

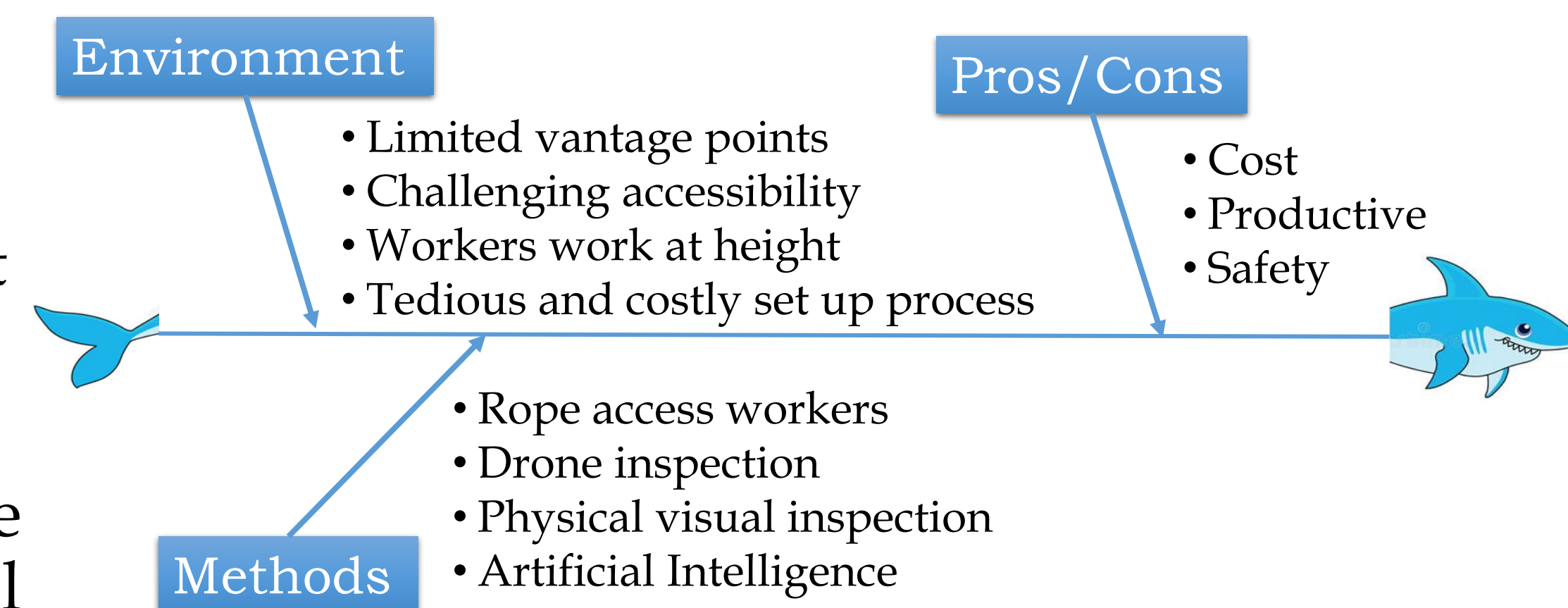


INTRODUCTION

Under Building Construction Authority (BCA) regulations, It is required for buildings above 20 years old to conduct building façade inspection every 7 years in order to identify abnormalities.

The conventional method of façade inspection is using rope access workers to visually inspect the façade from ground level, vantage points and openings. This process is labor intensive, consumes time, unproductive, costly and involves high level of work at height risks.

Utilizing a Fish-Bone diagram, the team researched the various methods of conducting the façade inspection, considering the pros and cons of each system. The method of selection shall be based on safety, efficiency and productivity.



OBJECTIVES

Reduce/mitigate risks involved in building façade inspection

Increase productivity, efficiency and reduce cost

RESULTS

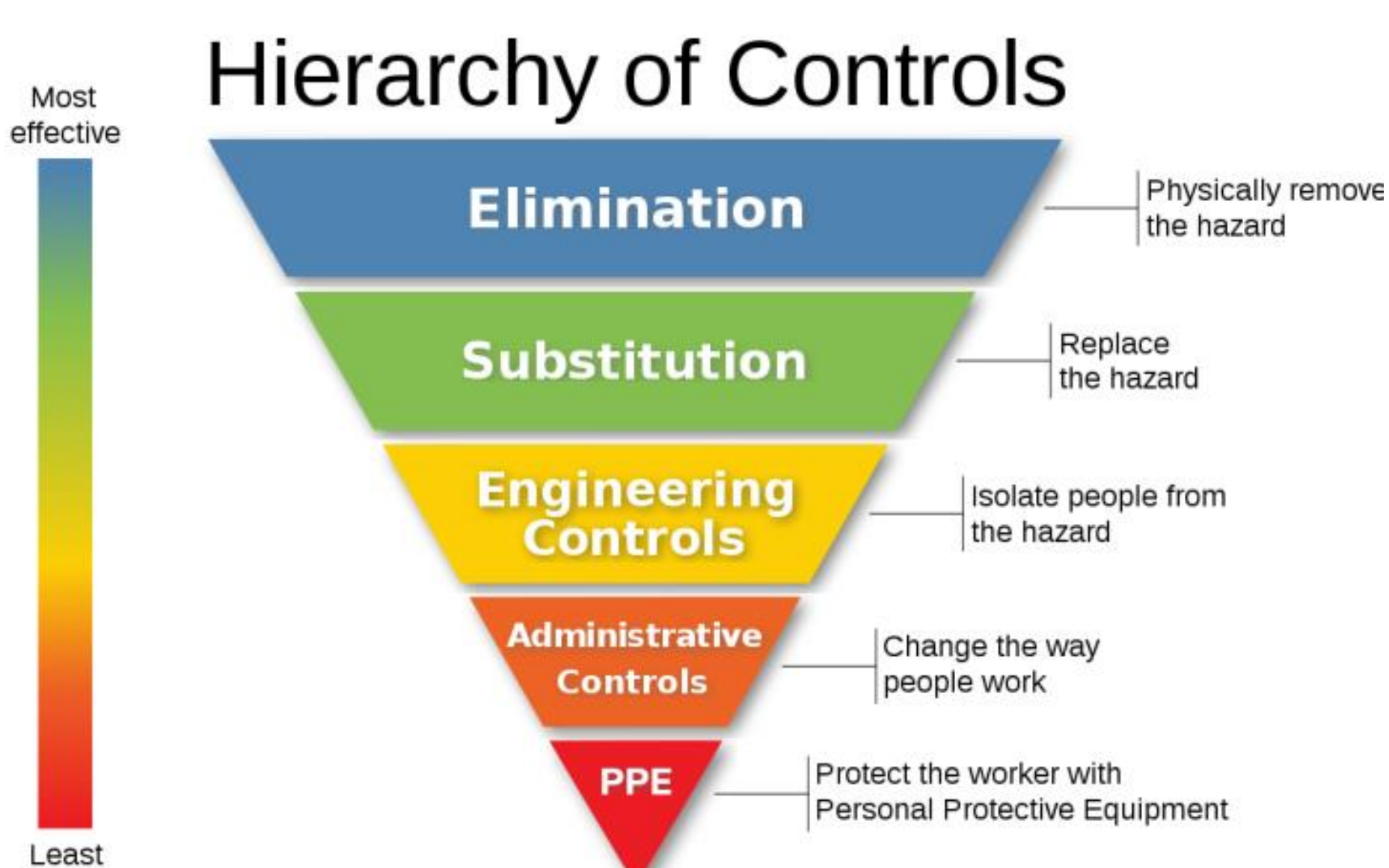
1) In terms of Safety

- Drone with AI method, minimal risks under controlled environments.
- Rope access technician method, Multiple risks such as worker fatigue, WAH, multiple equipment falling.
- Increase risk control from lowest hierarchy level
- PPE to Most effective "Substitution" of hazard

2) In terms of Productivity/Efficiency

- Drone with AI method, able to maneuver easily resulting in fast completion
- Rope access technician method, not able to maneuver easily, resulting in slow process this, productivity is low.
- Typical Building Façade Inspection using conventional methods will take approximately 2 weeks (2 workers, 1 supervisor) / 336 man hours to complete vs Drone Façade Inspection is able to be completed within 3 days (1 pilot and 1 worker) / 48hours. Total saving of 288 man hours.

This methodology is more cost saving, efficient and most importantly, safer to conduct the needful façade inspection



METHOD



Conventional method

- Uses rope access, technicians maneuver around the building with photography equipment to capture the building's façade condition

- Manpower intensive, unproductive, and exposing staff to potential Work at Height Risk (WAH)

- Photos are compiled, a Professional Engineer (PE) reviews the photos, identify defects, and make recommendations to Hospital Representatives

- Uses drones to scan the perimeter of the building façade, eliminating the need of workers to WAH

- Using artificial intelligence (AI), the drone picks up defects, abnormalities, and reports in the software

- The PE verify and validates the defects and abnormalities generated by the drone, then make recommendations to Hospital Representatives.

Proposed method



Defect Type - Worn off rubber gasket **Severity** - Require Repair **Details** - Worn off rubber gasket **Resolution** - Replace the rubber gasket and ensure the water and air tightness.

CONCLUSION

- ✓ Understanding risks, mitigation/substitution of works to a safer process
- ✓ Better understanding of AI technologies and its application
- ✓ Using technologies does not translate to higher cost, as shorter duration and lesser manpower is required
- ✓ Better safety awareness
- ✓ Shorter duration of project completion
- ✓ Feasibility of utilizing drones, AI, or both on other projects