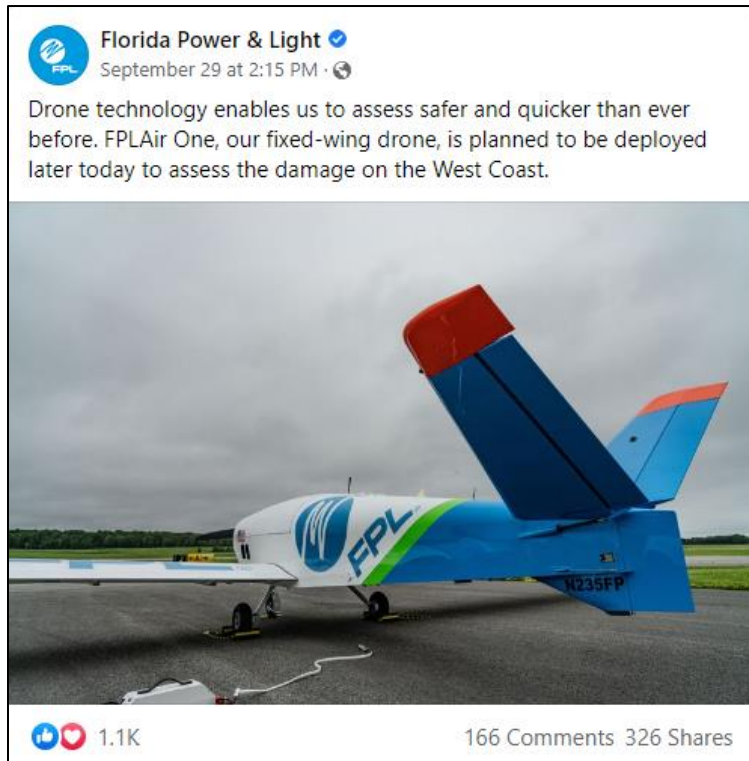
How Drones Lower Risk

Utilities have a history of serious injuries, and fatalities, occurring in right of way inspections (gas and electric), sub-station inspections, and hydroelectric power plant dam inspection.



The use of drones can eliminate the need for personnel to perform these tasks and are recommended for future use in electric and gas utilities.

How UAS Devices Lower Risk – Hurricane Ian Example from FPL



FPL: “To safely survey large areas that remain unreachable by vehicle or on foot, today we sent FPLAir One, our fixed-wing drone, on its inaugural recon mission. Drone technology will allow our team to view locations quickly and prepare crews for restoration efforts”.

Coutts Drone Program

Inspecting lines that would be hazardous to send employees in on foot



Coutts Examples of Drone Use



Starting an Internal UAS Program

Training

- FAA Part 107
 - Necessary to Utilize UAS in commercial applications
- Flying in the wire environment
 - Understanding MAD clearances
 - Understanding construction types, recognizing aerial hazards
- In House SOPs
 - In line with linework SOPs, appropriate overlap
 - Input from aviation experienced people suggested



Starting an Internal UAS Program

Equipment

- DJI
 - Leader in commercial applications
 - Parts and software available and compatible
 - 3rd party sensors are compatible



Starting an Internal UAS Program

Equipment

- Parts and Pieces
 - Controllers
 - Aircraft
 - Sensors
 - Sensors
 - HD Cameras
 - Thermal
 - Lidar
 - Multispectral
 - Corona
 - Gas Detection



Starting an Internal UAS Program

Equipment

- Parts and Pieces
 - Batteries
 - Daily Inspections
 - Track Usage
 - Understand Manufacturer Recommendations
 - Proper storage and charging
 - Cases



Equipment

- Mobile Command Center
 - Equipped for BVLOS Flights
 - Generator, Solar Panels and Battery Back up
 - Ability to elevate communication equipment
 - Temperature and Humidity Controlled



Hazards Associated with UAS

General Risks Associated with Aviation

- Air Space
- Gravity

Weather and Environment

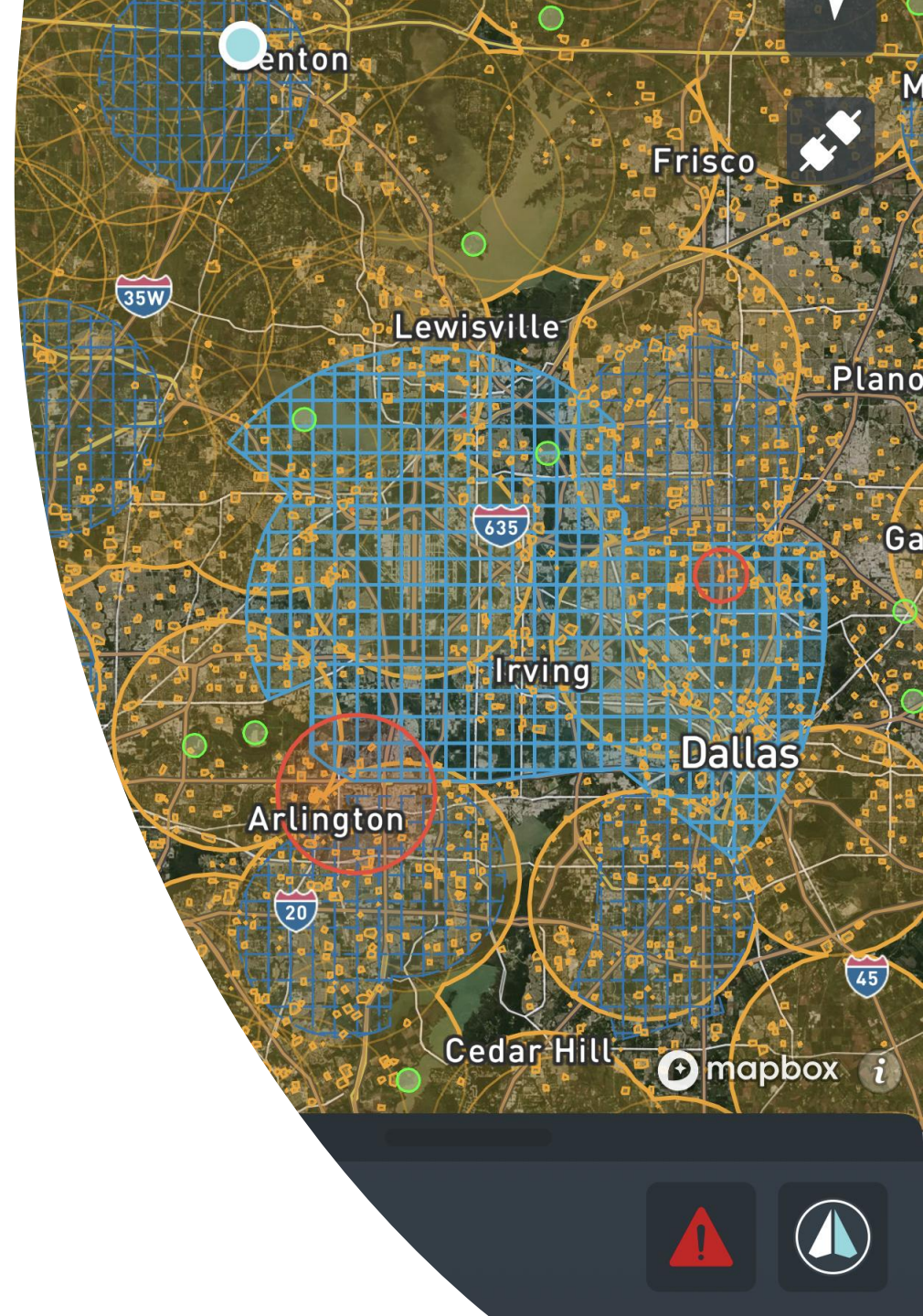
- Electronics exposed to weather

Electronic Malfunctions

- Video feeds
- EMFs emitted from HV transmission lines

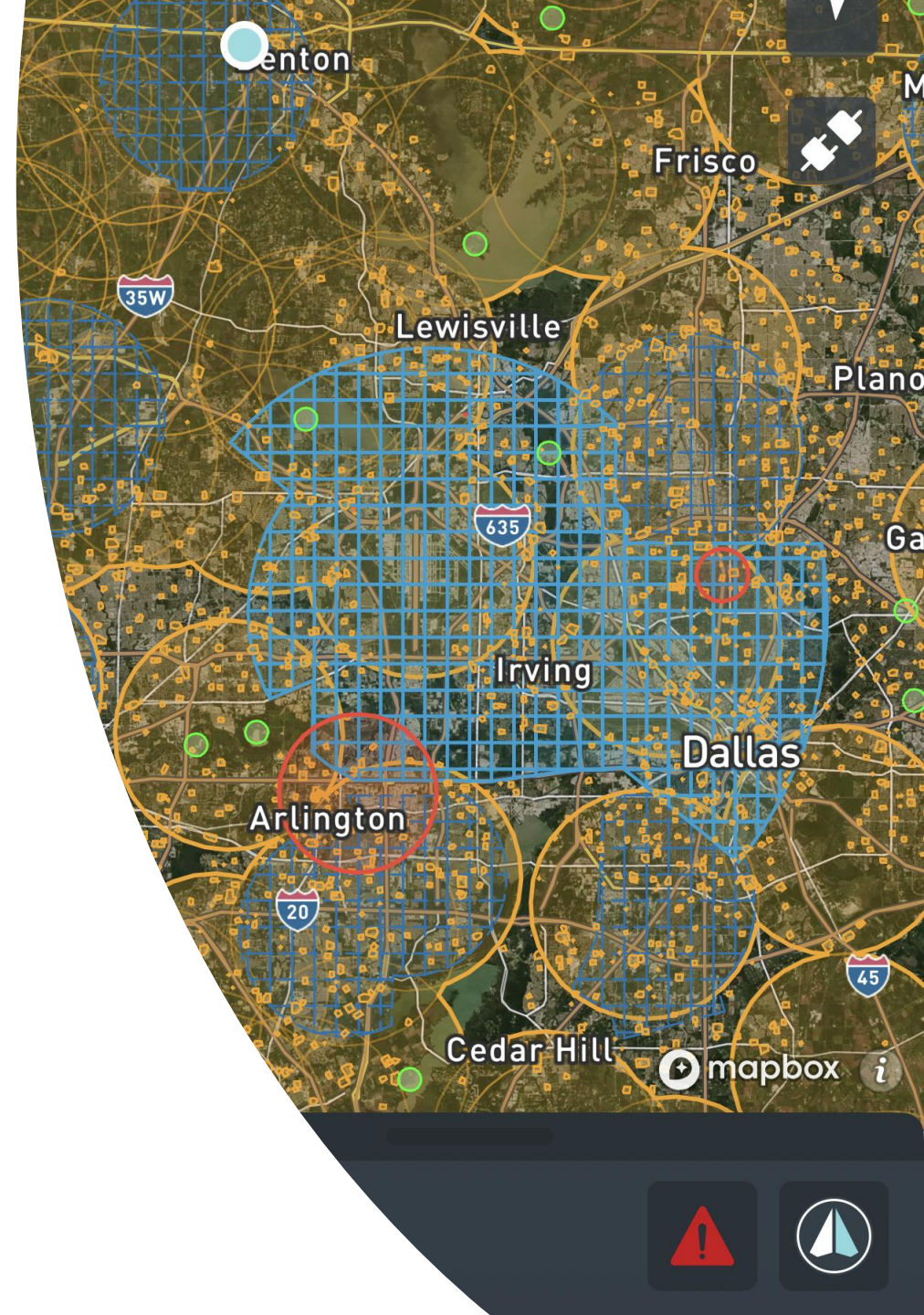
Human Error

Clearance Distance



How UAS have improved safety within Coutts

- Job Site Inspections
- Inaccessible and Danger Structures
- Night Flights with Thermal
- Scouting after Storm





Case Studies

Lack of clearance to climb (345KV corner structures)



Case Studies

Storm response

- Response with limited information



Case Studies

Storm response – Inclement Weather

- Response with detailed information
 - Location of issue was approximate

Future of UAS for Utilities

Beyond Visual Line of Sight (BVLOS)

Better patrols

- Post Storm and Annual
 - Photo and Video
 - Geotagged
 - Multiple Sensors

All without risks of manned aircraft

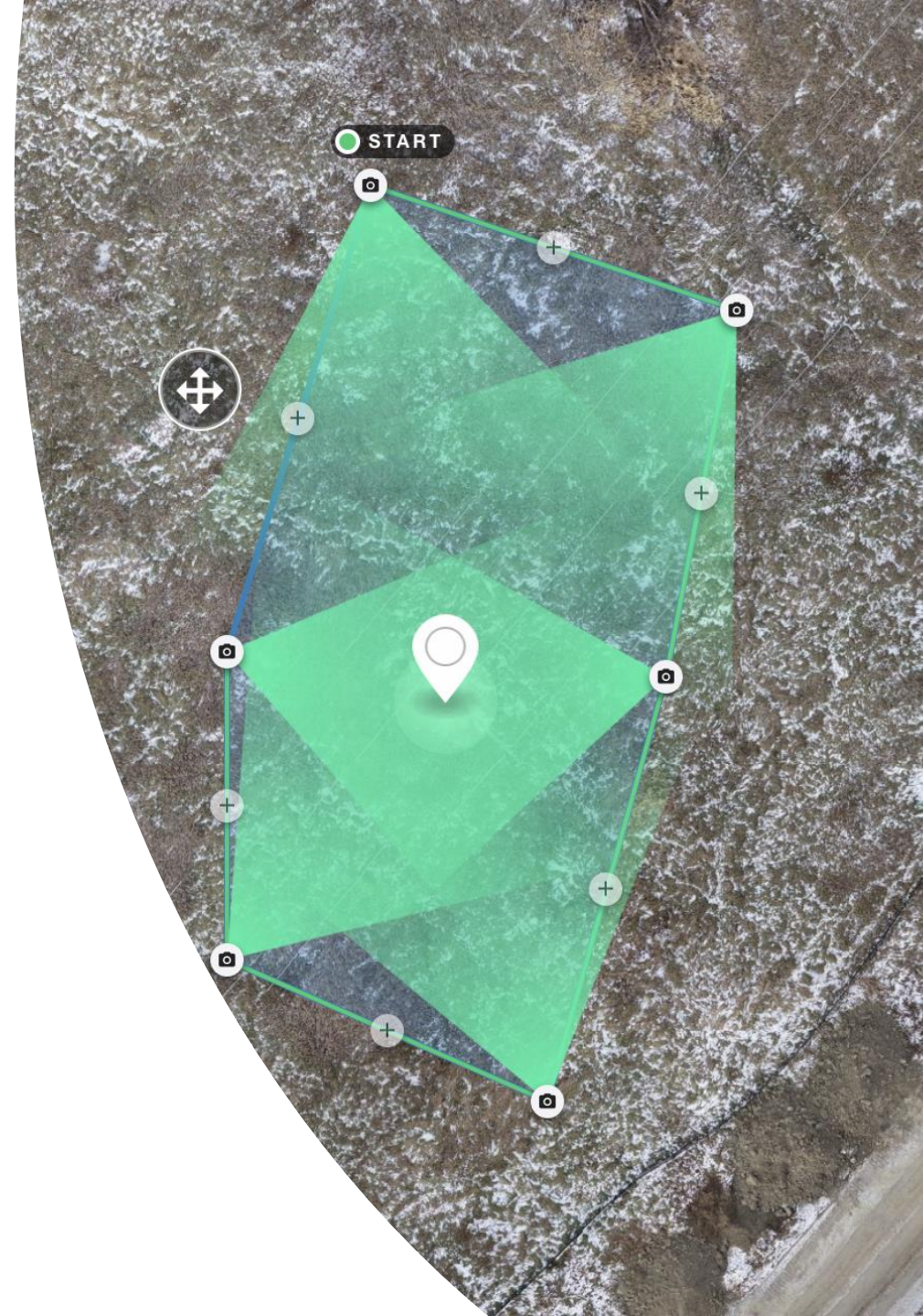


Future of UAS for Utilities

Artificial Intelligence

Sorting Photos by Location

Stitching Photos to build 360 photos



UAS uses outside of Utility Inspections

Pesticide and Herbicide Applications

Pulling wire (p-line)

Stock piles and volumetrics

Progression Tracking

Maps for access and scouting

Search and Rescue

NORTHEAST



LIVE LINE

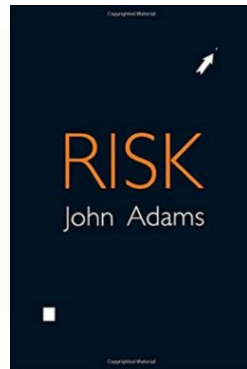
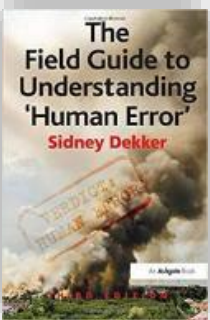
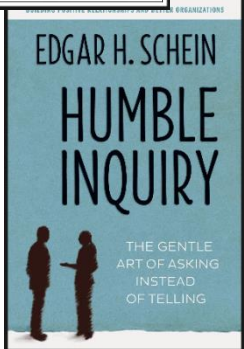
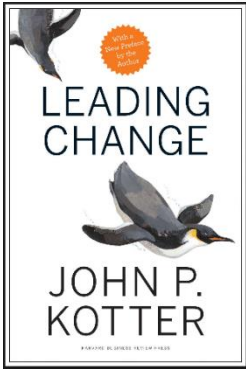
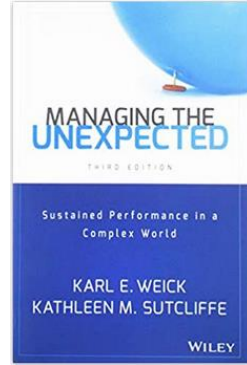
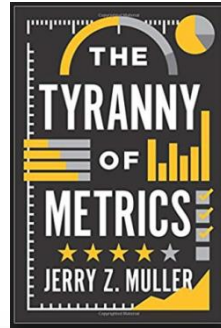
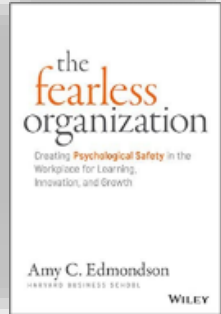
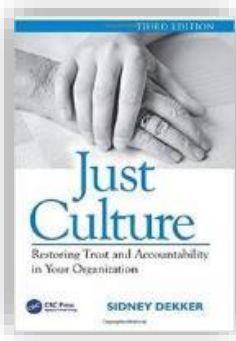
LEARNING WITH A PURPOSE



Final Thoughts

Essential Reading & Listening

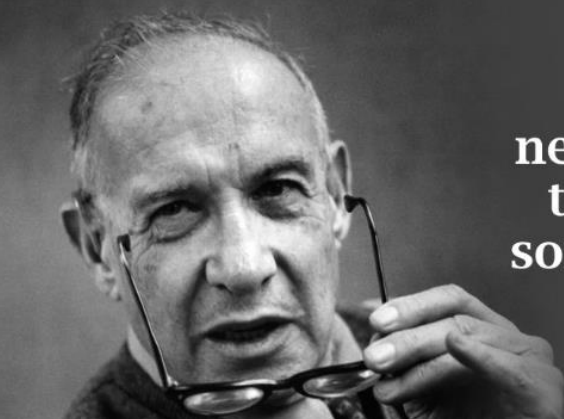
The Safety of Work.




Jared Rossignol
 Occupational Health & Safety Director/Certified
 Utility Safety Professional




Nathan Boutwell, MEng, CSP, CIT, ...
 Dad | Husband | Learning
 & Safety Leader | Culture Sh...

If you want something new, you have to stop doing something old.
 PETER DRUCKER