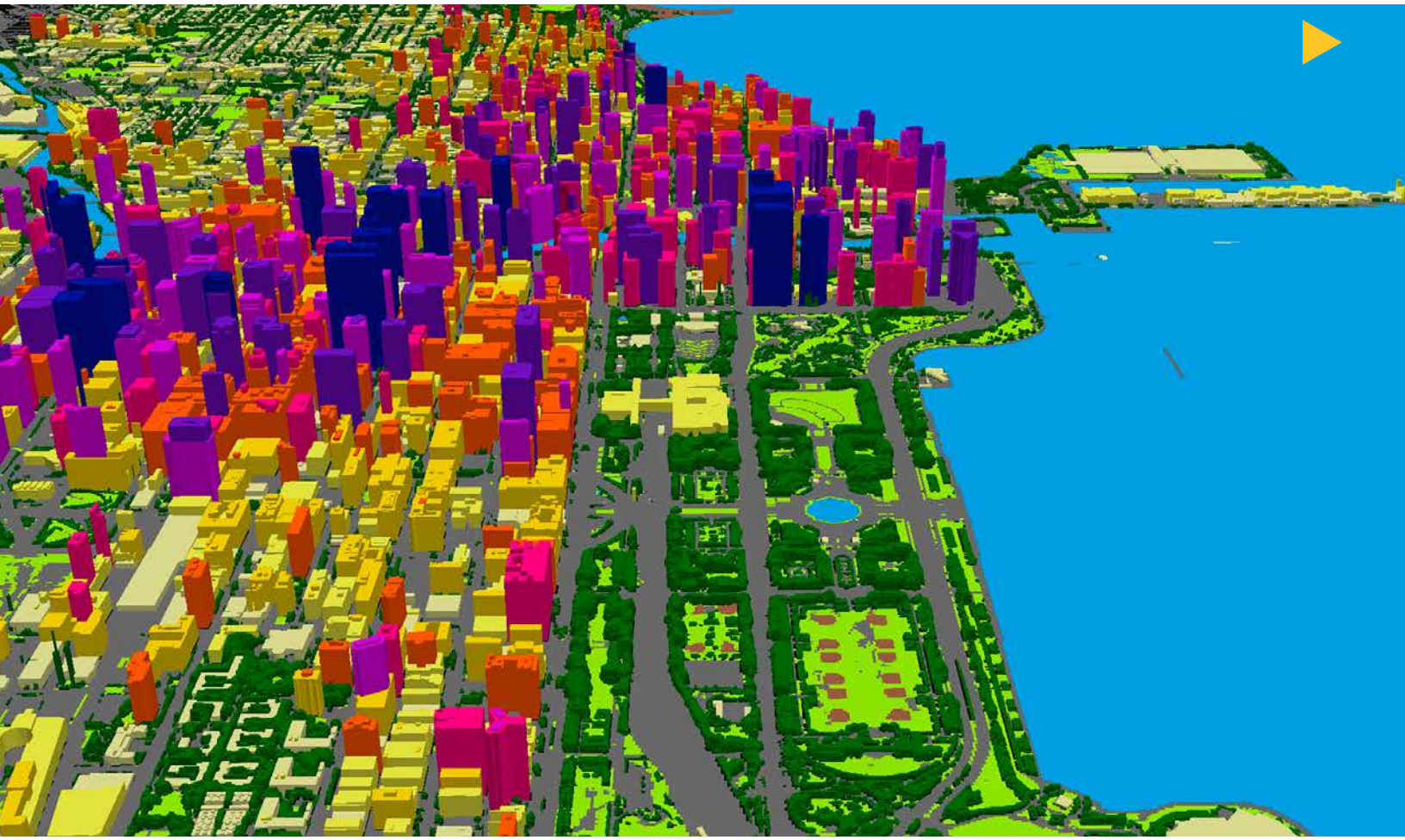
# Answering the Call for 3D City Models



## How customized classifications are providing business intelligence in the race for 5G network coverage

Colorado company uses Trimble technology to help accelerate 5G rollouts

## Solution

Trimble® eCognition®

# overview

Investments in fifth generation (5G) wireless infrastructure are estimated to exceed $325 billion by 2025; operator revenues are forecasted to reach US $1.3 trillion. To tap into that revenue stream telecom companies need to have accurate, detailed and up-to-date mapping of the markets they serve. One Colorado-based company is combining geospatial imagery and Trimble's eCognition technology to provide that essential business intelligence in 3D. The approach is giving companies telecom-tailored information that will help them compete in the race for a future that is predicted to be lightning fast.

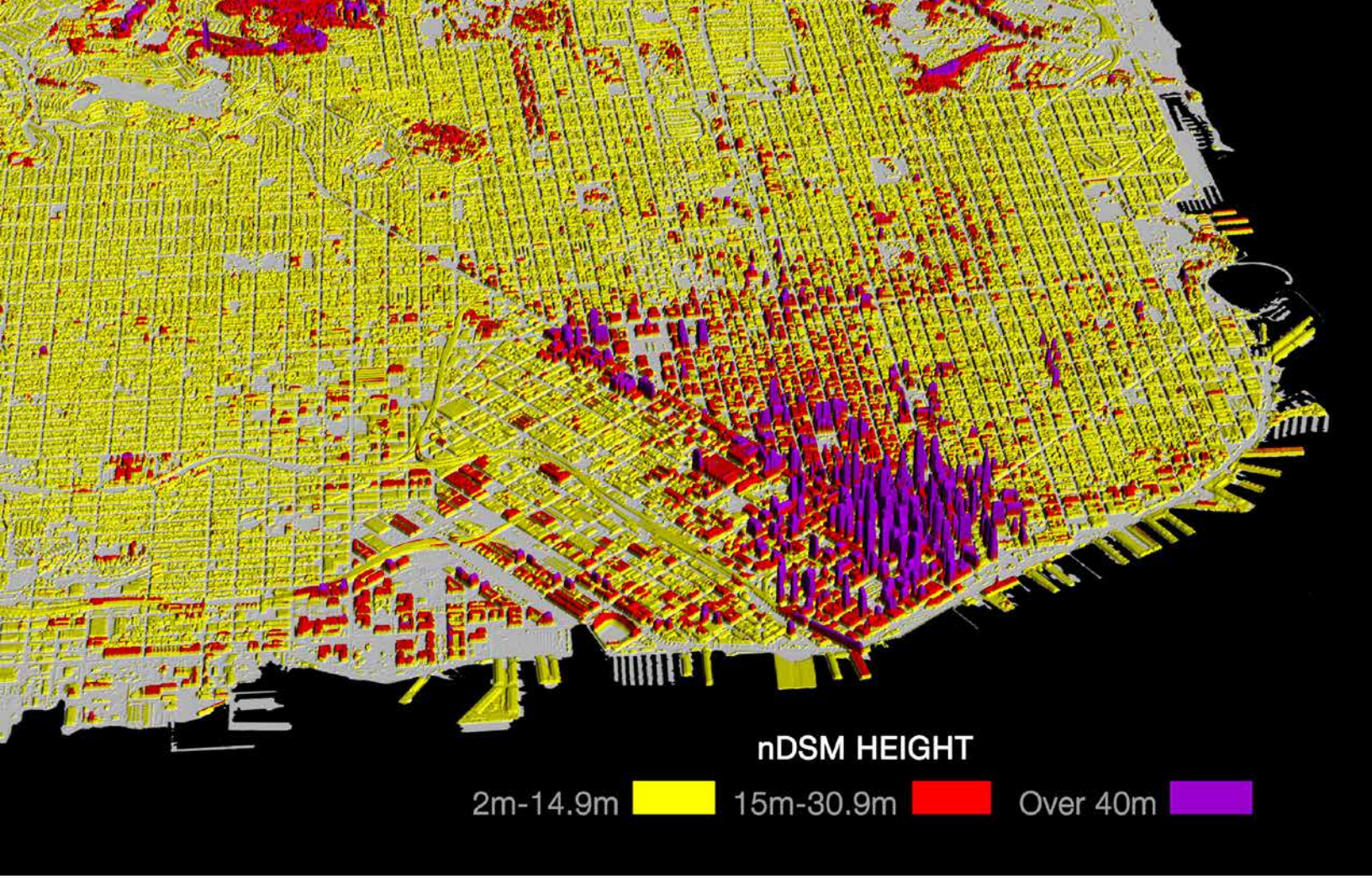
Location
COLORADO

One of the keys to unlocking 5G's fast future is the network's use of millimeter wave technology, which uses shorter, higher frequency wavelengths, which can mean faster data transmissions.

To achieve the faster wireless speeds, telecom companies will need a notably denser array of small antennas, which require line-of-sight for transmission to work. Companies have to figure out how to ensure the signal gets from the next generation of 5G base stations to wireless devices.

To help resolve this critical challenge, multiple US telecom companies have tasked Land Info Worldwide Mapping, an aerial and satellite data provider, with creating customized 3D models of select areas of interest (AOIs). They specifically required layered views of 3D building footprints, classified land cover and classified tree contours and their heights—the critical information to analyze line-of-sight potential for 5G sensors and determine the optimum locations for their infrastructure and accelerate their rollout. Guided by the telecom companies' lists of AOIs nationwide and their mapping requirements, Chris Lowe, Land Info's director of imagery analysis, created the city models.

He obtained 1-m multispectral aerial imagery from the USDA's National Agriculture Imagery Program (NAIP) and aerial-derived DTM and DSM data, sourced from either lidar or SGM (Semi-Global Matching.) And for the vector datasets, Lowe sourced building footprints, water polygons and roads. He also used the DTM and DSM to create a normalized DSM (nDSM), which would provide key elevation data for classifying trees and buildings and calculating their heights.

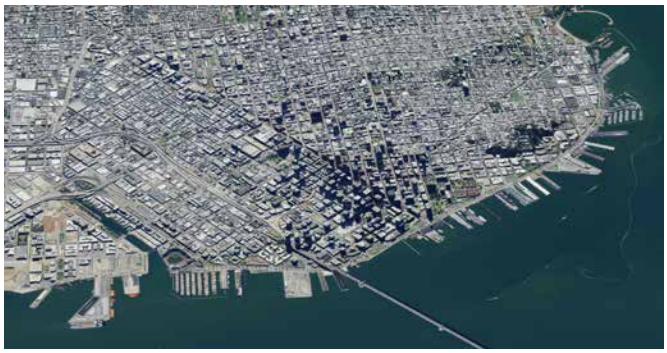


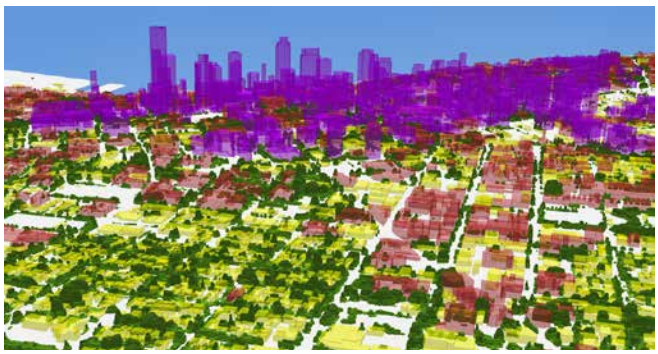

## BUILDINGS AND TREES

For this particular work, Lowe needed three rule sets — a main, comprehensive workflow and two smaller, more targeted workflows — which together required more than 100 individual processing steps.

Given the breadth and rigor of the first rule set, Lowe used eCognition Server technology to batch-process the workflow, which analyzed all the data inputs to delineate and classify building footprints and vegetation. Once the trees were classified, eCognition then classified shadows and individual tree contours at 2-m to 3-m intervals.

The second rule set targeted each AOIs building footprints and classified them like they are in the real world, with different levels and elevations. The final rule set refined the vegetation and building height classifications to ensure building elevations weren't skewed by trees on rooftop gardens.





The results of all the rule sets were exported into ArcGIS for further customization and quality-control checks. The final deliverables to the telecoms companies were 3D city models complete with vegetation contours, building footprints and the raster classification.

With the tailored models, telecom companies have the critical information to analyze line-of-sight potential for 5G sensors and determine the best strategy to optimize their network to give them a competitive edge.

In the cutthroat race for network coverage, using eCognition-based 3D land-cover classifications could be a good call.

"One of the strengths of eCognition is that I can create any rule and the software will consistently and reliably follow it. That flexibility allows me to solve some really challenging issues like classifying shadows and tree contours. I can't think of another way to accurately classify those objects without eCognition."

*— Chris Lowe, Director of Imagery Analysis, Land Info Worldwide Mapping*

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