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**

<table>
<thead>
<tr>
<th>COST</th>
<th>SAFETY</th>
<th>EFFICIENCY</th>
<th>DATA</th>
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<tbody>
<tr>
<td>Operating crew</td>
<td>Time</td>
<td>Duration</td>
<td>Accuracy</td>
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<tr>
<td>Equipment</td>
<td>Personnel</td>
<td>Frequency</td>
<td>Exhaustivity</td>
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Today’s solutions are either unsafe, non optimal and/or expensive
What are the current pain points to Surveying and Safety?

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

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

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

4. Data Quality and Consistency
   - Incorrect pipeline centerline
   - Reusable digital blueprints
   - Incomplete data
   - Hard to access data (Paper data)
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
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 Pipeline Ruptures were because of Faulty Construction”

“9th European Gas Incident DATA Group Report”

Overall Safety

- Asset Risk
- Time
- Personnel

Comparison of different methods:
- Manned aircraft
- Ground survey
- Manned copter
- Fixed wing VTOL drone
Efficiency

Real Life Examples

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

Key Metrics

- Personnel
- Duration
- Frequency
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
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?

- **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: High
  - Ease of Use: Easy
  - Area of Operation: Anywhere with VTOL Capability

- **Heavy Duty Drone**
  - Range: 40 km²
  - Accuracy: High
  - Ease of Use: Advanced
  - Area of Operation: Limited due to Catapult launch but extended flight time
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
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.