Embracing the “Frankenstein” Approach to Surveying and Mapping in the Northern Territory

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About Me

• Surveyor by education

• 20 years’ experience in surveying & mapping industry (predominantly aerial mapping projects)

• Passionate about:
  • Designing & delivering low-risk/high-value solutions
  • (Aerial) Mine Surveying
  • Large broad acre aerial imagery and mapping projects
  • Technology Fusion & Data fusion
About AAM

• **People and Places**
  - Over 500 staff located in 20 locations across Australia, Africa, Asia and the Pacific
  - Yes, we have an office in Darwin!

• **What do we do?**
  - Aerial Survey (airborne LiDAR, aerial photography, mapping)
  - Satellite Imagery
  - Field Surveying
  - 3D City Modelling
  - 3D GIS & Visualisation Software (K2Vi)
**Why this Presentation?**

Embracing the “Frankenstein” Approach to Surveying and Mapping in the Northern Territory

My Challenge Today:

*To demonstrate that **embracing** the “Frankenstein” (i.e. multi-discipline) approach to surveying and mapping is **essential** to deliver **best value** outcomes in today’s demanding and highly competitive geospatial marketplace.*
Outline

• Evolution of Aerial Mapping Technology
• Current Technology & Applications
• Case Study - Frankenstein Style!
• Opportunities for the NT
When I was a boy (1994)....
20 odd years later...

9 x Fixed-wing Aircraft

3 x Large Format Digital Mapping Cameras

6 x Airborne LiDAR Systems (each equipped with a mid-format camera)

5 x UAVs

3 x Super-Large Format Digital Mapping Cameras

Constellation of High-Resolution Satellites
Frankenstein’s Monster!
Current Tools

9 x Fixed-wing Aircraft

3 x Large Format Digital Mapping Cameras

6 x Airborne LiDAR Systems (each equipped with a mid-format camera)

5 x UAVs

3 x Super-Large Format Digital Mapping Cameras

Constellation of High-Resolution Satellites
Features & Benefits

- 106 mega pixels
- No film processing/no film scanning = Time, Quality, Cost
- Proven technology = Low Risk, Reliable
- Ability to acquire multiple bands simultaneously (RGB & Infra-Red) = Multiple uses
Sample Frame-Based Aerial Imagery
Sample Frame-Based Imagery Project

NT Lands 2014 Aerial Photography Program

- 17,500km²
- Multiple Uses
- 15cm, 30cm, 50cm imagery
- Fully processed, aero-triangulated, “ready-to-map” digital imagery
- Digital Orthophotos
Swinging Lens Digital Aerial Cameras

Features & Benefits

- 480 mega pixels
- Ability to fly higher = Critical for Urban/Large Areas
- Vertical and oblique imagery = Flexibility
- Automated Image Processing = Speed & Cost Benefits
Sample Swinging Lens Aerial Imagery
Sample Imagery Project - “Frankenstein” Approach

QLD 2014 Aerial Photography Program
• 220,000km²
• Combination of Frame-Based and Swinging Lens Cameras
• 10cm and 25cm imagery
• Fully Processed Digital Orthophotos
By end of 2015:

- ~700,000km² of aerial imagery captured using a combination of Frame-based and Swinging Lens Cameras
- 10cm – 50cm imagery
- Fully processed Digital Orthophotos
Airborne LiDAR
Why Airborne LiDAR?

- For large areas (>100km²) requiring high accuracy mapping (<0.2m) faster and more cost-effective than aerial photogrammetry
- Ground and non-ground features captured simultaneously
- Ability to penetrate vegetation cover
- Less weather dependent (can fly at night, beneath clouds)
- Aerial photography can be captured simultaneously and processed separately or merged with LiDAR data
Airborne LiDAR + Aerial Photography
QLD State LiDAR Capture Program

2006 – 2014 LiDAR Capture Program
• ~400 projects
• ~120,000km2
• ~0.15m vertical accuracy
• Fully Processed Ground/Non-Ground Data
• DEM, DSM, Surface Contours

Predominantly driven by the need for better storm surge and flood models
Case Study – Frankenstein Style!

Groote Eylandt Mine Operation - NT
1. **Accountants Need Stockpile Volumes:**
   - For inventory purposes. Date-critical, must be accurate.

2. **Mine Engineers Need Pit Mapping:**
   - For mine planning, calculating void volumes.

3. **Mine Surveyors Need Feature Mapping:**
   - For preparing mine plans.

4. **Concentrator Personnel Need Tailings Dam Mapping:**
   - To know how full the tailings dams are. What capacity is left?

5. **Everyone Needs Imagery!**
   - Situational awareness. Environmental monitoring, planning, safety management.
Solution

1. **Accountants Need Stockpile Volumes:**
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Tailings Dam Mapping
Tailings Dam Mapping
Tailings Dam Mapping
Outcome

✓ Accountants Need Stockpile Volumes:
  - For inventory purposes. Date critical, must be accurate.

✓ Mine Engineers Need Pit Mapping:
  - For mine planning, calculating void volumes.

✓ Mine Surveyors Need Feature Mapping:
  - For preparing mine plans.

✓ Concentrator Personnel Need Tailings Dam Mapping:
  - To know how full the tailings dams are. What capacity is left?

✓ Everyone Needs Imagery!
  - Situational awareness. Environmental monitoring, planning, safety management.
Opportunities for the NT

• Aerial Surveying and Mapping technology is changing constantly and rapidly (in parallel with other survey tools)

• The need to “do more with less” is driving innovation and the multi-discipline solutions

• Technologies such as LiDAR are proven and complement rather than replace traditional aerial mapping technologies

• Government can learn from the other States who have adopted multi-discipline mapping programs

• Focusing on specifying the desired outcome of a project, rather than specifying the particular technology to use for a project will always result in the best value solution
AAM receives top Spatial Excellence Award for Asia-Pacific