

Perils, Pitfalls and Progress: Navigating Design and Installation of SHMS

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Introduction

- SHMS—no such thing as typical! The variety is everywhere:
 - Sensor types and measurement quantities
 - Location → power and communication availability
 - Location → asset owner requirements
 - Data acquisition system
 - Data/cloud management
 - Data manipulation/calculations
 - Bespoke dashboarding



Case Studies— enjoy the variety, deal with the complexity

■ Bridge 1, WA

- 14 strain channels plus camera and trigger
- No internet (Satellite comms)
- No power (Solar panels)
- Hot and remote
- Duration: 3-5 years



■ Bridge 2, NSW

- 2 inclinometers, 4 displ
- Alerts required regarding corroded abutment anchors
- Successful identification of one failure and fast response
- Duration: 3 years

■ Gantries, NSW

- 6 strain channels
- Inside a rail corridor
- Bluetooth access from outside corridor
- No power (Solar panels)
- Duration: 1 year

■ Mining structure, WA

- 52 strain, 60 accel, 4 temp, weather
- Fibre-optic & copper sensors
- connected to client systems
- Very tight timeframe
- Duration: 5 years

Peril – Progress under pressure (timing)

Problem:

- ☠ Fast project timelines → equipment choices are limited or non-existent
- ☠ Client processes may also contribute to reducing the available time-frame

Solution:

- ✓ Make do! Perfect is not always achievable
- ✓ Think laterally and find alternative options
→ may require some redesign
- ✓ Find alternative purchasing pathways

Example– Mining structure



Pitfall – Restrictive client specifications

Problem:

- ☠ Initially unknown requirements affect equipment selection and installation practices
- ☠ Exceptions to client standards require time

Solution:

- ☑ Flexibility in design
- ☑ Communications is critical!!!

Example– Mining structure



Peril – Equipment failure

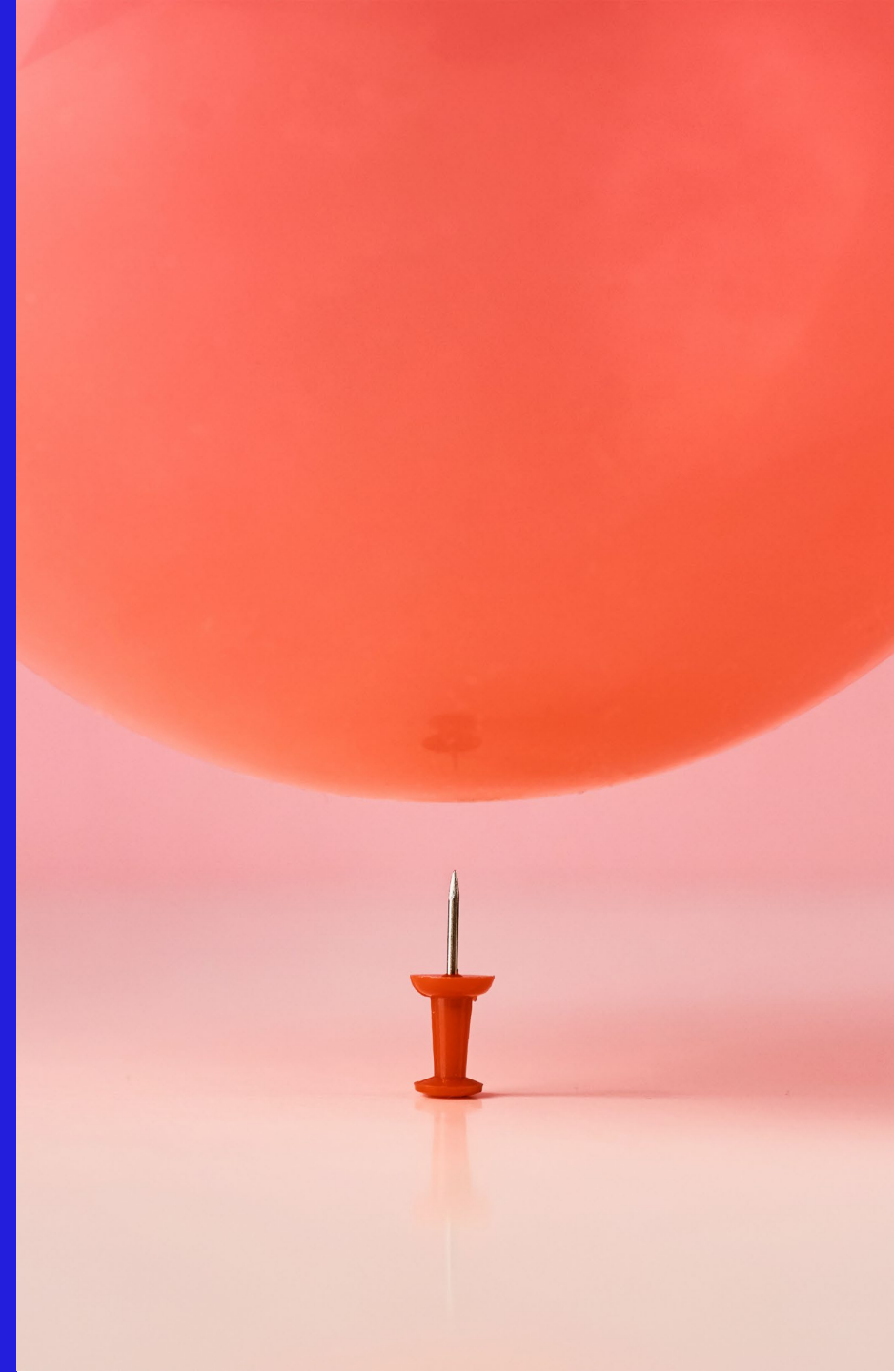
Problem:

- ☠ Every piece of equipment can fail!!!
(this is particularly problematic when the SHMS is extremely remote)
- ☠ Windows...

Solution:

- ☑ Communication with client, preliminary plans to overcome potential issues
- ☑ Scheduled restarts, remote power switching capability built into the system
- ☑ Redundant/ backup sensors
- ☑ Allowance for a repair/ troubleshooting visit

Example– WA Bridge, Gantries



Pitfall – Third party installation

Problem:

- ☠ Communication
- ☠ Execution
- ☠ Dealing with installation errors

Solution:

- ☑ Don't play the whispering game – direct communication with the installer
- ☑ Work hard on documentation
- ☑ Checks, checks and more checks

Example– Mining structure



Pitfall – Data management

Problem:

- ☠ If we measure everything all the time then data sizes become very large

Solution:

- ✓ Work smarter, not harder
- ✓ Staged approaches – record everything to start then reduce quantity of data recorded
- ✓ Step back and think hard about what is required vs ‘nice to have’
- ✓ Statistics are your friend

Example– WA bridge, Gantries

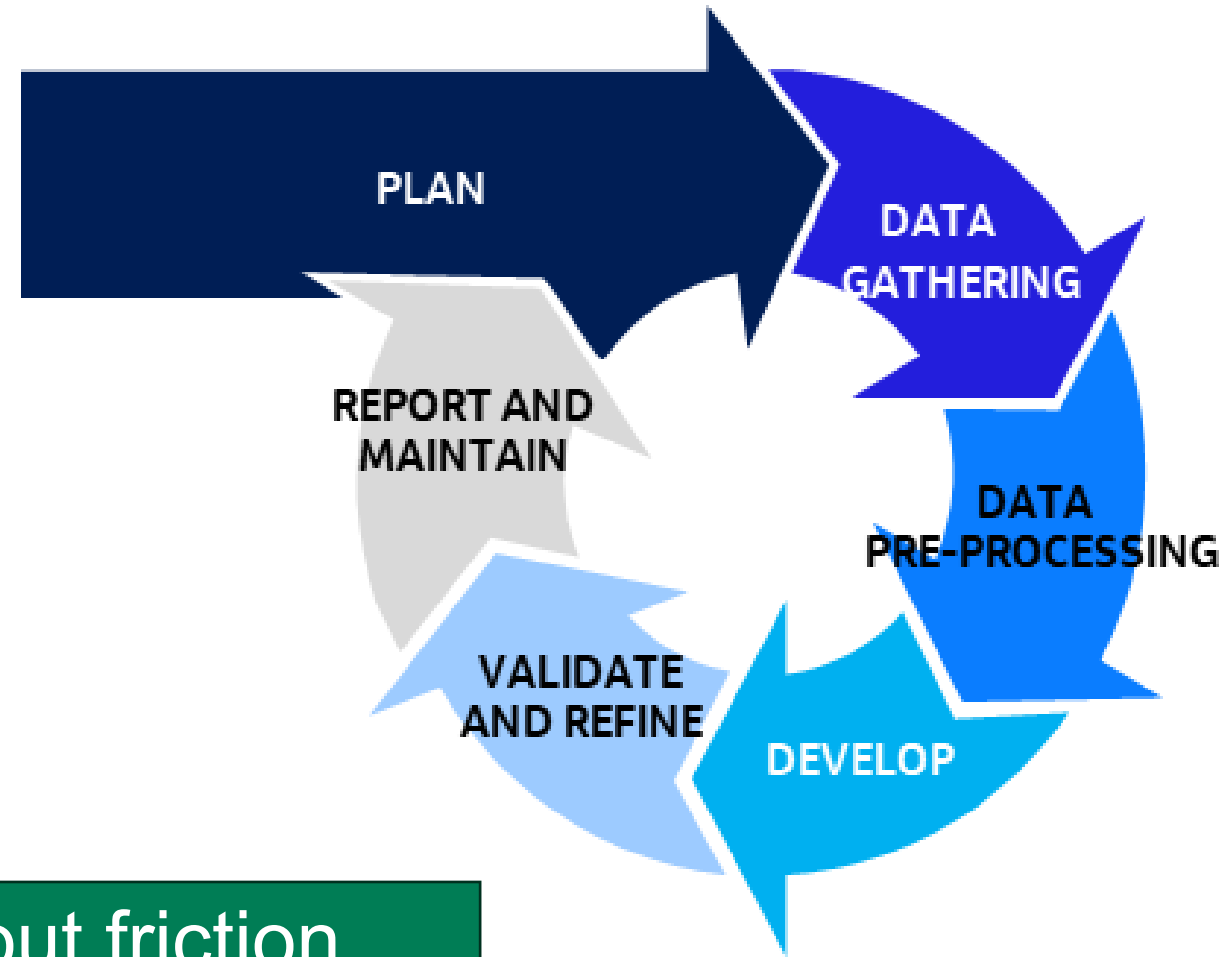


Progress...

- To deliver a quality SHMS we must be doggedly determined to overcome multiple obstacles.
- Variety is great but brings on multiple challenges.
- Flexibility is a must.

“The gem cannot be polished without friction,
nor ~~man~~ perfected without trials.” - Confucius

SHMS



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