

# CONTRIBUTION OF UAS MONITORING TO SAFETY PLANNING AND CONTROL

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# INTRODUCTION

- The safety management in construction sites by traditional methods face difficulties such as **inspection of large construction sites, manual processes prone to errors and inadequate information sharing.**
- The adoption of the UAV for the management of safety at construction sites has stood out due to its ability to:
  - capture images and videos of large areas,
  - reducing data collection and processing time,
  - and identifying the identification of risk situations.
- The UAS monitoring supports **activities workflow, enables the identification of safety and production trade-offs, and anticipates risk situations faced by workers, as well as interferences between processes.**

## RESEARCH PROBLEM

- Few studies have explored UAS monitoring to assist Safety Planning and Control (SPC)(Melo and Costa, 2019; Martinez et al., 2020)

## MAIN OBJECTIVE

- This study suggests a **set of managerial practices and indicators to incorporate the information provided by UAS monitoring into SPC.**
- The work was developed based a case study.

# RESEARCH METHOD

Awareness

Suggestion

Implementation

Evaluation and Conclusion

Scope of  
this paper

1<sup>st</sup> implementation

1<sup>st</sup> evaluation (Management team and front-in-line workers)

## Implementation

- 14 weeks in Project A (residential condominium)
- Artifact: practices and indicators to incorporate the UAS safety monitoring using the Smart Inspects System into the SPC process

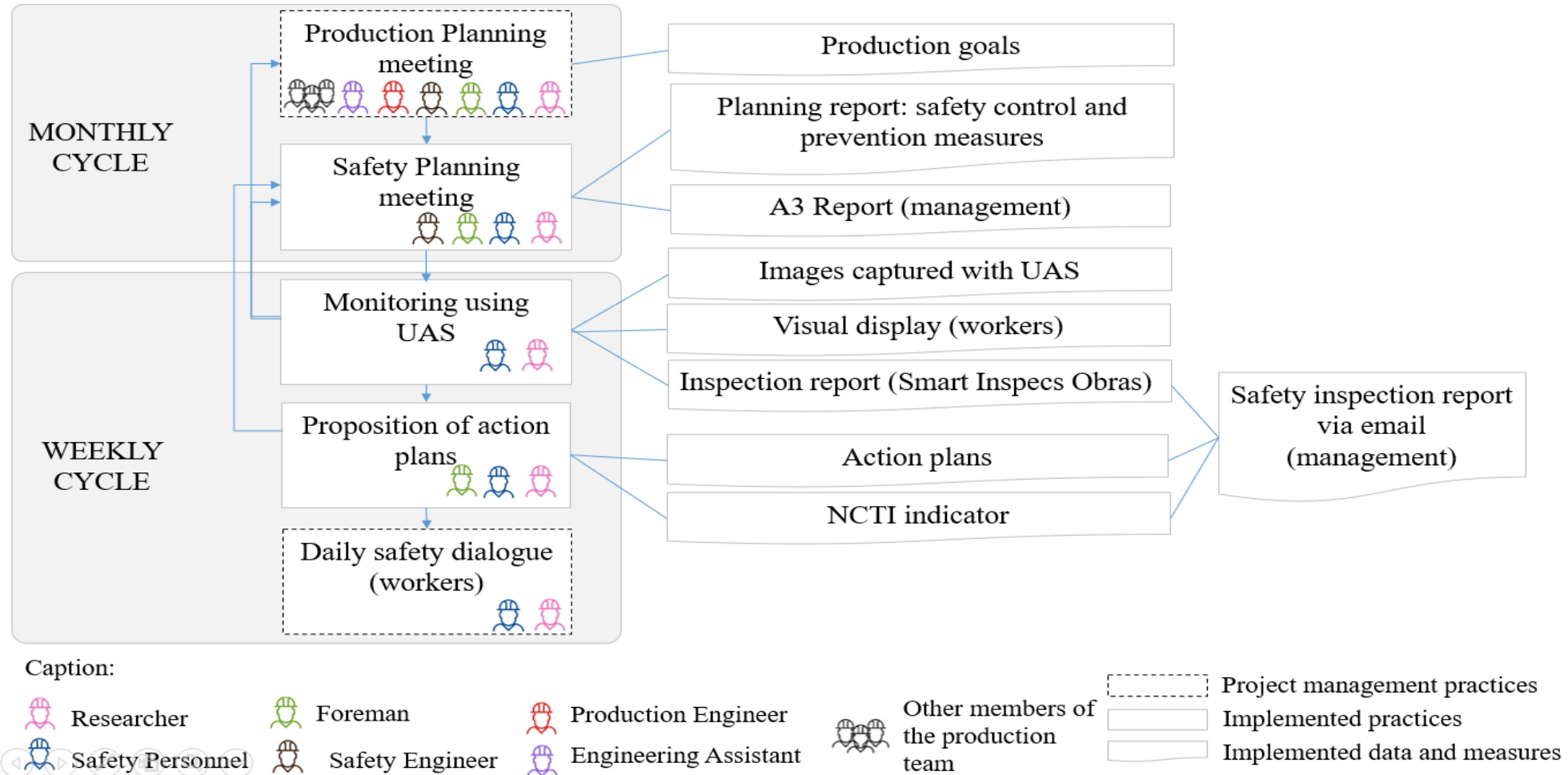
## Evaluation

- Interviews with the management team (n=5)
- Interviews with workers (n=22)
- Constructs: collaboration, transparency, utility

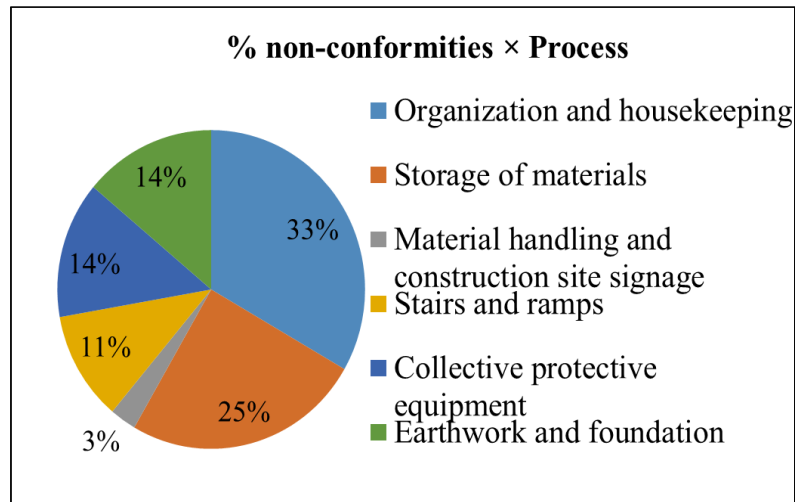
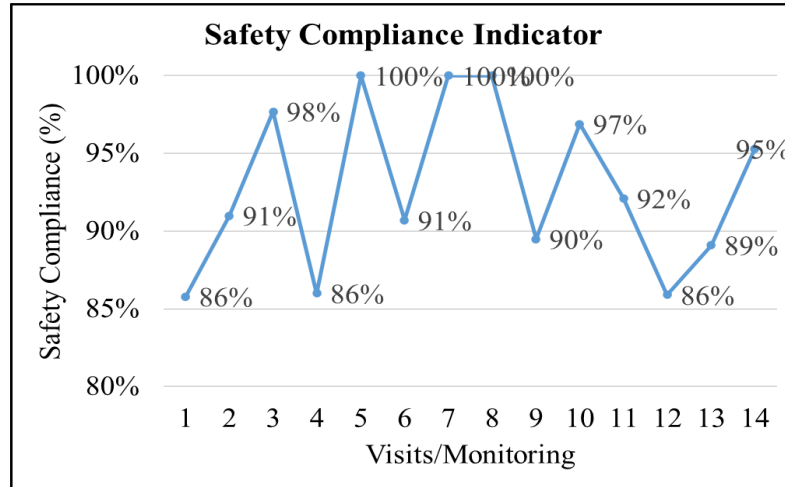
# RESEARCH METHOD

## Proposed artifact:

Set of practices and indicators to incorporate the UAS safety monitoring using the Smart Inspects System into the SPC process



# RESULTS AND DISCUSSION



- **Safety Compliance Indicator = 93%** (average)
- **Total of 36 non-conformities identified**
- **Organization and housekeeping (33%), material storage (25%), and collective protective equipment (14%).**
- **Nonconformities Treatment Indicator = 78%** (average)
- **The time taken to carry out the corrective actions was 1 to 3 weeks**

# EVALUATION OF THE ARTIFACT

## Collaboration

- Data and measures adopted have a **high to a very high level of efficiency** in sharing safety information.
- Highlight for the **relevance of the images collected with UAS** and the **visual display** to **improve communication**.
- **Collaboration** between the **production and safety teams** and increase the **Foreman's participation** on the **decision-making process**.

## Transparency

- **Better understanding of the safety conditions** due to the aerial images captured by UAS.
- The workers interviewed (n=22) reported a **high level of understanding about the information presented on the visual display**

# EVALUATION OF THE ARTIFACT

## Utility

- The safety planning meetings and the definition of action plans allowed **identifying challenges in resource acquisition** and the elaboration of effective planning with a focus on safety
- Improved **ability to anticipate and eliminate safety constraints.**
- 77% of the workers' interviewed (n=22) noted a **very high** in the **organization and housekeeping aspects, adequate waste disposal, and construction site signaling.**
- Difficulty to the incorporation of the overwork and prioritization of production goals by managers.



# CONCLUSIONS

The Smart Inspects System and the practices implemented **improve visual management** through the visual display, images collected with UAS, and A3 report.

Data and measures proved to be helpful to **enhance safety training and workers' risk awareness**

Promoting more **consistent safety planning meetings and anticipating and eliminating safety constraints**

**Limitations:** the non possibility to inspect safety requirements **within buildings** and the practices and indicators were **implemented only in Project A.**

**Future research:** investigate **how to use the information provided** by UAS to improve SPC in the **medium and long planning term**, as well as use the information to increase the engagement and participation of workers in safety practices

# THANK YOU!

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