

27/08/2024

**[AT THE CORE OF
DURABILITY.]**

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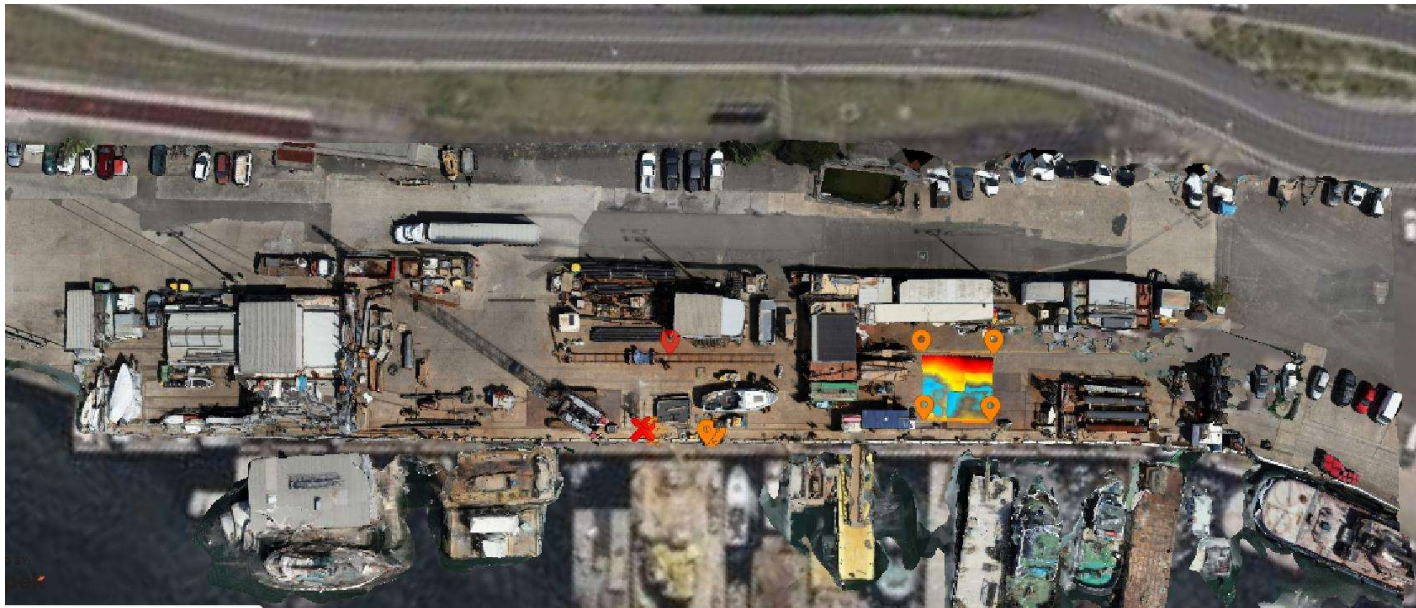
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WHARF SURVEYS (WSCAM) USING PHOTOGRAMMETRY DIGITAL TWIN MODELS

Relevant UN SDGs 3, 9, 11, 12



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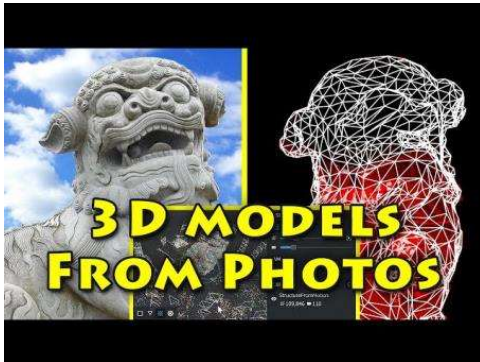
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PHOTOGRAMMETRY & DIGITAL TWINS

What is Photogrammetry?

The process involves taking overlapping photographs of an object or structure and digitally “stitching” them together into 3D digital models.



In the asset space, these models are known as **Digital Twins** – which are digital versions of the asset that can be used to manage its life cycle, and plan outages and servicing of the structure as needed.

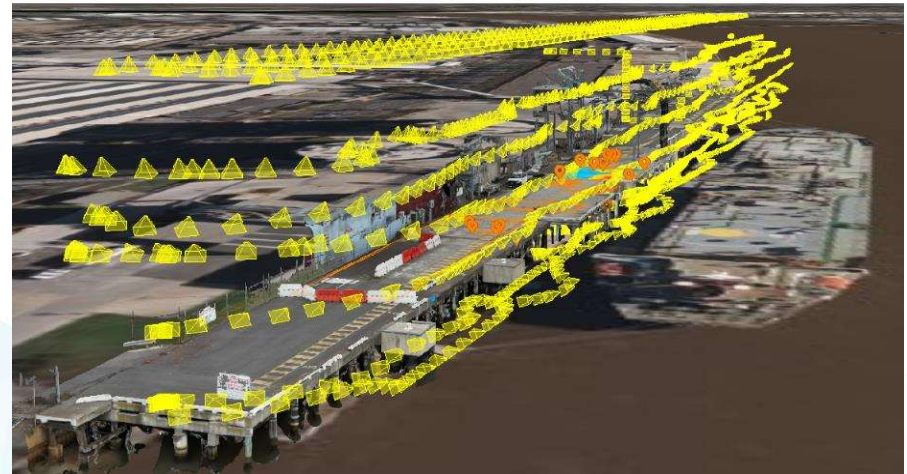
WSCAM SURVEYS

- WSCAM surveys intention – consistent approach to condition assessments of port structures. They would include:
 - Baseline and periodic visual surveys
 - Detailed investigations
- Priority/safety maintenance works can be prioritised.
- Accurate budgets and timeframes.



WHY USE PHOTOGRAMMETRY?

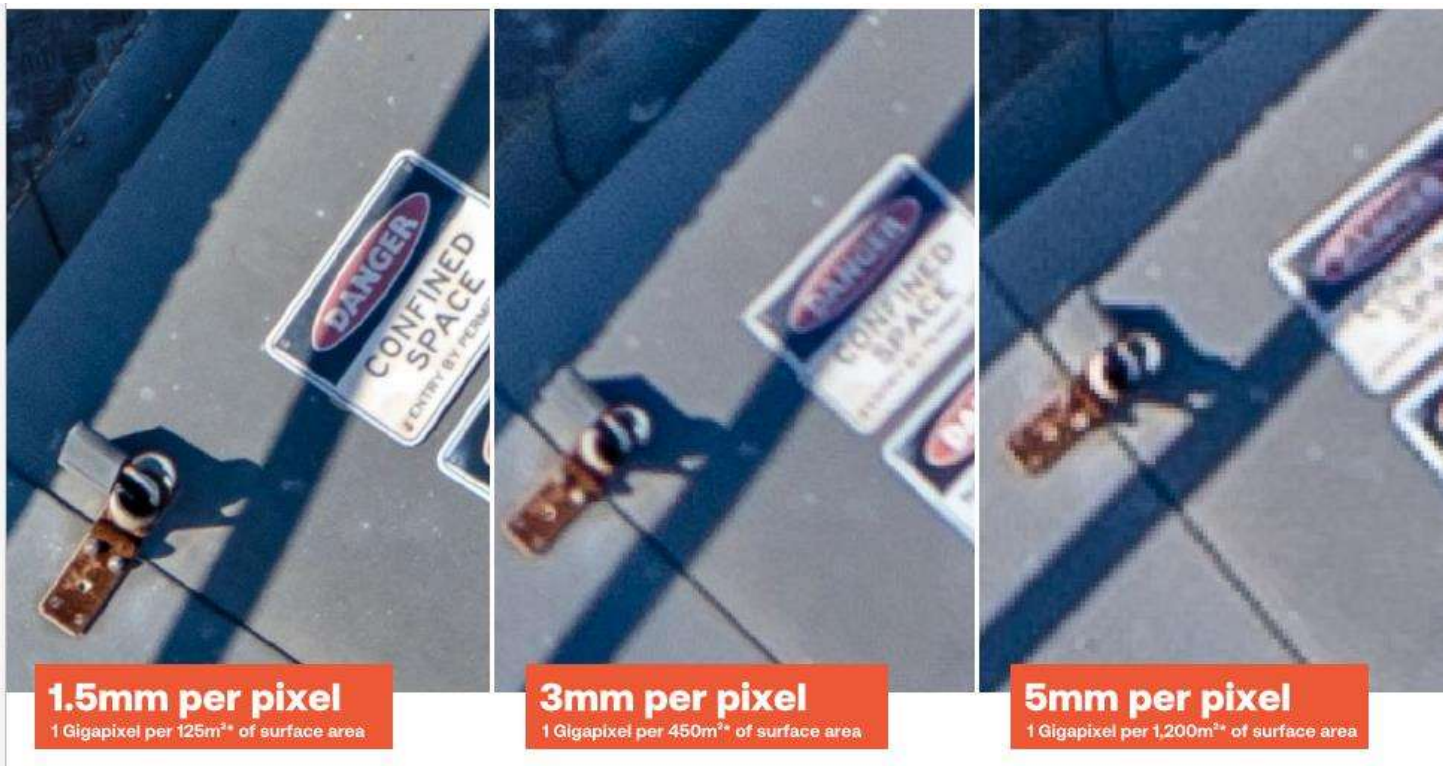
- In person visual inspections can be very slow with limited access to entire structure.
- An alternative approach is building of a 3D photogrammetry model which captures the entire structure.
- Using the 3D model, a visual inspection can then be carried out.



MODELS FOR WSCAM PURPOSES

Main challenges that may affect the accuracy of the visual assessment:

- Model Resolution –1.5mm resolution.



MODELS FOR WSCAM PURPOSES

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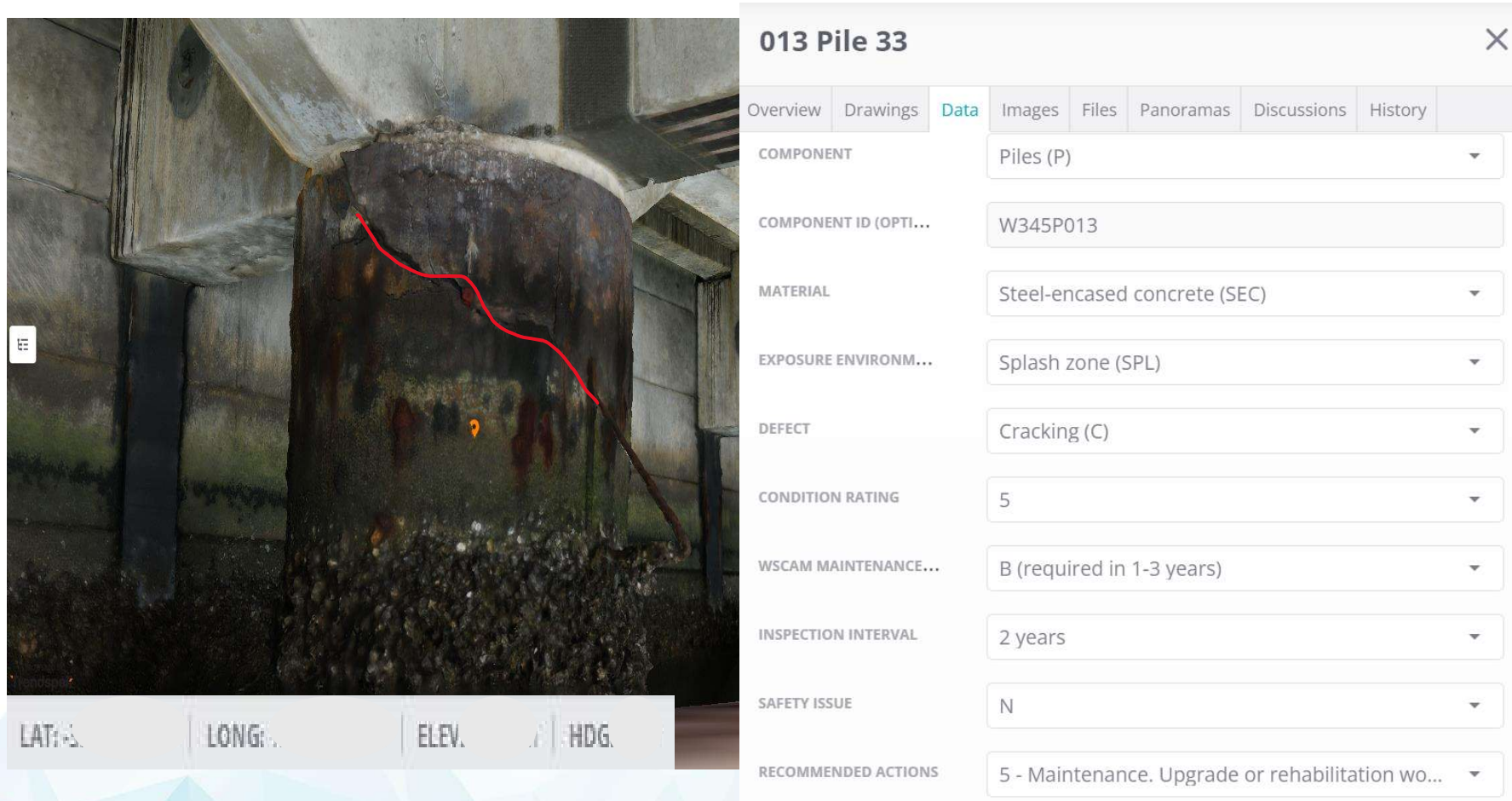
- Precise Location – under wharf inspections (i.e. no GPS signals).
- Type of software used for viewing – allows for measurements to be taken, and defects to be annotated and recorded.



MODELS FOR WSCAM PURPOSES

- Annotated models can include fields for WSCAM requirements including:
 - Component ID
 - Defect Type
 - Condition rating
 - Defect size and location (coordinates)
- These same models can be integrated with existing databases and GIS systems, which would allow the condition of an individual element to be followed over time.

EXAMPLES OF WSCAM SURVEYS



The image shows a close-up of a pile with a prominent red crack line. A data entry form is overlaid on the right side of the image, titled '013 Pile 33'. The form includes tabs for Overview, Drawings, Data, Images, Files, Panoramas, Discussions, and History. The 'Data' tab is active, showing the following fields:

Field	Value
COMPONENT	Piles (P)
COMPONENT ID (OPTI...	W345P013
MATERIAL	Steel-encased concrete (SEC)
EXPOSURE ENVIRONM...	Splash zone (SPL)
DEFECT	Cracking (C)
CONDITION RATING	5
WSCAM MAINTENANCE...	B (required in 1-3 years)
INSPECTION INTERVAL	2 years
SAFETY ISSUE	N
RECOMMENDED ACTIONS	5 - Maintenance. Upgrade or rehabilitation wo...

At the bottom of the image, there are fields for LATITUDE, LONGITUDE, ELEVATION, and HDG.

ADVANTAGES OF 3D MODELS

- Access constraints.
- Safety considerations.
- Inspection of structures (whole structure).
- Better programming of maintenance works.
- Reduction in overall inspection costs.
- Visibility on detailed test areas before arriving to site.



BEYOND WSCAM

- As-built drawings can be confusing, inaccurate or unavailable.
- The Digital Twin models can provide accurate location and scale information as well as the actual condition.
- The models can be utilised for point cloud information to create BIM or structure drawings.
- Accurate measurements of defects as well as exact locations are supplied, which helps in accurately pricing of maintenance jobs.
- Models can be shared with maintenance staff, consultants and contractors. Work sites can be viewed online, where access and maintenance work can be planned more effectively.
- Quality control during repair works are captured at various points in time and back saved to the model.

WSCAM SURVEYS –VIA DIGITAL TWIN



CONCLUSION

Transforming Wharf Inspections with Digital Twin Technology

Optimized WSCAM Assessments: Enable proactive maintenance and targeted repairs through precise condition assessments.

Enhanced Safety and Efficiency:

- Mitigate risks associated with manual inspections by adopting drone-enabled, photogrammetry-based 3D models for comprehensive wharf assessments.
- Models can be shared internally as well as with consultants and contractors to better understand the structure, the nature of defects, allow for better planning and more accurate remediation pricing.

QUESTIONS





THANK YOU.

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