

Windmill Maintenance

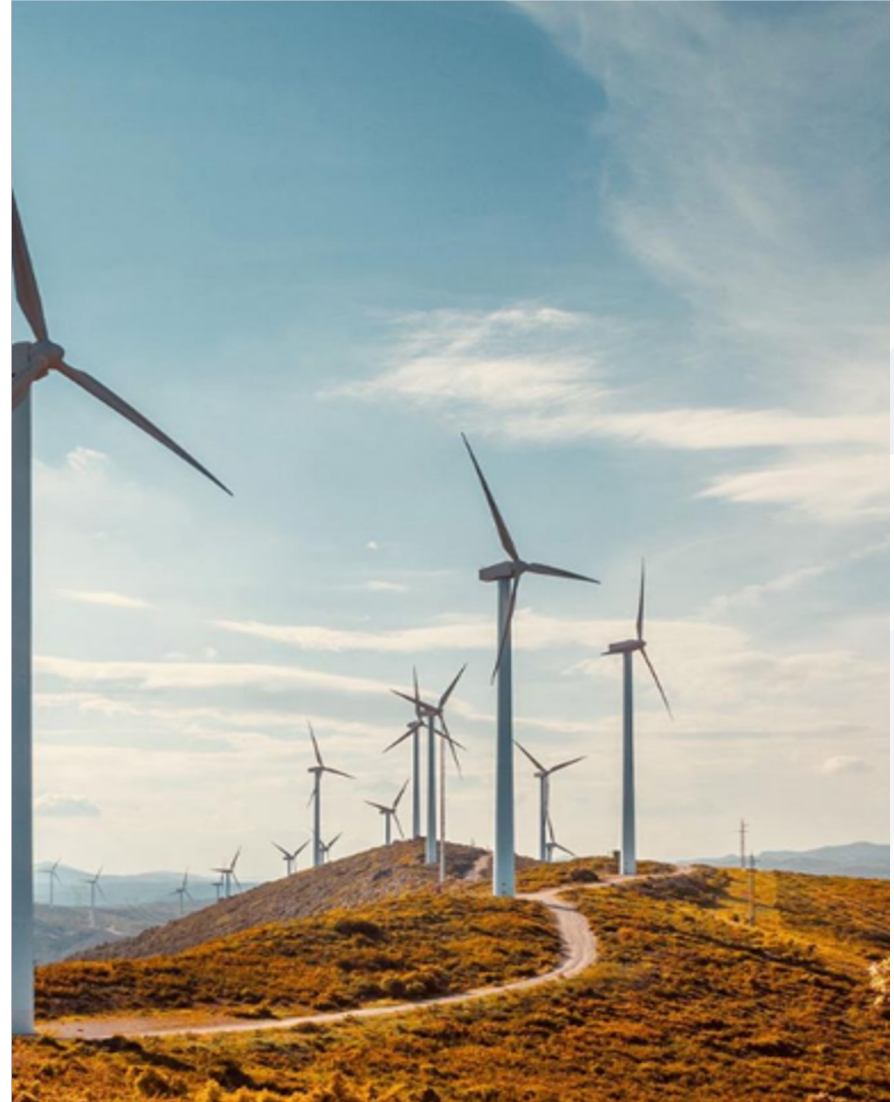


NebulOuS

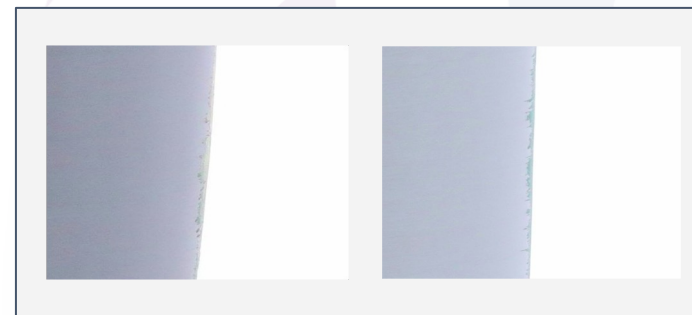
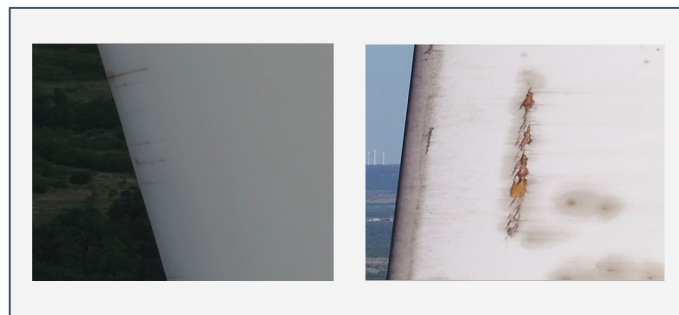
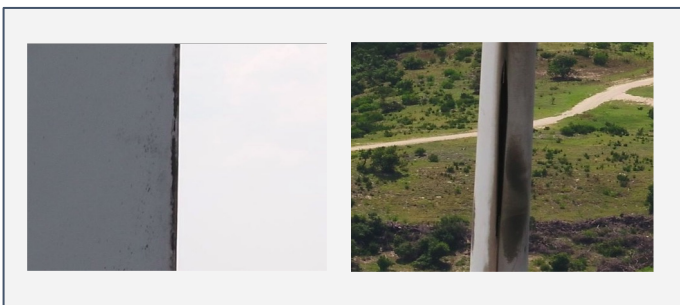
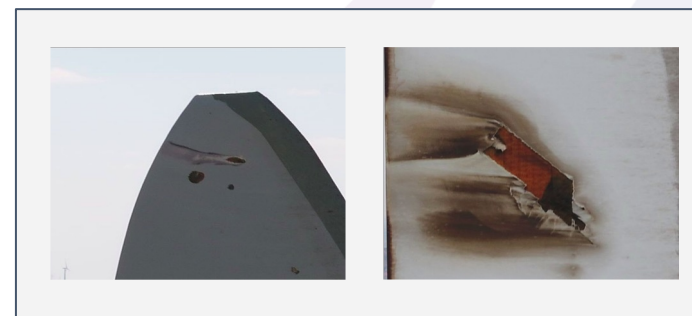
Michał Kłosiński, TTA
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Agenda

- Wind turbine inspection
- Use case background
- Cloud data processing pipelines
- Data processing approach with NebulOuS
- Software stack
- Deployment
- Data format

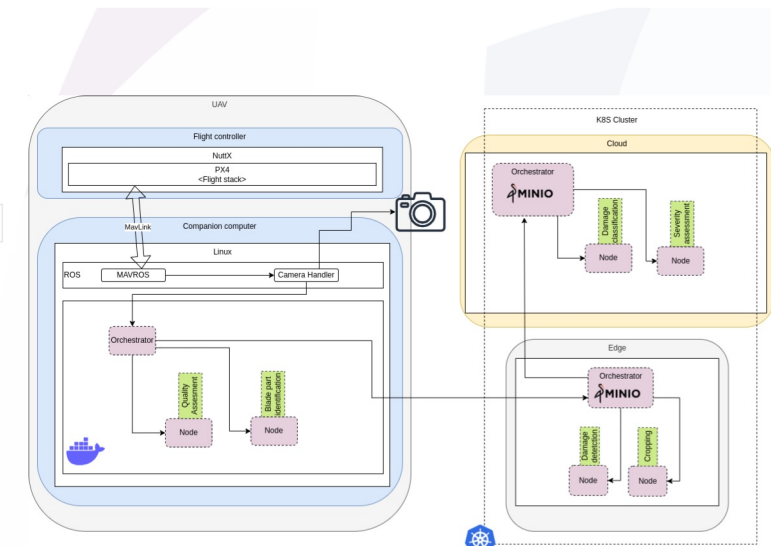
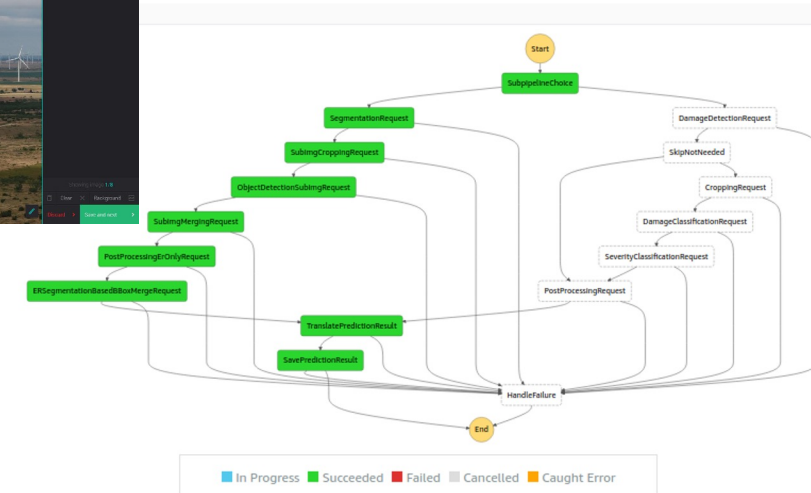


What we are working with ?

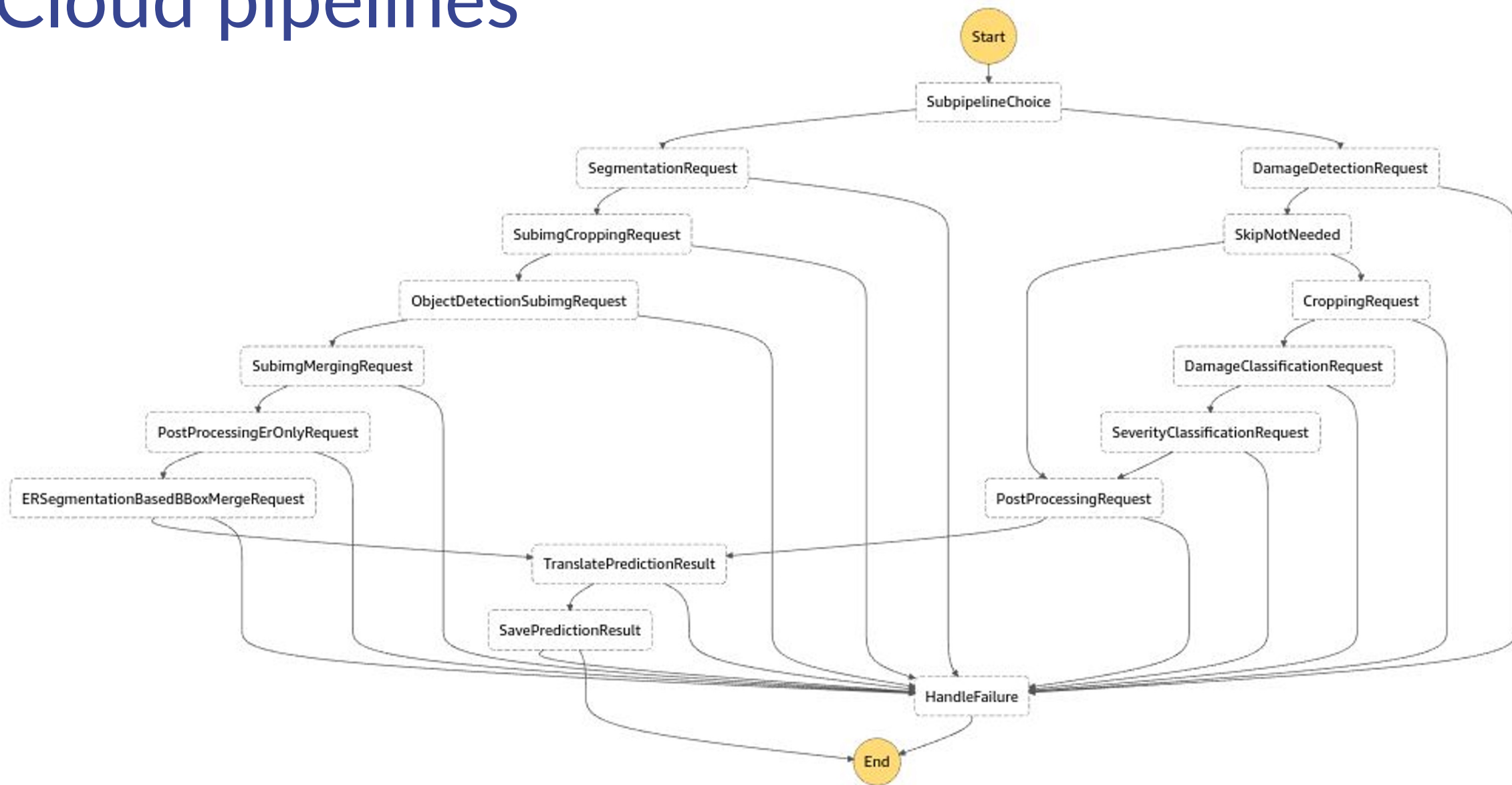


TTA Background

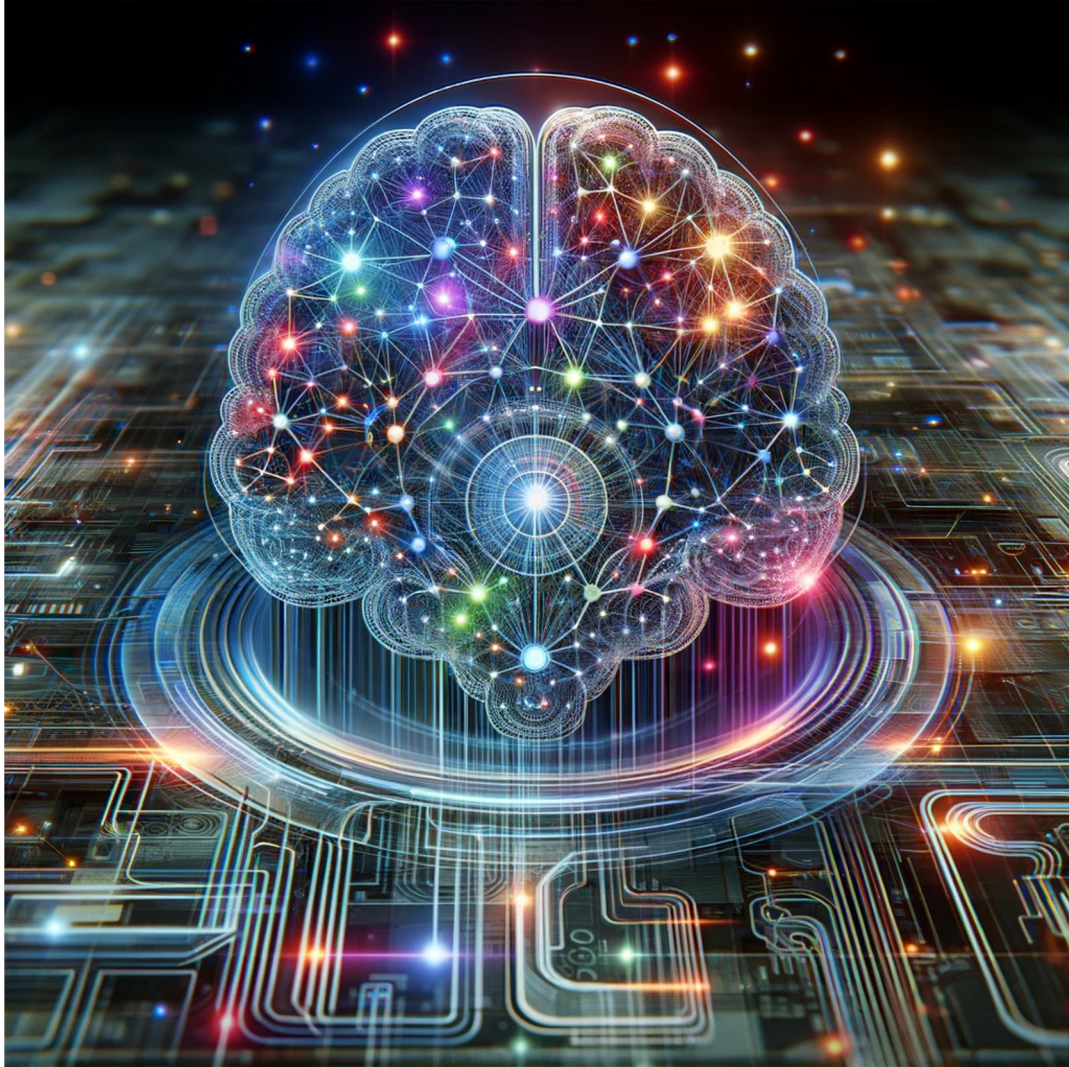
- AirFusion: Cloud Asset Management platform
- Generic AI model integration
- Custom solution using dedicated model
- Flexible multi-step image analysis pipeline
- TTA: Next-gen data processing pipeline
- NebulOus: Seamless data processing on UAV, edge and cloud.



Cloud pipelines



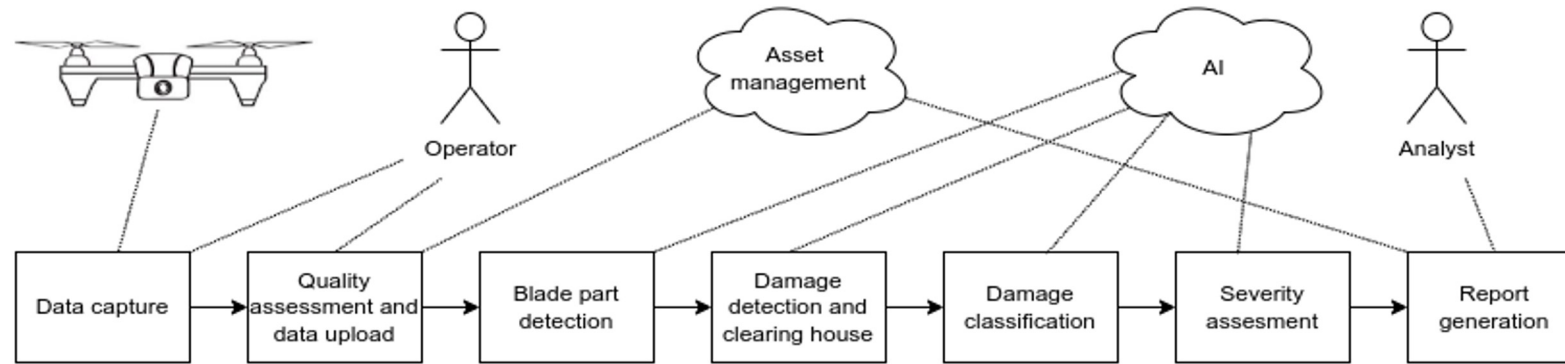
Algorithms behind



- Multi-step pipeline vs single model
- Trying out different algorithms and hyperparameters
 - Detection (YoloV2/V3, Detectron2, Faster-RCNN, EfficientDet)
 - Classification (Densenet121/201, Mobilenet, 3-5 layer CNNs, BiT Resnet)
 - Segmentation (PSPNet, Densenet), Unsupervised segmentation algorithms (GrabCut, kmeans/slic/felzenszwalb, other custom ideas)
- Pretrained weights, augmentation, anchors, noisy cropping data for classifiers
- Severity regression/classification
- Finding similar damages labeled differently
- Background replacement

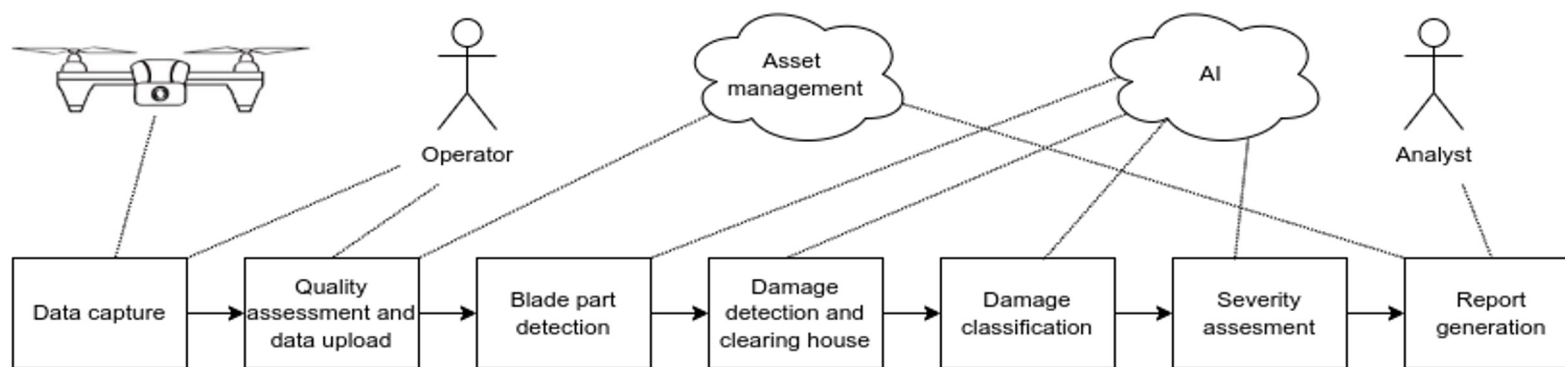
Process transformation

Before

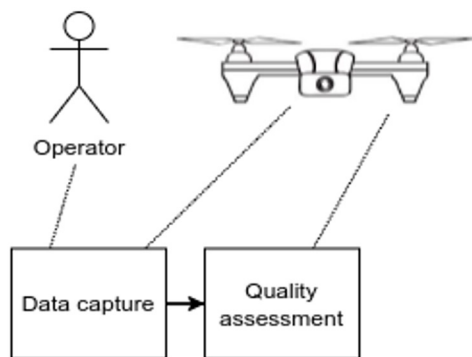


Process transformation

Before

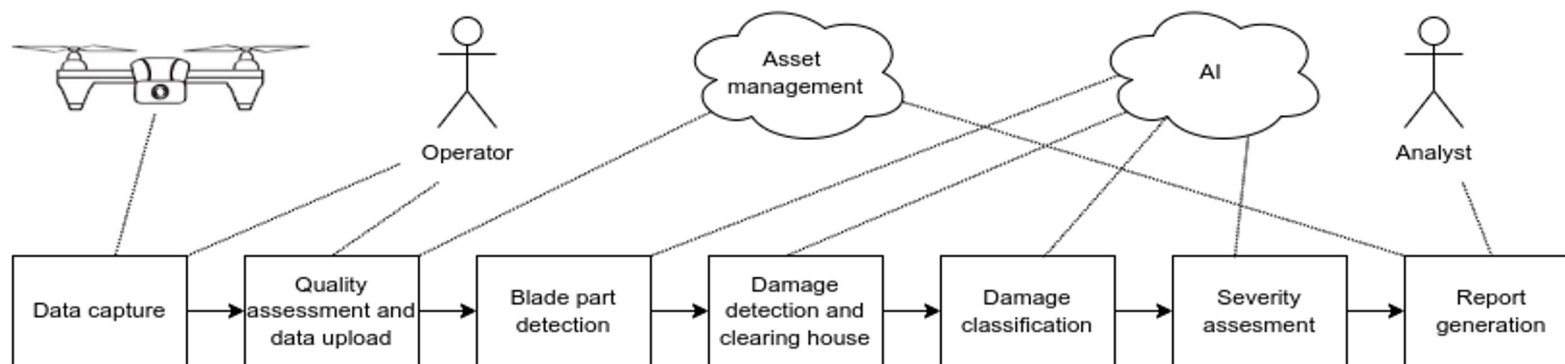


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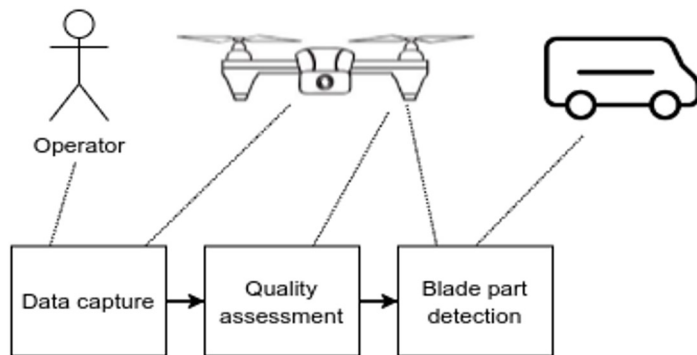


Process transformation

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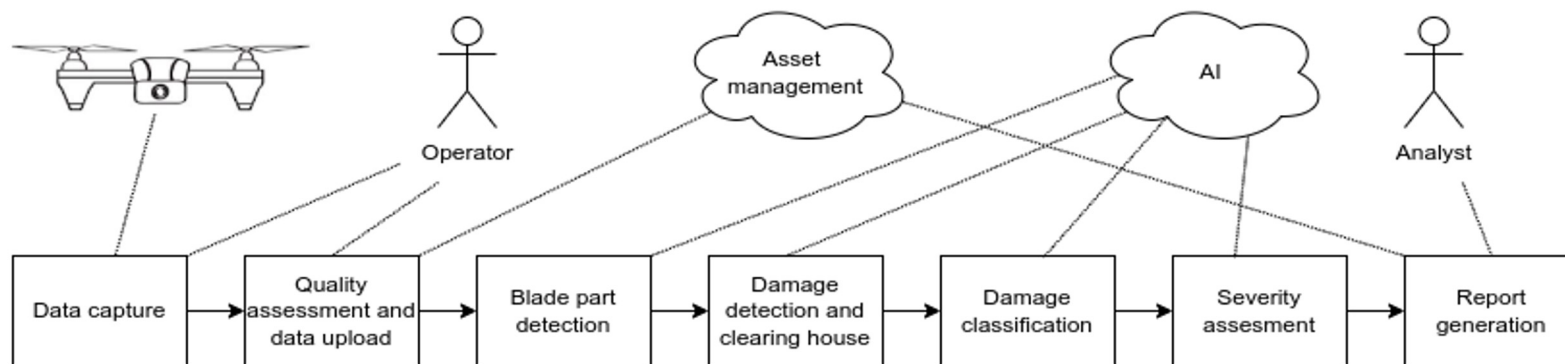


After

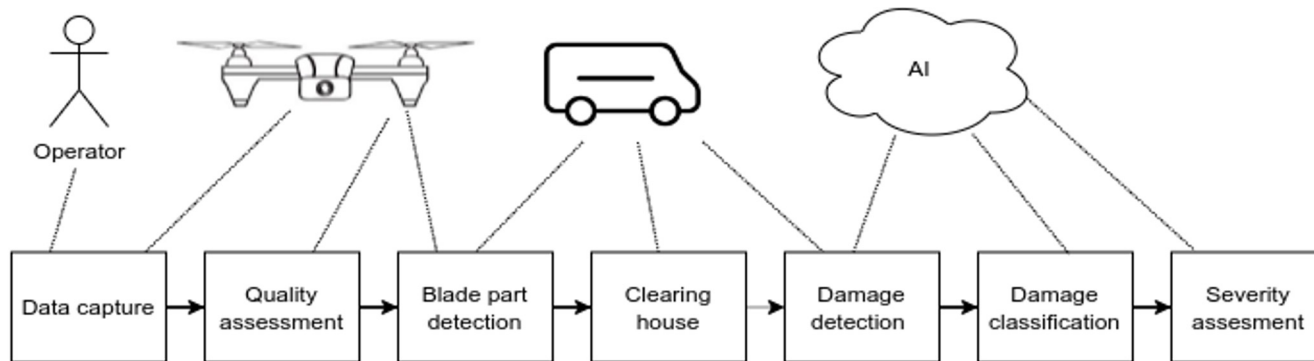


Process transformation

Before

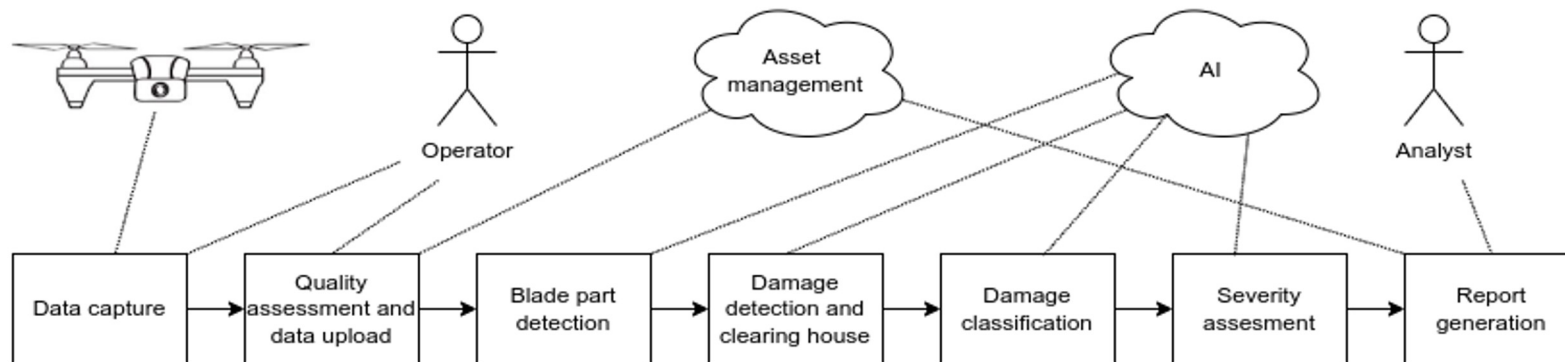


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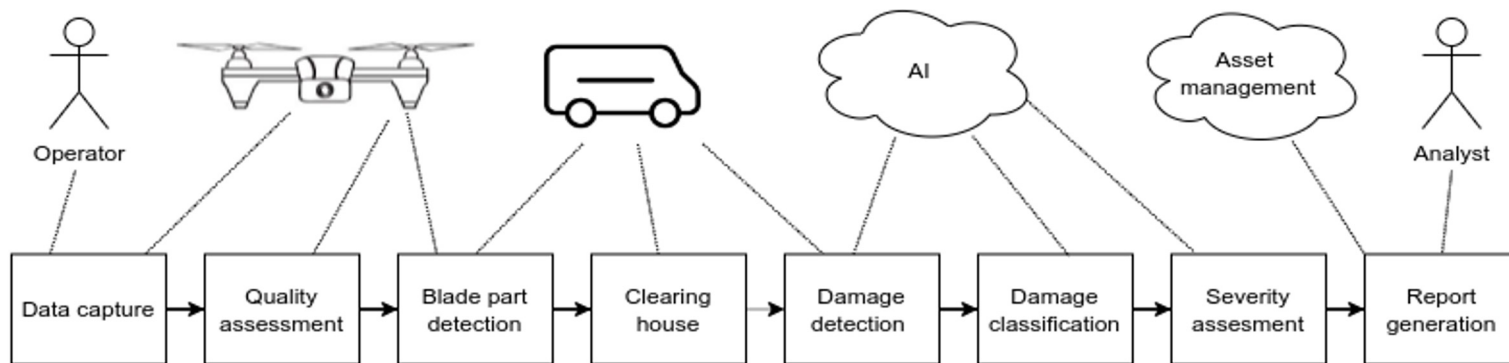


Process transformation

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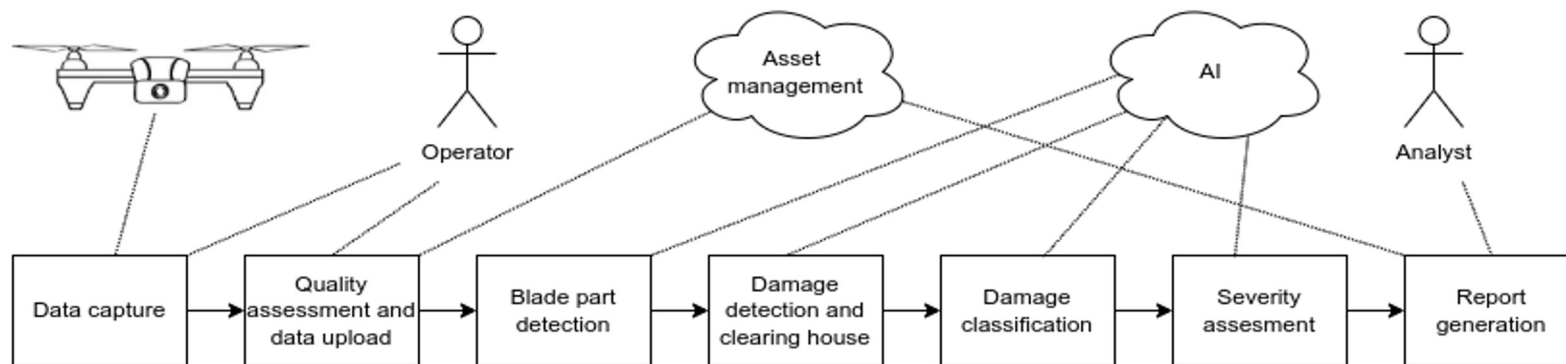


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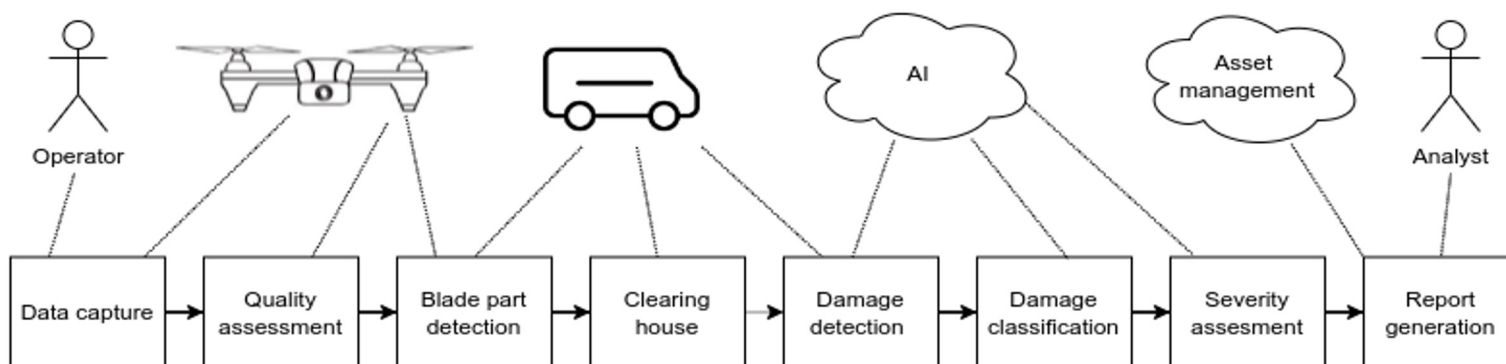


Process transformation

Before



After



Key differences

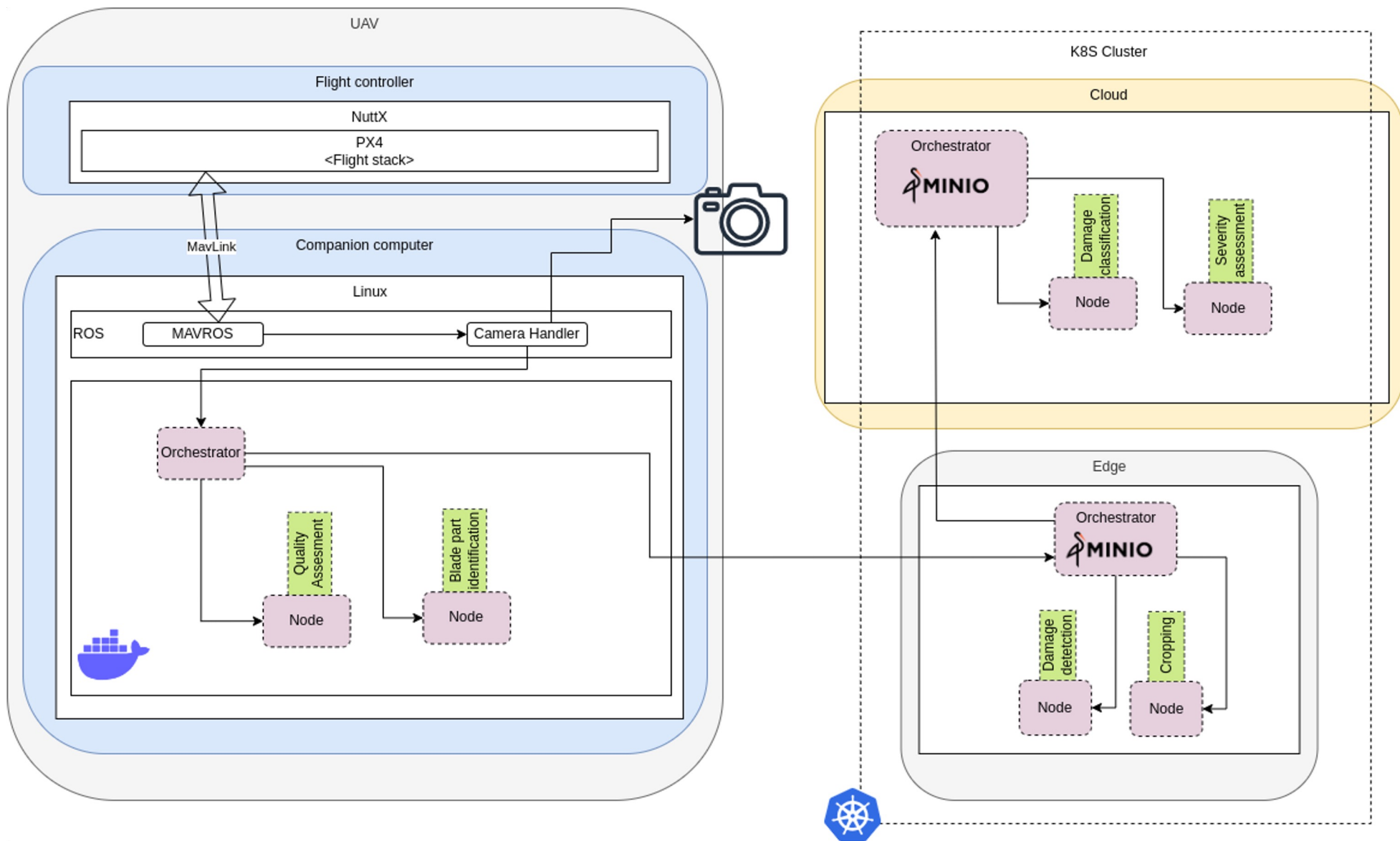
Before:

- Manual quality assessment
- Manual data upload
- All processing done in the cloud
- Batch process

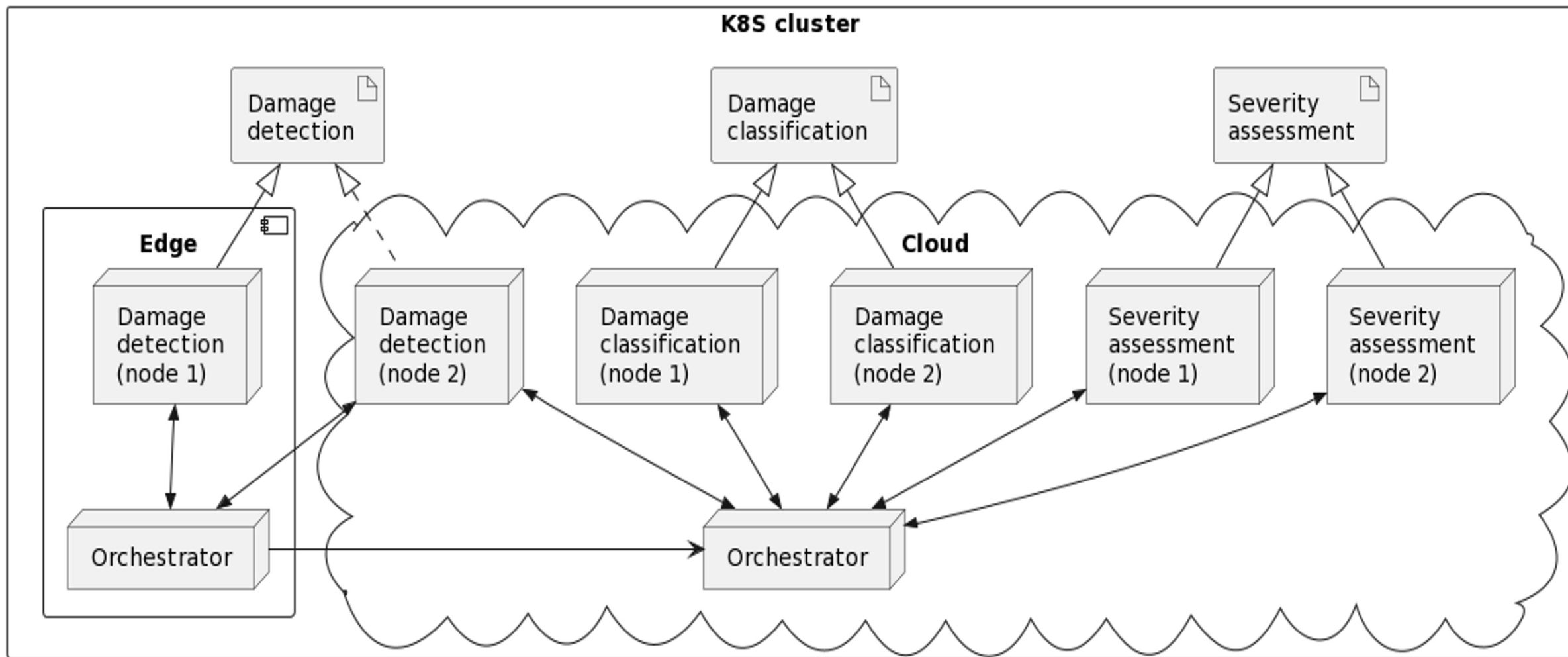
After

- Immediate quality feedback
- No dedicated data upload step: automated process involving initial data analysis
- Asset management application involved only after data is processed
- On-line process

Software stack



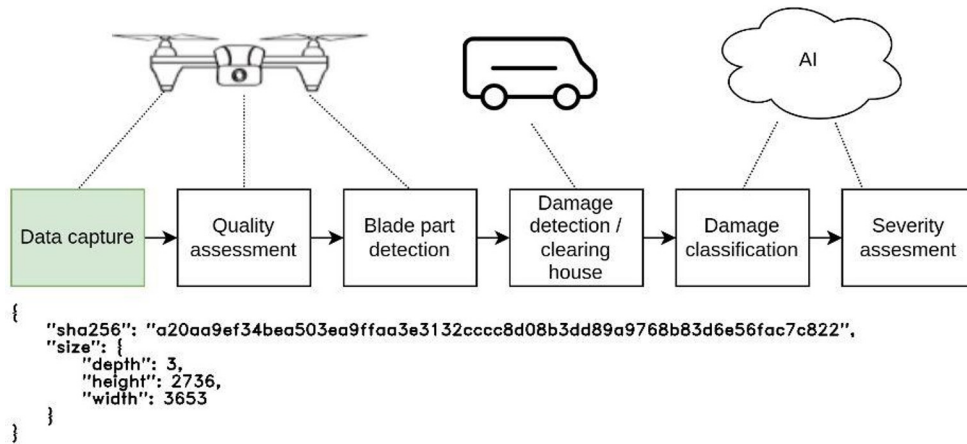
Deployment perspective



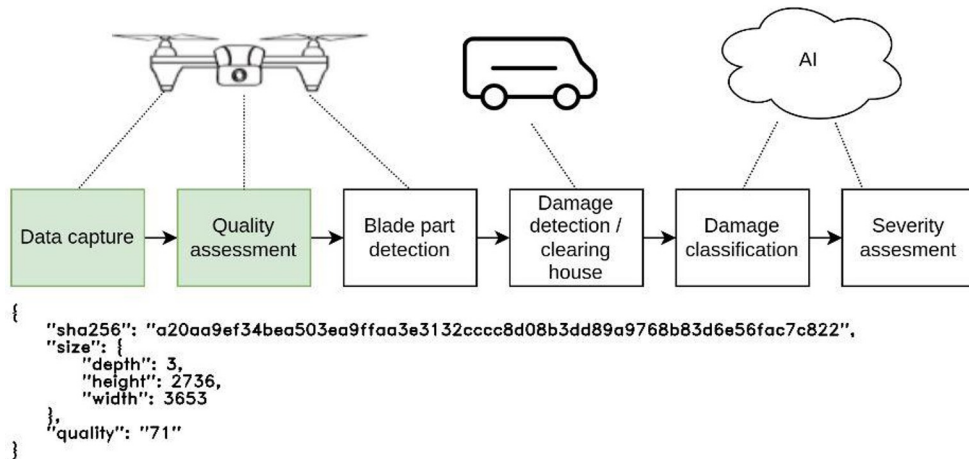
Collected data



Collected data

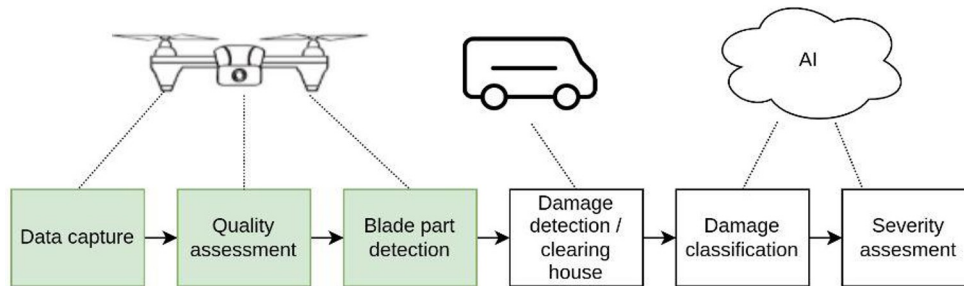


Collected data



Quality: 71

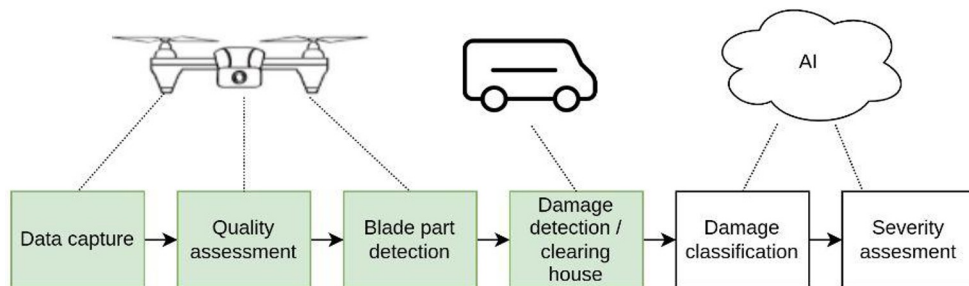
Collected data



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Collected data



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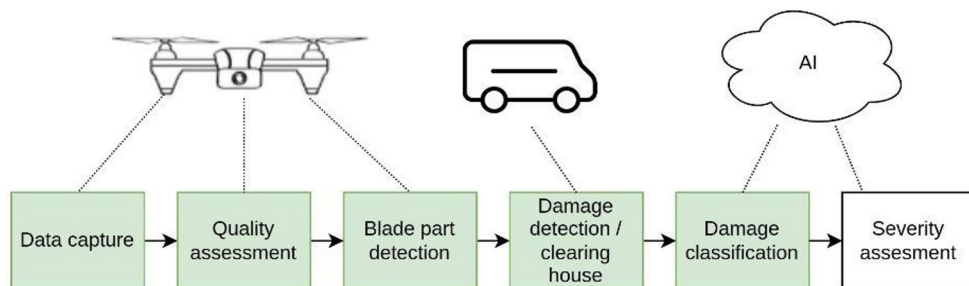
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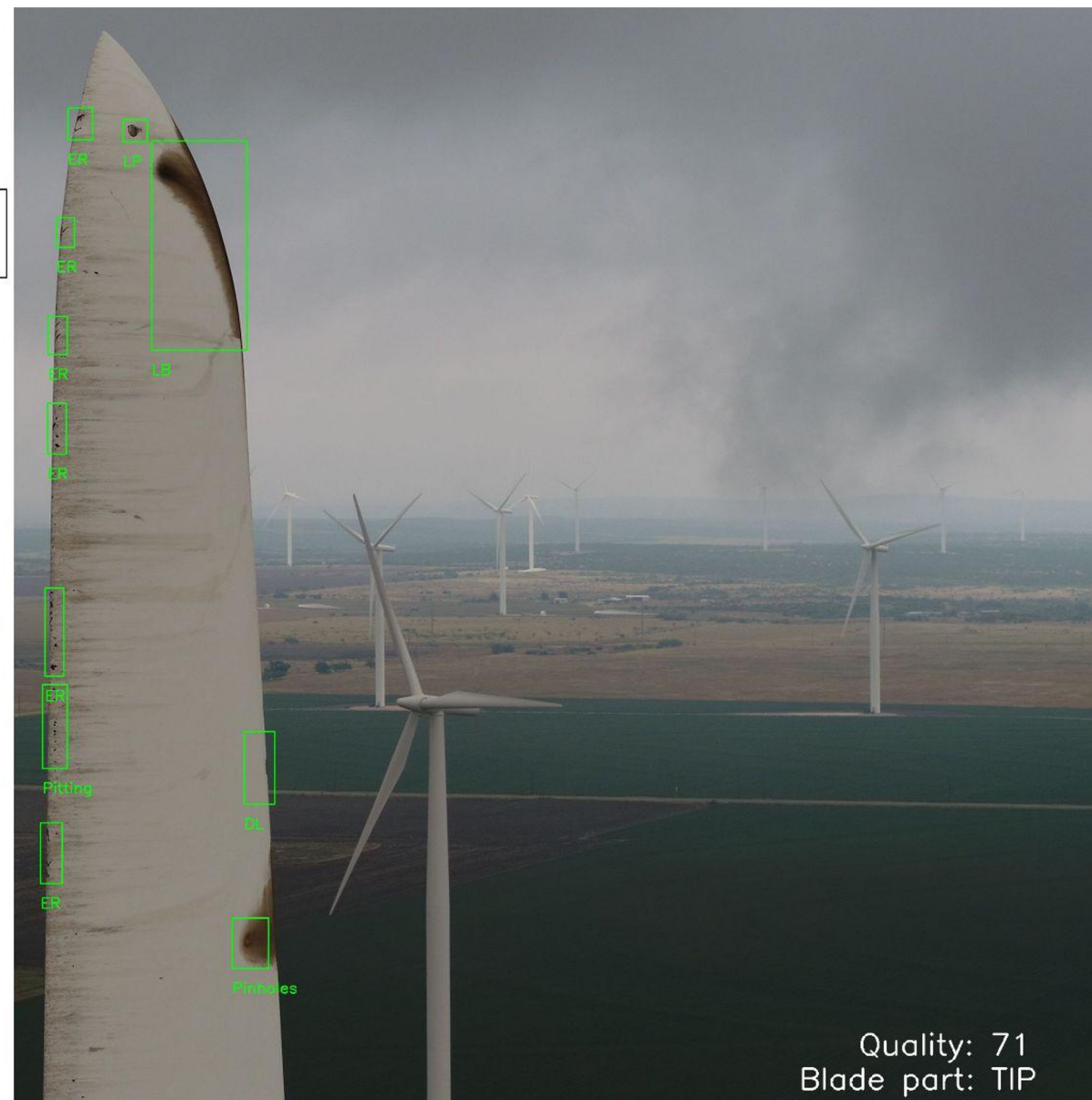
Quality: 71
Blade part: TIP

Collected data



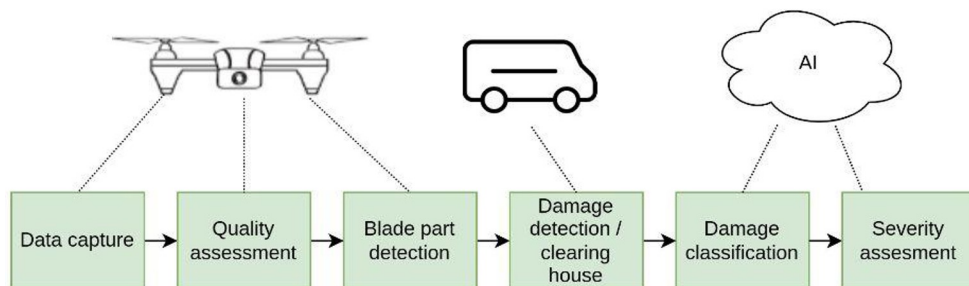
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Quality: 71
Blade part: TIP

Collected data



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```



Quality: 71
Blade part: TIP



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Questions ?



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Thank you.

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