



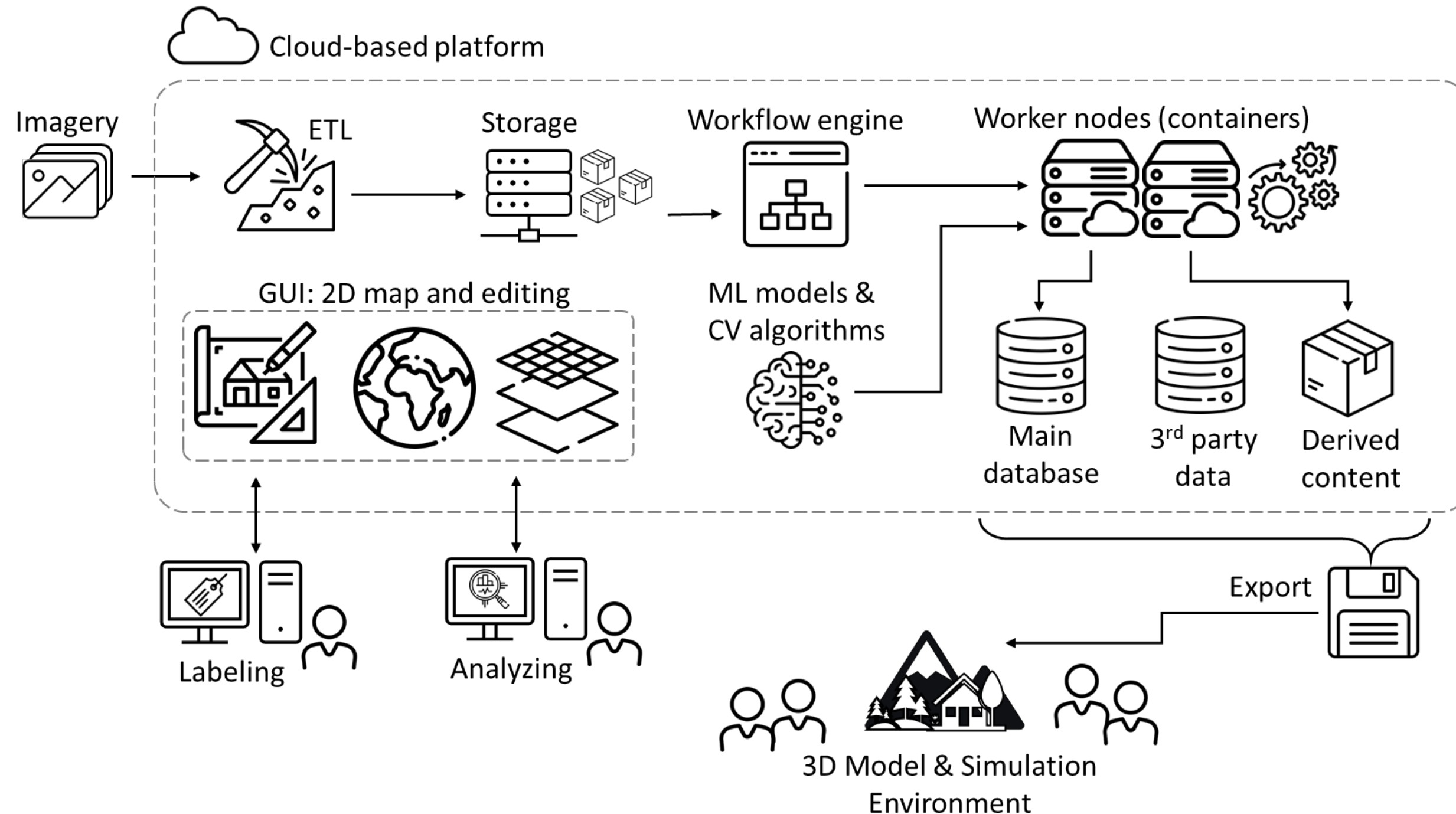
Close to Real-Time Object Detection to Provide Synthetic Environments with Georeferenced Objects for Time-Critical Mission Planning

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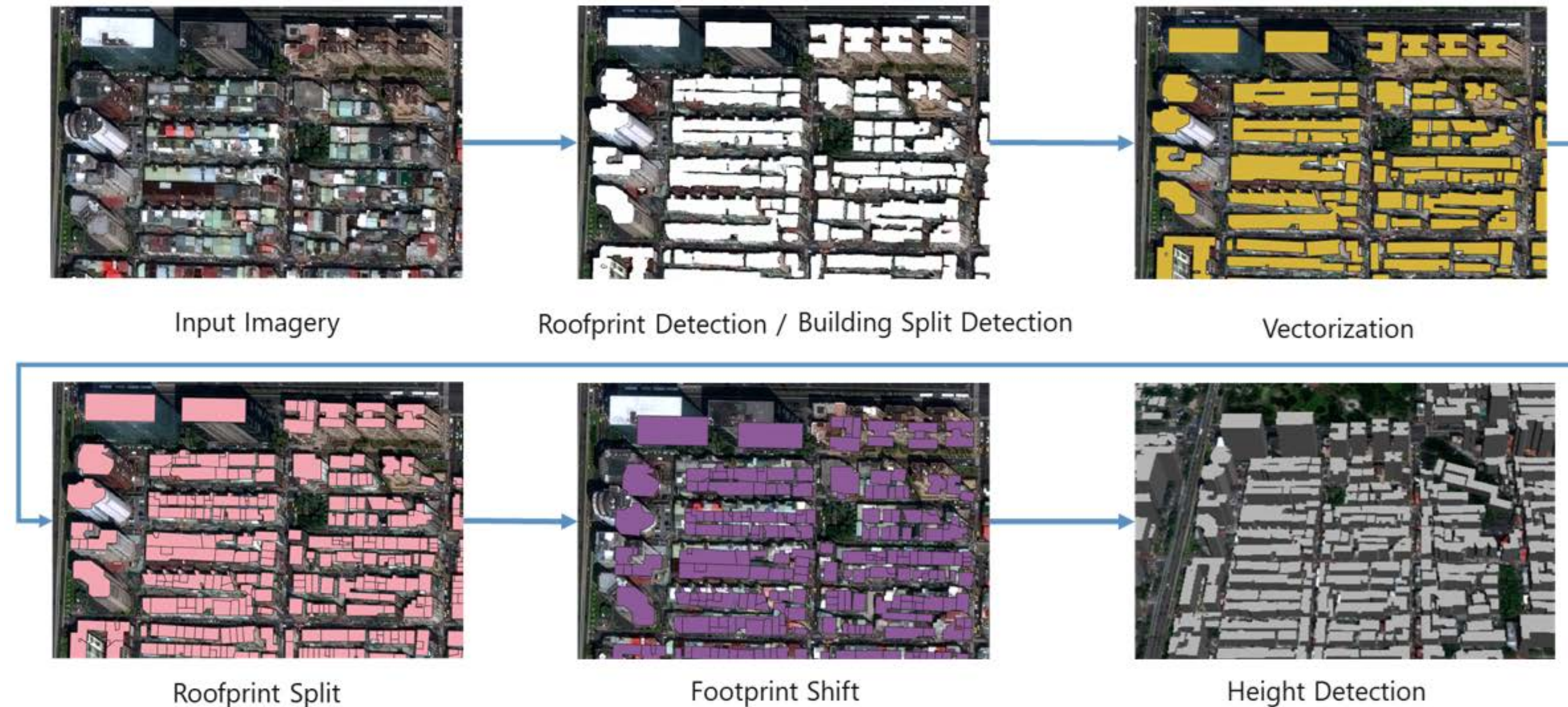
Architecture of a Geospatial Analysis Platform

Cloud-based platforms enable processing large quantities of data.
Still: same technology can be used on-premise or in field (offline)



Example of Feature Detection: Buildings

Machine Learning models and computer vision algorithms can be combined in workflows to extract relevant features with high precision



Efficient scheduling: see U.S. Patent No. 11,372,687

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Procedural Generation of Simulation Environment

Detected features are used as input for procedural generation of the 3D simulation providing a high fidelity, semantically enriched environment.



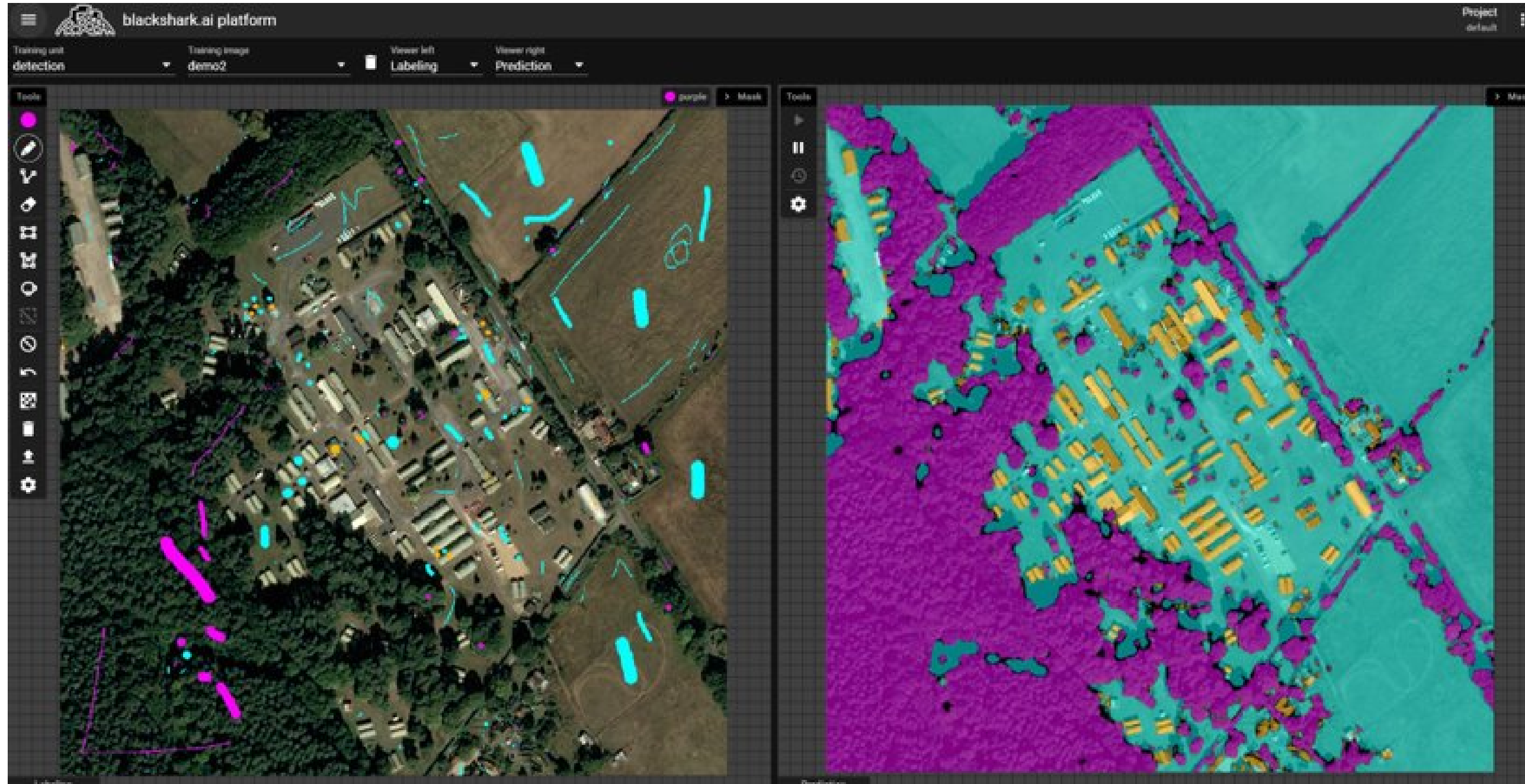
Efficient procedural generation: see U.S. Patent No. 10,636,209

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Near Real-Time Training and Detection

Our *Live Labeling* approach gives instant feedback (within seconds) for labeling and training enabling training models on new features in the field on mobile devices.



Live Labeling: see U.S. Patent No. 11,049,044

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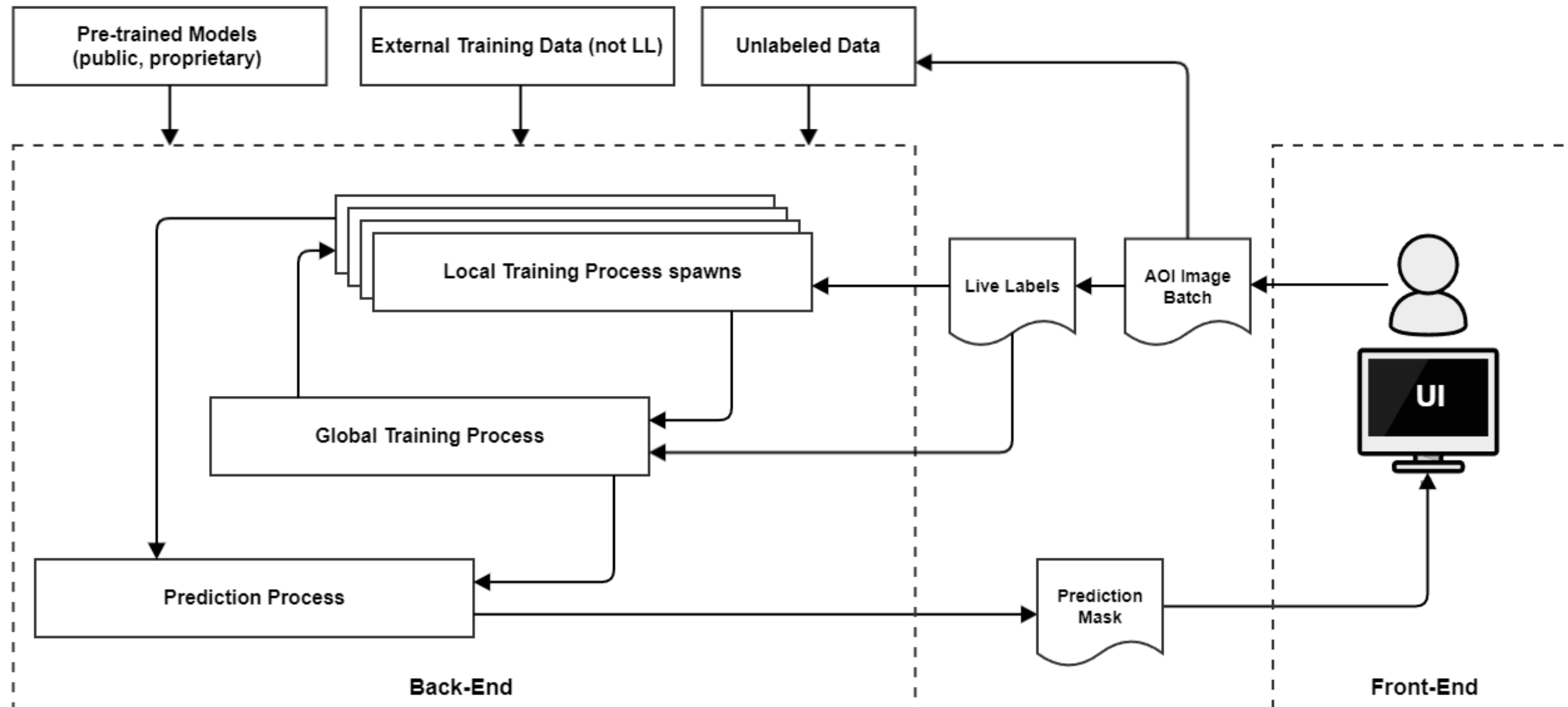
Live Labeling for ML Training

Patented Live Labeling toolset and technology in action

Part of the blackshark.ai end-to-end geospatial platform

Live Labeling Architecture

Live Labeling splits the model into two streams: one global model, which is continuously trained on all training data, and one iterative/local model that only takes the current training image as input and has a very high learning rate, magnifying the impact of every label.



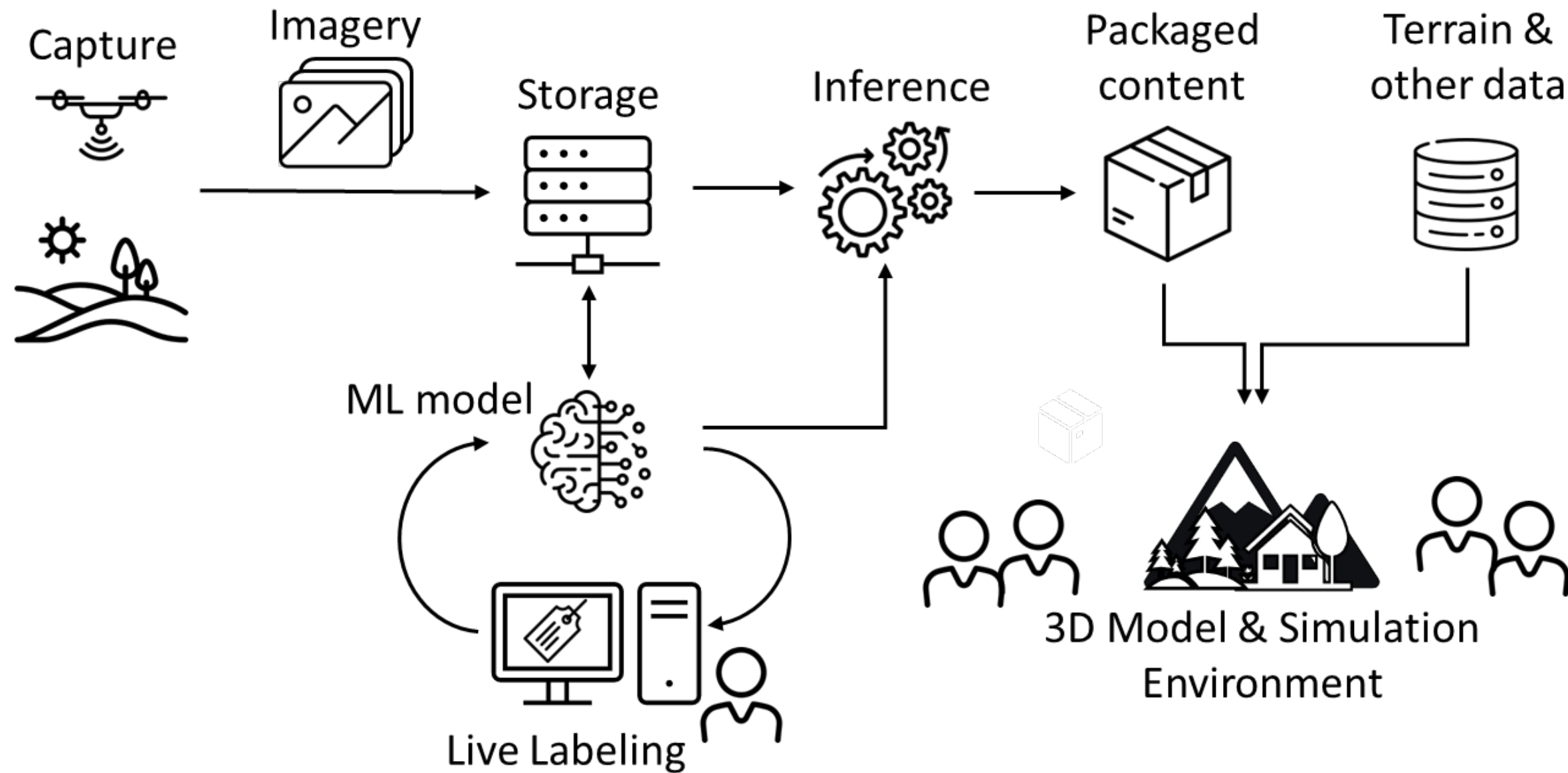
Live Labeling: see U.S. Patent No. 11,049,044

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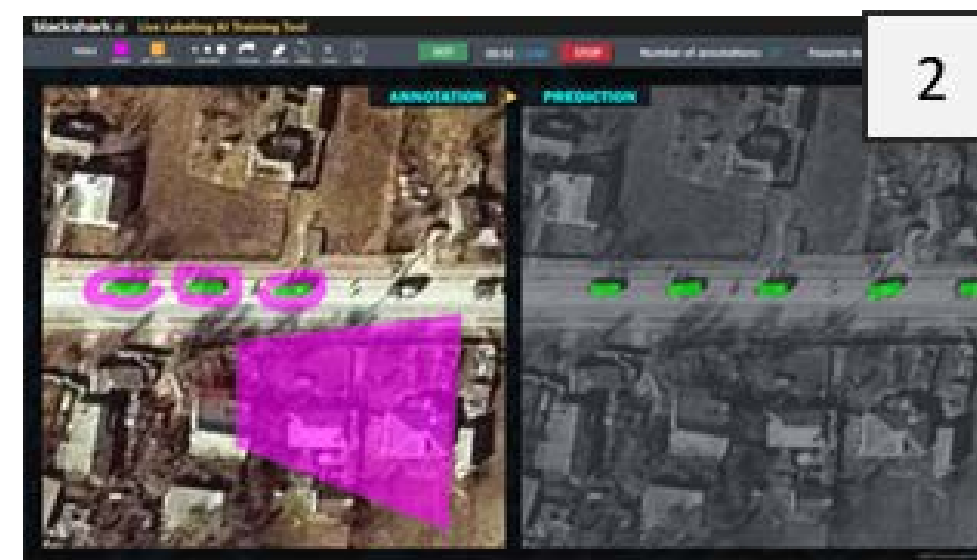
Example: Close to Real-time Object Detection

Once imagery is captured, Live Labeling is used to train new detection classes, then run inference and visualize newly detected features in the 3D M&S environment



Example: Detecting Trucks

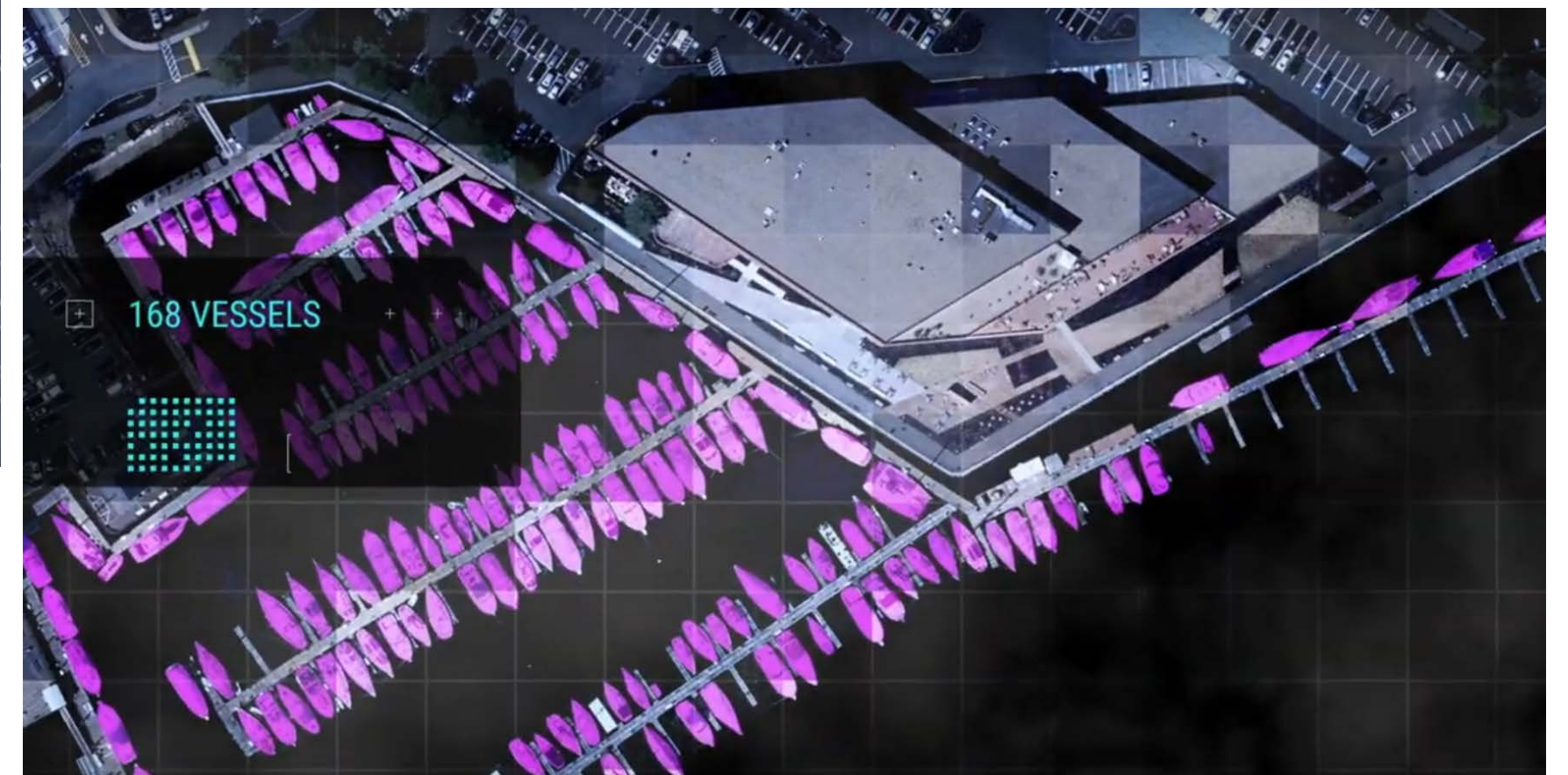
Once aerial imagery is available, it is transferred to local units. They can train ML models in an ad-hoc manner and use the inference results in their M&S application.



(1) Input imagery | (2) labeling trucks
(3) Inference on imagery | (4) visualization in M&S environment

Future Work

Integrate object detection and segmentation into one step; generalization for multi-domain environments; broader support of common formats; improved workflows





Thank you.

