

Preserving Japan with mobile lidar mapping

PX-80 for forestry applications



woodinfo—a consultant that generates forest information systems for forest owners, forest buyers, governments, and more—was dissatisfied with the old way of gathering forest data.

“The PX-80 helps us to do forest management using data. In the past it was done by personal feeling.”

- Hiroyuki Nakamura, woodinfo

In the past, performing an inventory involved sending a team into the field to measure the height and diameter of trees manually. Three or more workers might measure every tree in a forest, or much more often, select a grid of sample plots across the forest and measure the trees in that plot to make estimates for the whole forest.

THE SOLUTION

Since both methods are slow and offer limited data, woodinfo developed a new workflow that uses 3D scanning for capture and their own automated point-cloud processing software to produce rich, finalized forestry data.

When evaluating which laser-scanning method would be best for their customers' business needs, they tested two different technologies to see how long they would take to capture and process a single hectare of forest (10,000 sq meters).

The first was a tripod-based scanner, and the second was a PX-80 SLAM-based handheld scanner that they attached to a backpack. The SLAM approach proved much faster.

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How much faster? A tripod-based scanner enabled woodinfo to capture and finalize data for one hectare of forest in about 11 hours, a PX-80 enabled them to capture and process it in under 5. For those keeping track, that means the SLAM-based scanning workflow enables woodinfo to capture and process a full hectare (10,000 sq meters) of forest in the same amount of time it used to take them to perform manual measurements for just 200 sq meters of forest.



About woodinfo

Founded in 2011 with headquarters in Shinjuku, Tokyo, woodinfo specializes in the development, management and consulting of forests, forestry, timber industry and tree related information systems.



Woodinfo's 3DWalker in action

THE WORKFLOW

SCAN

- Put on the 3DWALKER backpack device, which includes PX-80, GPS logger, and hi-res 180° camera
- A two-person team walks the forest to capture (extra person present for safety reasons)

FIELD NOTES

- For steep slopes, woodinfo will scan in a zig-zag pattern from top to bottom
- For flatter areas, the woodinfo scanner will walk in a loop
- 3DWALKER can capture trees out to 10 meters on either side of the scanner, so woodinfo can capture a whole forest very easily when the customer wants
- PX-80 required no repetitive scanner set-ups in the field, and scanning took 30 minutes.
- When woodinfo tested the tripod-based scanner for capturing one hectare of forest, the project required 16 set-ups and scanning took four hours.
- Using laser scanning, woodinfo was able to cut the number of workers in the field to two, which meant cutting costs by 33% compared to manual methods.



Point cloud in

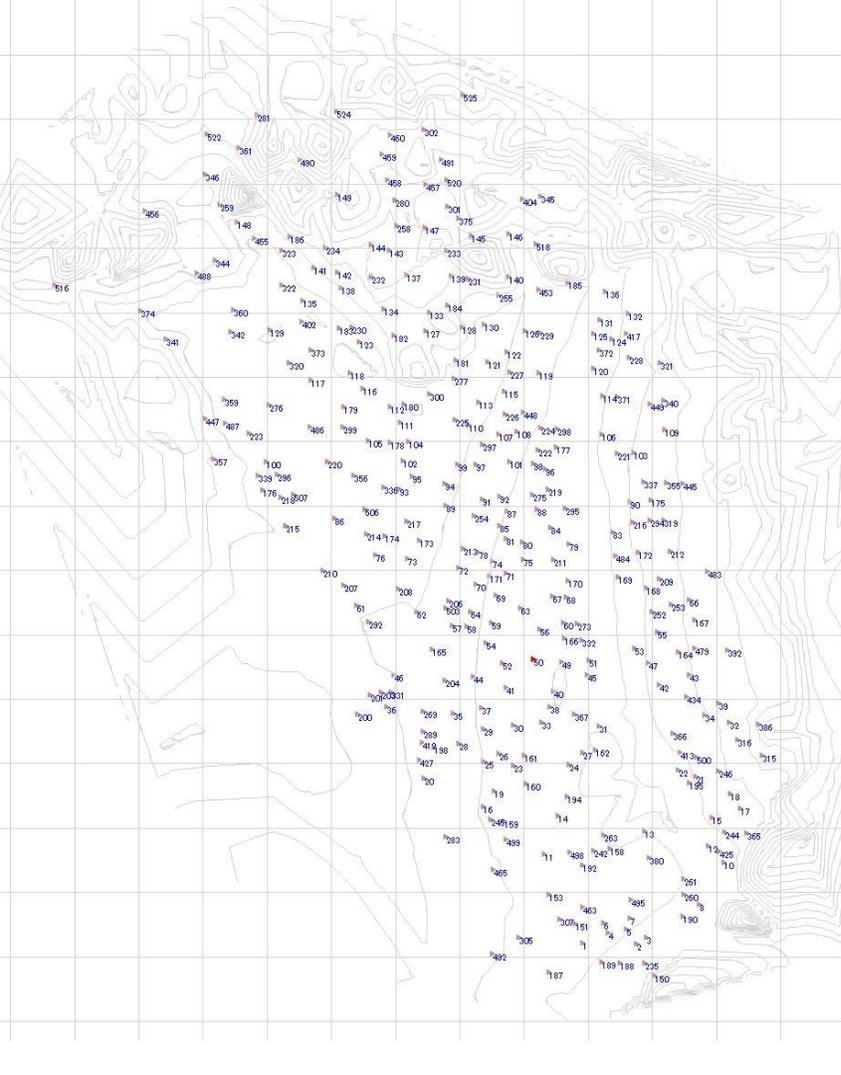
PROCESS

- Process the point cloud on the device
- Export PLY file from PX-80 and load it into a computer back in the office

FIELD NOTES

- The PX-80 processes scans automatically on the device. It can be left to run overnight or while you perform other tasks.
- When woodinfo tested a tripod-based scanner for capturing one hectare of forest, the 16 set-ups required 4 hours of *active* registration time.





Height and position of trees shown in Digital Forest software

ANALYZE

- Load the PLY file into woodinfo's proprietary Digital Forest software, which automatically produces complete forestry data in a usable format. This includes the following data for each tree:
 - ◆ Latitude and longitude
 - ◆ diameter at 5cm intervals
 - ◆ height
 - ◆ stem volume
 - ◆ trunk bend

- Use Digital Forest to automatically generate PDF that includes digital elevation model of landscape with location of all trees (both relative and absolute coordinates)

- Take GPS logger data at 1-second intervals and match it to PX-80 trajectory data by timestamp to get absolute coordinates for each tree

- Take hi-res camera captures at 2-second intervals and match it to PX-80 trajectory data by timestamp to get imagery for each tree

- Output finalized data to a forest GIS

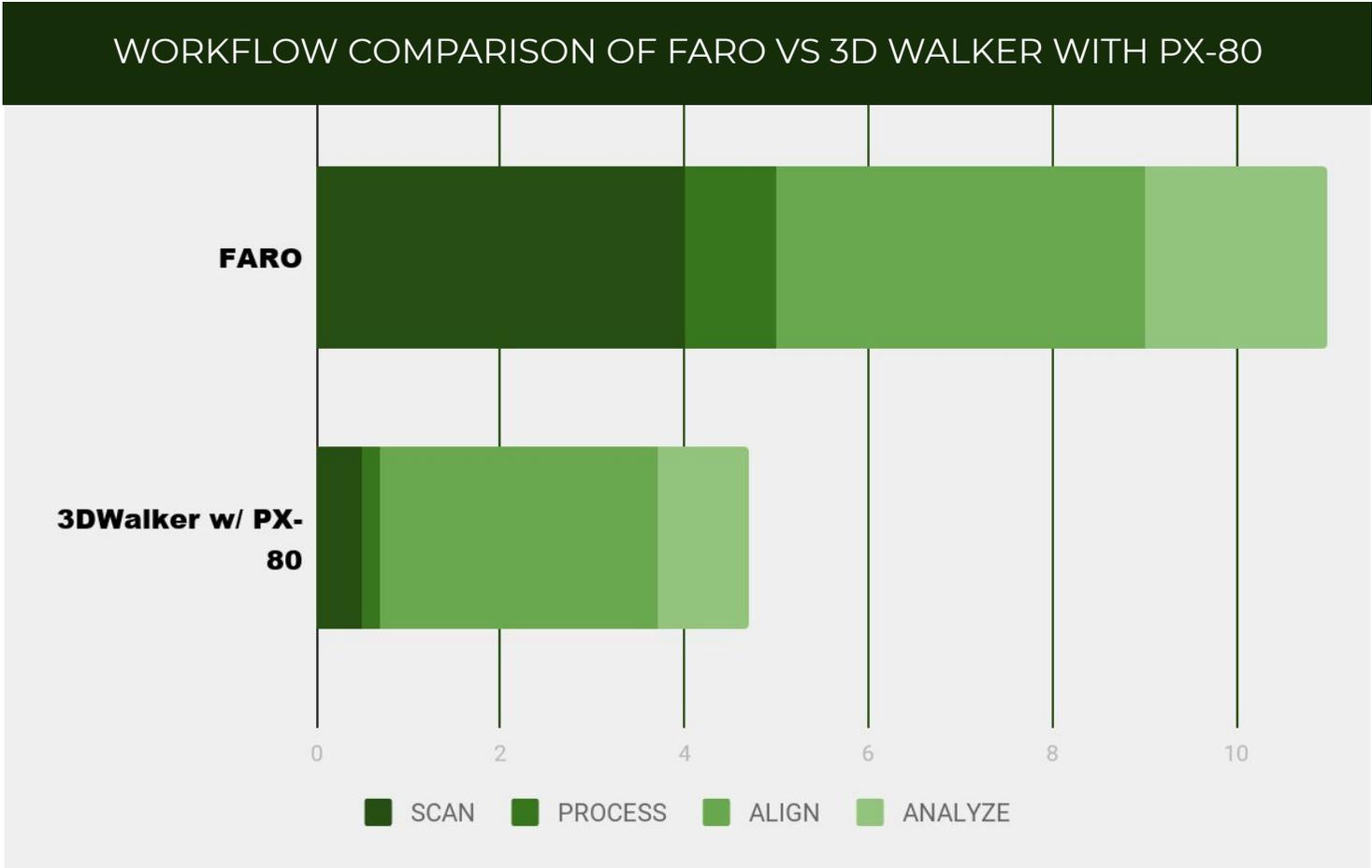
FIELD NOTES

- When woodinfo tested the tripod-based scanner, the file it produced required one hour to convert, and then one hour to process.
- Digital Forest can process PX-80 data directly, without conversion. The whole process for one hectare of forest takes one hour total.



TIME CHARTS

The old manual sampling method took up to three people and more than a day per hectare. It still did not provide data for each tree, or comprehensive data for the trees that were measured.





ABOUT PARACOSM

Paracosm, a division of Occipital, Inc., develops mobile LiDAR scanning technology and visualization tools for the documentation of both indoor and outdoor spaces. Paracosm was founded in 2013 in Gainesville, FL and became a part of Occipital in 2017.



PX-80

CONTACT

Paracosm
12 South Main Street
Gainesville, Florida 32601
United States



(352) 505-1971



sales@paracosm.io



paracosm.io