How pipeline companies are using drones for surveying and safety?

Agenda / overview of presentation?

1   The 5 Ds of Surveying in Pipeline

2   Connecting the Dots between Cost, Safety, Efficiency and Data

3   Why VTOL Drones

4   What are the pain points in Surveying?

5   Cost, Safety, Efficiency and Data

6   What works best?

7   How to get started?

7KM Orthophoto done with a Wingtra

4D assets are the most challenging ones...

Dull   Dirty   Distant   Dangerous

...for mitigating industry issues

Safety and environment (2018 gas pipeline explosion in Beaver County, Pennsylvania)
Loss of revenue (1 day downtime leading to multiple USD 100k loss a day)

Uptime is money, crews are expensive and potentially at risk, and assets are often expected to last 50 to 100 years.

A 5th D... for Data

"Imagine that if you're [inspecting] faster, you might be able to do it more often. And more data typically will give you better data."

Sue Siegel, CEO
GE Ventures

Shifting pipeline management to proactive issue prevention...

Challenges

Dull	Dirty	Dangerous	Distant	Data

Key Performance Indicators

COST	SAFETY	EFFICIENCY	DATA
Operating crew	Time	Duration	Accuracy
Equipment	Personnel	Frequency	Exhaustivity
			Update

Today's solutions are either unsafe, non optimal and/or expensive

What are the current pain points to Surveying and Safety?

Costs
1

- Delay in construction
- Insurance costs associated with Aerial Surveys
- Onsite costs of idling equipment

Safety
2

- Pre-emptive planning for HRA
- Post Extreme Weather Events Assessments
- Route Selection
- Maintain safe Construction sites

Efficiency
3

- People management
- Contracting and procurement strategies
- Organization and governance
- Non transparent communication

Data Quality and Consistency
4

- Incorrect pipeline centerline
- Reusable digital blueprints
- Incomplete data
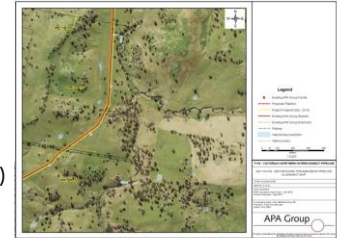- Hard to access data (Paper data)

Figure 2.2.1: Example Alignment Route Map showing a proposed pipeline alignment (APA Group 2015, p. 8)
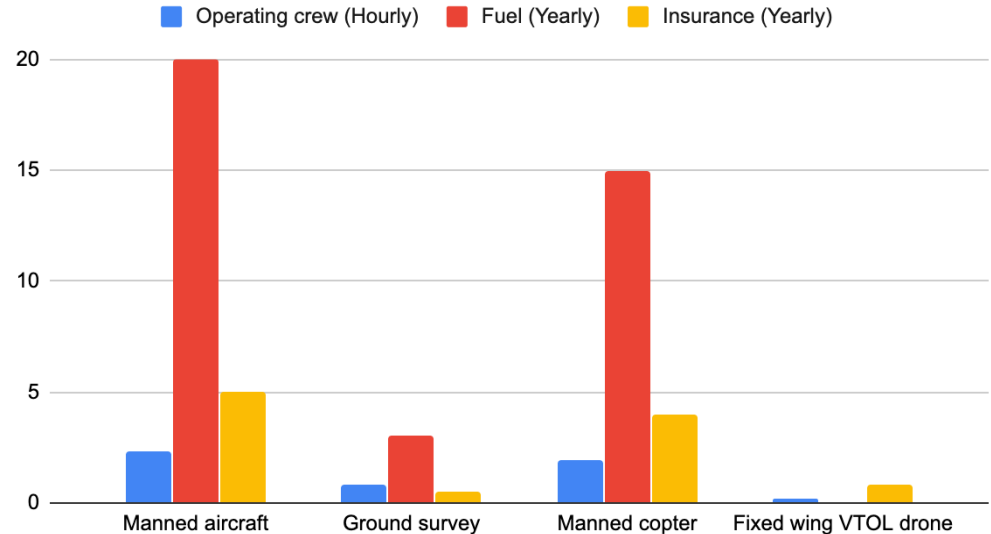
Costs

Real Life Examples

- Delay in construction
- Insurance costs associated with Aerial Surveys
- Onsite costs of idling equipment

Key Metrics

- Operating crew (Hourly)
- Fuel (Yearly costs)
- Insurance (Yearly costs)

- "64% of Projects face cost overruns"
  - "Spotlight on Oil and Gas Mega projects" E&Y

Operating Costs

Legend: ■ Operating crew (Hourly) ■ Fuel (Yearly) ■ Insurance (Yearly)

Category	Operating crew (Hourly)	Fuel (Yearly)	Insurance (Yearly)
Manned aircraft	~2.3	20	5
Ground survey	~0.8	3	~0.5
Manned copter	~1.9	15	4
Fixed wing VTOL drone	~0.2	—	~0.8

Safety

Real Life Examples

- Pre-emptive planning for HRA
- Post Extreme Weather Events Assessments
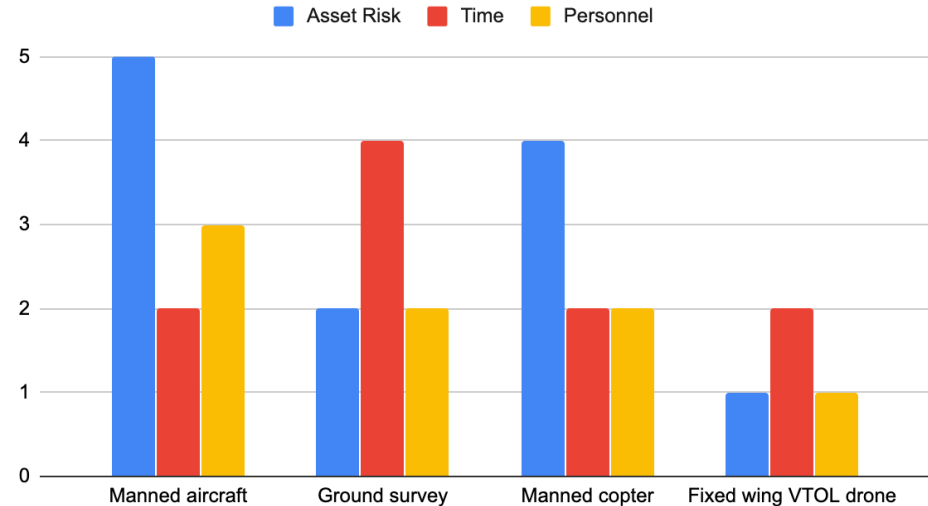- Route Selection
- Maintain safe Construction sites

Key Metrics

- Asset Risk
- Time
- Number of Personnel to operate

- "16% of of Pipeline Ruptures were because of Faulty Construction"
  - "9th European Gas Incident DATA Group Report"

Overall Safety

Legend: Asset Risk (blue), Time (red), Personnel (yellow)

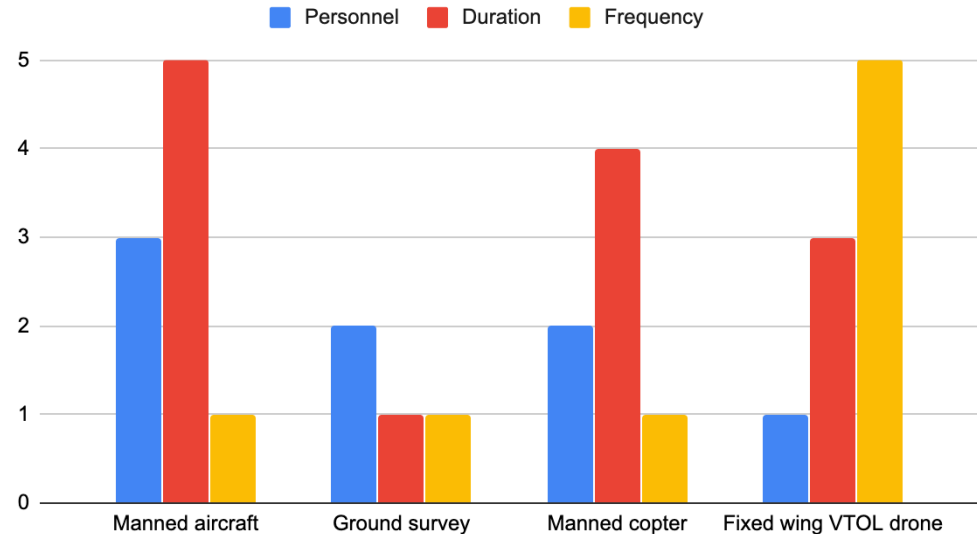|	Asset Risk	Time	Personnel
Manned aircraft	5	2	3
Ground survey	2	4	2
Manned copter	4	2	2
Fixed wing VTOL drone	1	2	1

Efficiency

Real Life Examples

- Frequency of Surveys
- Pipeline health
- Regular updates on safety
- Construction of pipeline
- Regulatory Checks

Key Metrics

- Personnel
- Duration
- Frequency

Overall Efficiency
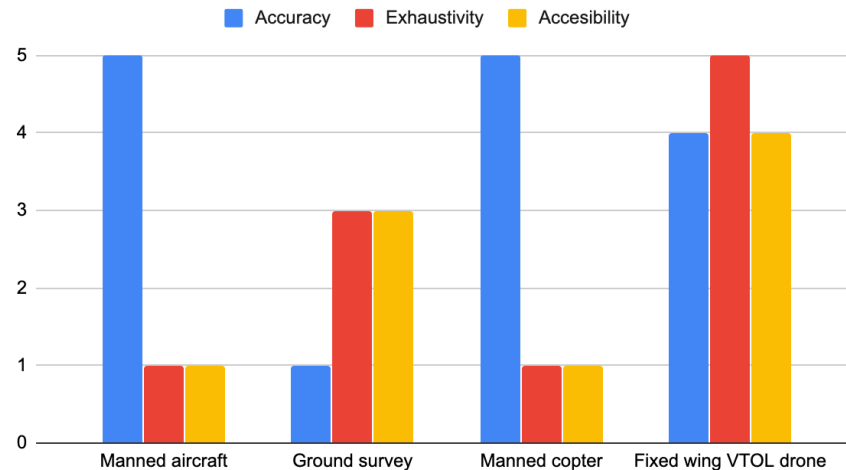
Data Quality

Real Life Examples

- Incorrect pipeline centerline
- Reusable digital blueprints
- Incomplete data
- Hard to access data (Paper data)

Key Metrics

- Accuracy
- Exhaustivity of Asset
- Accessibility
- Frequency

Overall Data

Are drones the biggest opportunity to unlock greater KPIs?

Manned aircraft
Quick and exhaustive, but fairly inaccurate, expensive thus infrequent, and fairly unsafe

Ground survey
Accurate but non exhaustive, unsafe, super slow thus infrequent

Manned copter
Quick and exhaustive, but fairly inaccurate, super expensive thus infrequent, and fairly unsafe

Fixed-wing VTOL drone
Quick and exhaustive, accurate, safe and cheap thus frequent

Example Average costs for surveying 3.5KM, 25M wide construction corridor of ROW

Which drones are out there?

USABILITY

Quadcopter

- Range: 7 km²
- Accuracy: Low
- Ease of Use: Easy
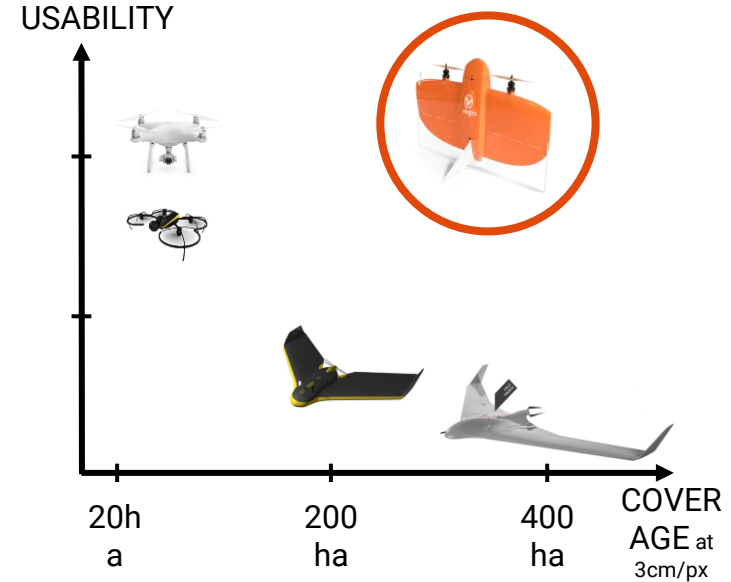- Area of Operation: Anywhere but limited Range

Vertical Take Off and Landing Fixed Wing

- Range: 24 km²
- Accuracy: Low
- Ease of Use: Easy
- Area of Operation: Anywhere with VTOL Capability

Heavy Duty Drone

- Range: 40 km²
- Accuracy: Low
- Ease of Use: Advanced
- Area of Operation: Limited due to Catapult launch but extended flight time

20ha 200 ha 400 ha COVERAGE at 3cm/px

Go the extra mile, and unlock specific competitive advantages

If data is the new oil… Refine it!

- Data-intensive infrastructure (high res images, maps, etc.)

- Getting insights to make informed decisions

- Combined with AI and ML to power predictive analytics

If operation is a process… Excel it!

- Customized workflows

- Automation at scale

- Seamless enterprise integration

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How to build your own enterprise drone program?

In House

| Proof of Concept | Waivers and Certifications | Equipment | Safety and Insurance | Data Management |

Outsource

| Safety and Insurance | Data Management |

Hybrid

| Equipment | Safety and Insurance | Data Management |

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Thank you from Wingtra.