



transforming the way the world works



Campbell Brooke
WW Sales Director, Geospatial
Trimble Navigation



Mechanical and Manual



Early Automation



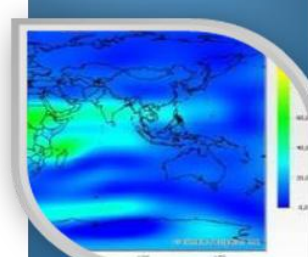
Field Centered Intelligence



Integrated & Real Time Decision Making in the Field



Digital Era



Beginning 20th
Century

1980's

1990's

> 2000

Angle & Distance Measurement



Theodolites, tapes, chains

EDM

Total Stations

3D Scanning



Space & Inertial Measurement



Inertial Surveying

Transit

GPS

Multi-GNSS + Inertial



Photogrammetry & Remote Sensing



Photogrammetry

Airborne Scanning

High Resolution Remote Sensing



Peripheral Sensors



Barometers, Gravimeters

RFID

Automotive Sensors

Billions Devices/Sensors



Computation & Communications



Manual Computation

Digital Computation

Real Time Information



Integrated Mobile Mapping



Office

Place

Field

Dedicated Collection

Source

Crowd Sourcing

Official Data

Data Integrity

Sufficient

Proprietary

Access

Free & Ubiquitous

“Classical”

Application

Embedded in Process

Version Controlled

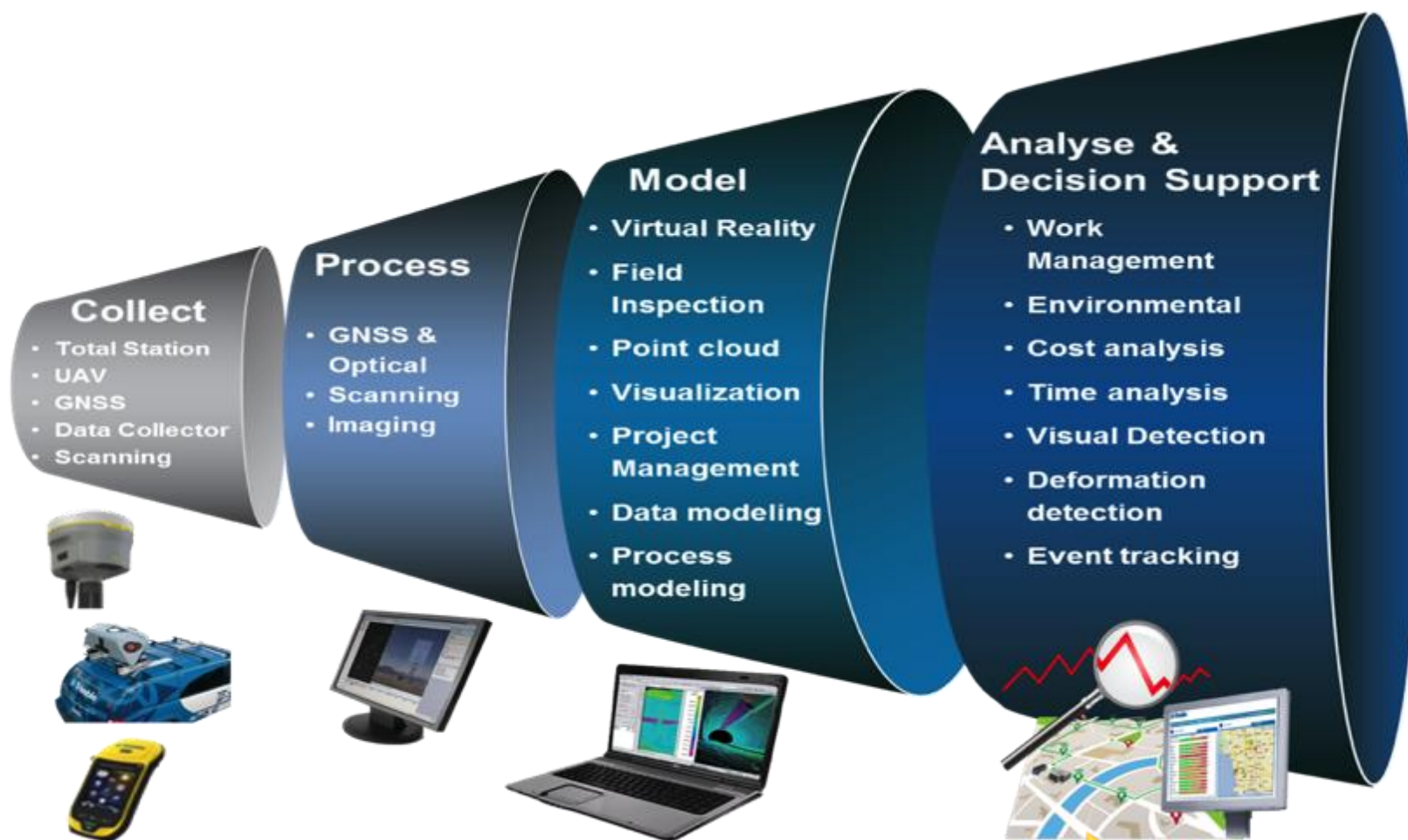
Update Frequency

Dynamic

Professional

Influence

Owner/User/New
Constituencies



1X

Addressable Geospatial Market

3X



**Survey Data for
Alignments**



Survey Data in 3D



**Existing
Development**



Dam and Tunnel



New Structure

**High precision 3D geospatial
information is used and fed back
across the entire cycle**



Bridge Structure



Terrain modeling



Title



Title



Agriculture



Heavy Civil
Construction



Construction BIM



Cadastral &
Geospatial



Transportation &
Logistics



Rail



Environmental &
Waste



Water Utilities



Electric Utilities



Intelligent
Transportation



Forestry



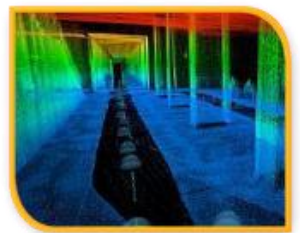
Field Service



Oil & Gas



Consumer
Devices



Indoor Mapping &
Virtual Worlds

CITIZENS & CONSUMERS

- GIS Data Users
- Smart Phones



DBs



Enterprise Application



GIS Server

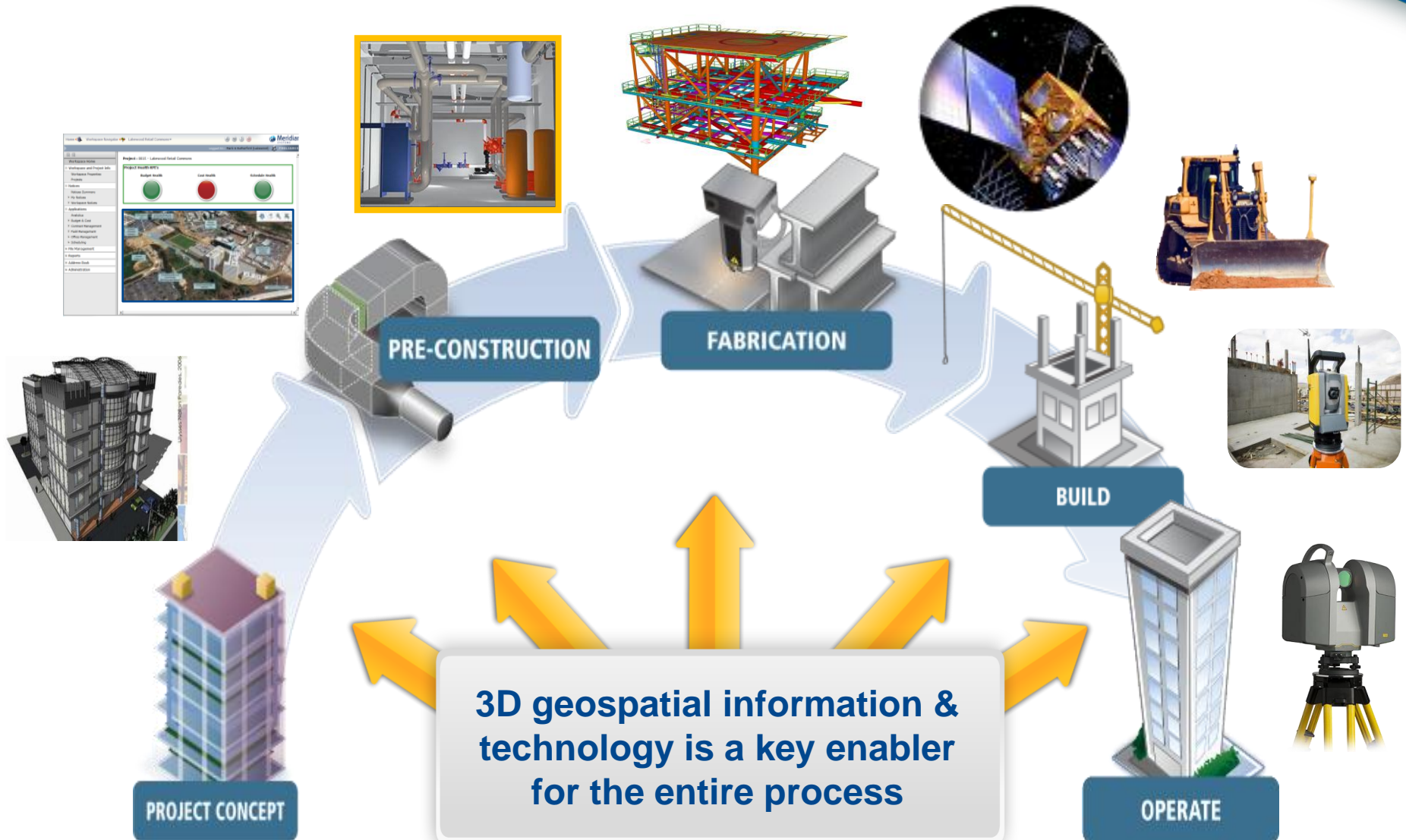
MOBILE FIELD CREWS & FLEETS

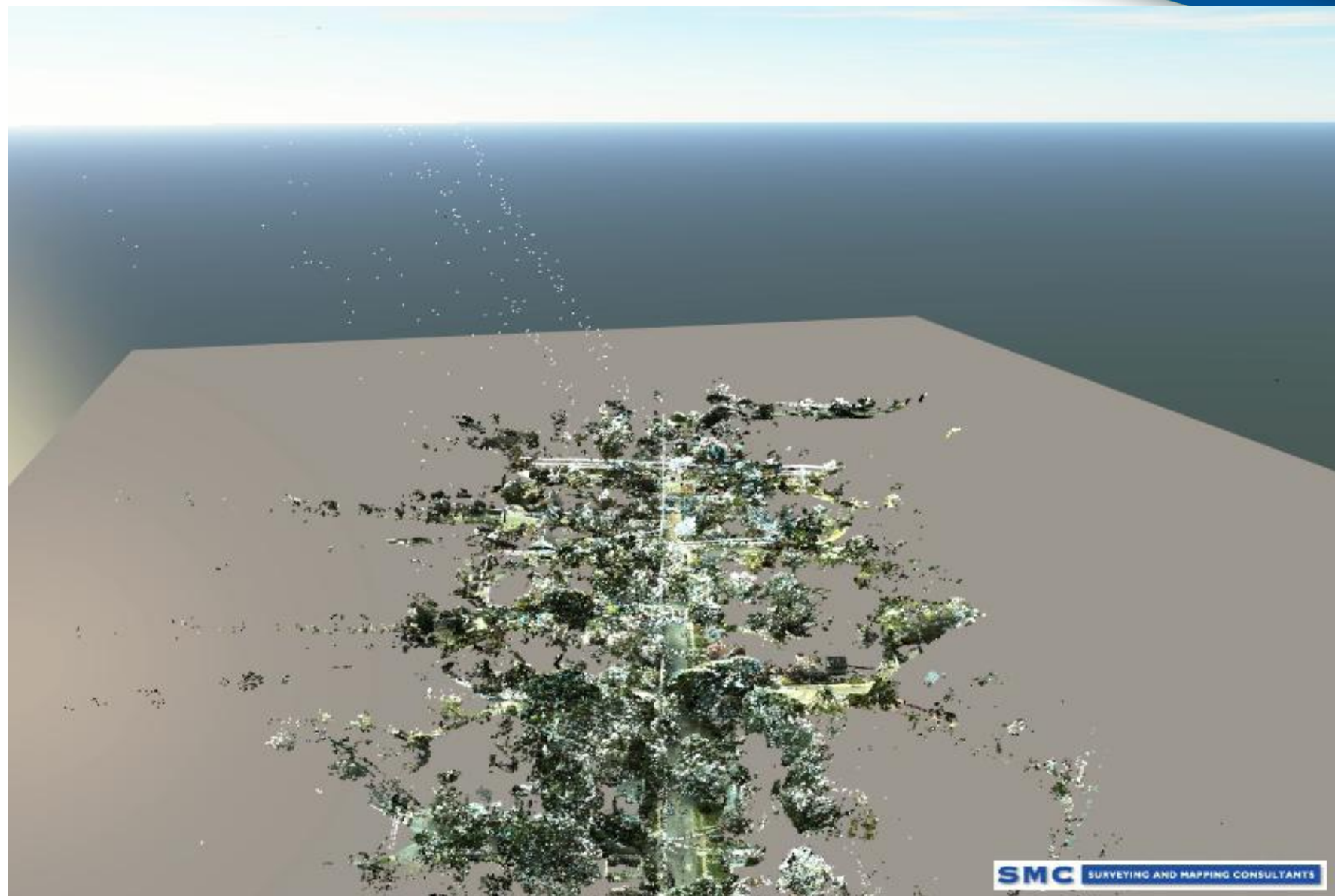
- Data Collection / Validation
- Work & Incident Management
- Asset Management
- Fleet tracking & Routing



CONTRACTORS – Intelligent Machines



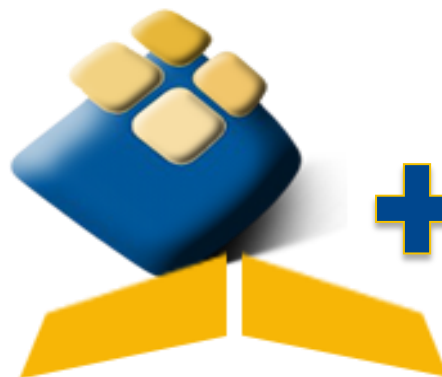








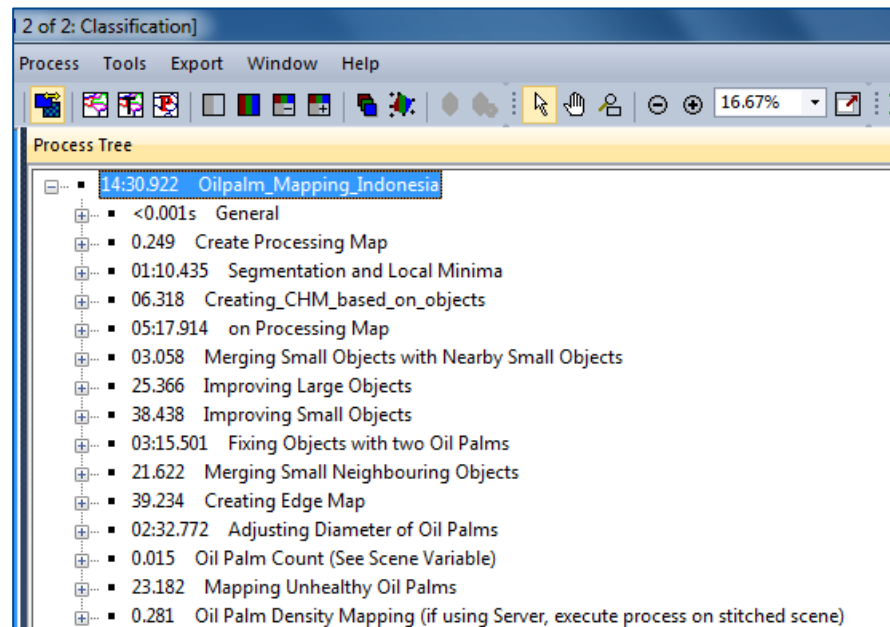
Solution?



**ANALYTICS FOR
INDUSTRY**

Oil Palm Mapping

1. To automatically count oil palms
2. To automatically identify unhealthy palms
3. To automatically map oil palm density
4. To automatically map wet areas (not yet completed)

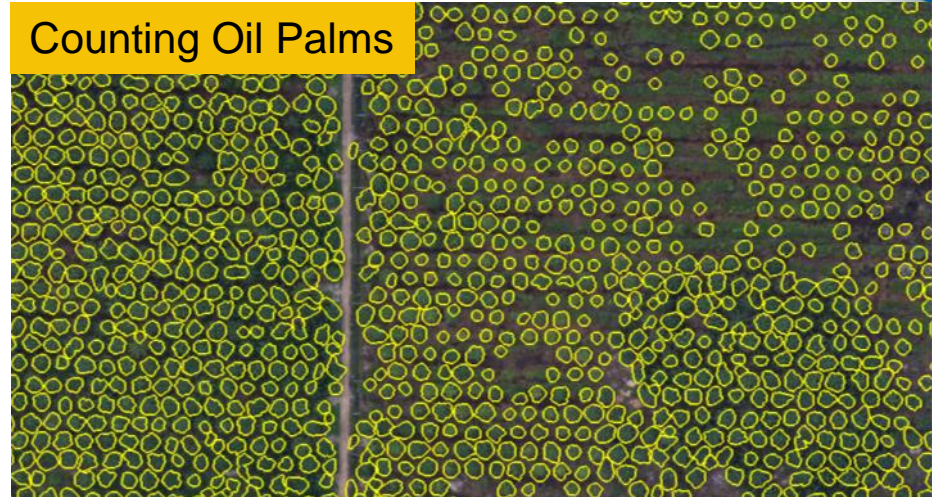


Oil Palm Mapping

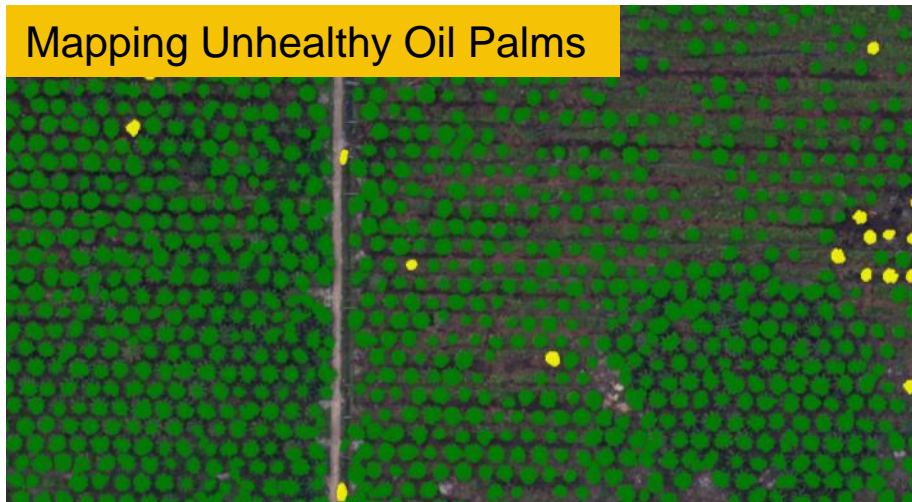
Oil Palm Plantation



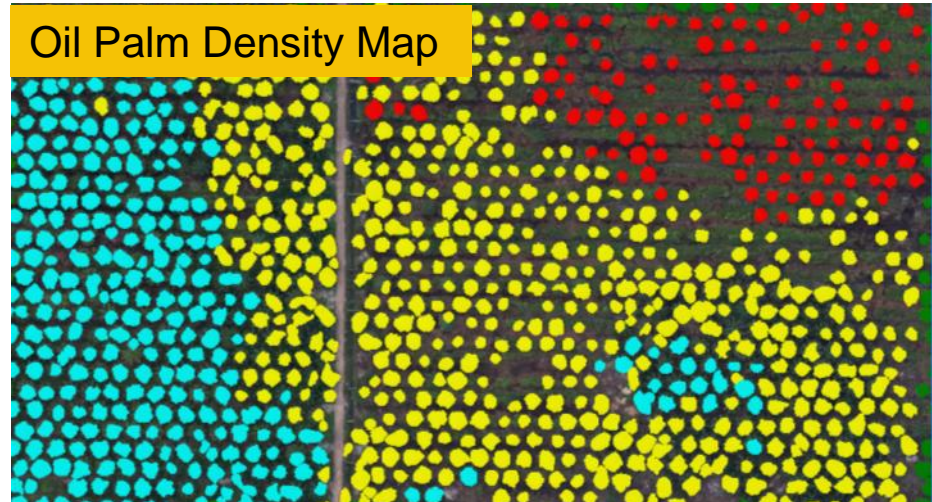
Counting Oil Palms



Mapping Unhealthy Oil Palms



Oil Palm Density Map

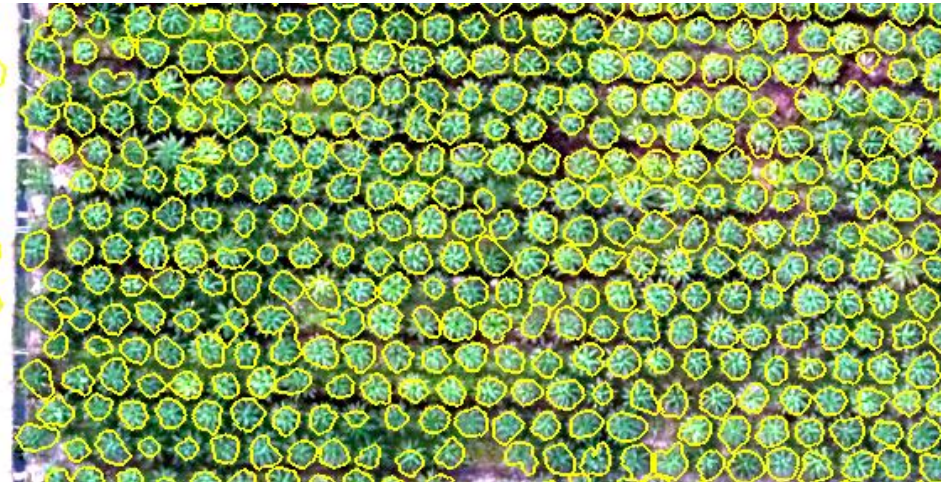
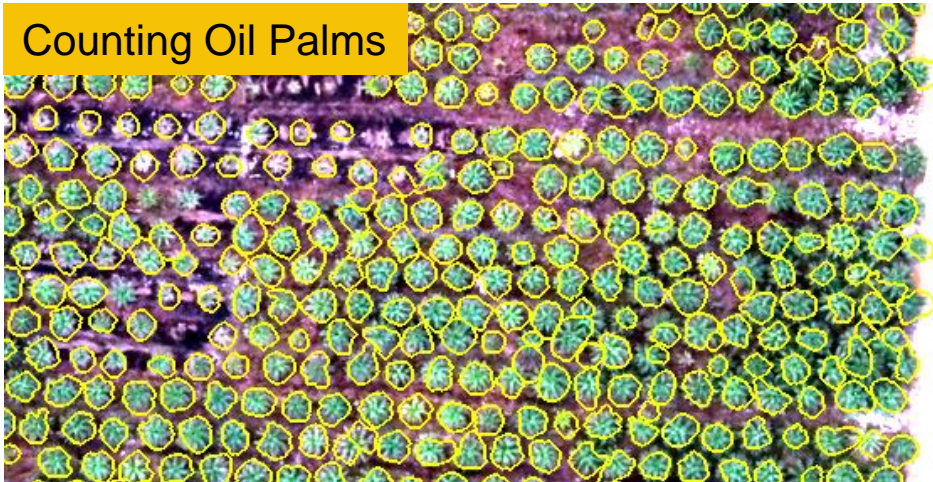


Oil Palm Mapping

Oil Palm Plantation



Counting Oil Palms

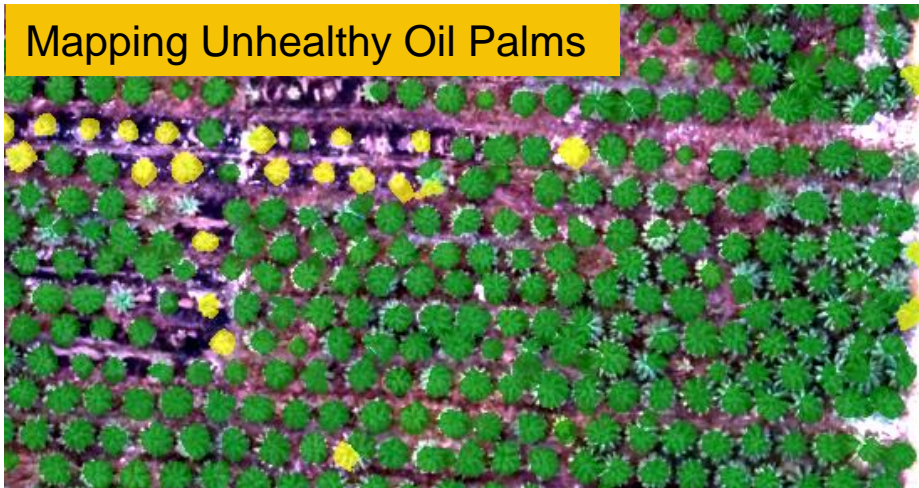


Oil Palm Mapping

Oil Palm Plantation



Mapping Unhealthy Oil Palms

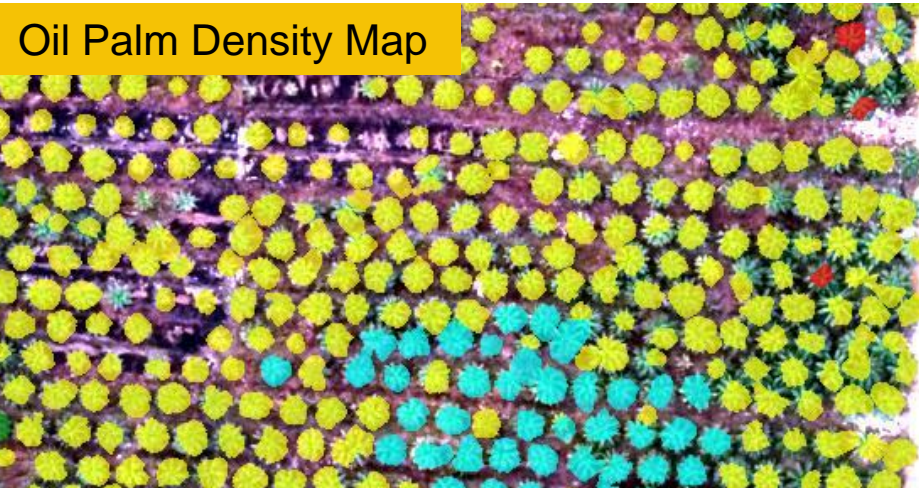


Oil Palm Mapping

Oil Palm Plantation



Oil Palm Density Map



Historical: discrete process steps performed by a professional with explicit hand-off of results



Geospatial context
embedded in the data
structure with all other
data elements



Traditional Comfort Zone “Data Collection”

Roles to Be Defined “Data Management”



```
graph LR; A((Measurement & Data Collection)) --> B((Interpretation & Quality Control)); B --> C((Analysis, Modeling & Applications));
```

Measurement
& Data
Collection

Interpretation
& Quality
Control

Analysis,
Modeling &
Applications

Key Skills: Instrumental precision
Meticulous calculations

Key Values: Accuracy
Credibility
Reliability

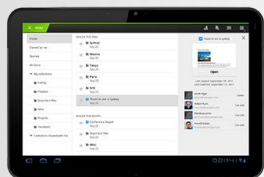
Key Skills: Establishing context
Managing complexity
Data management

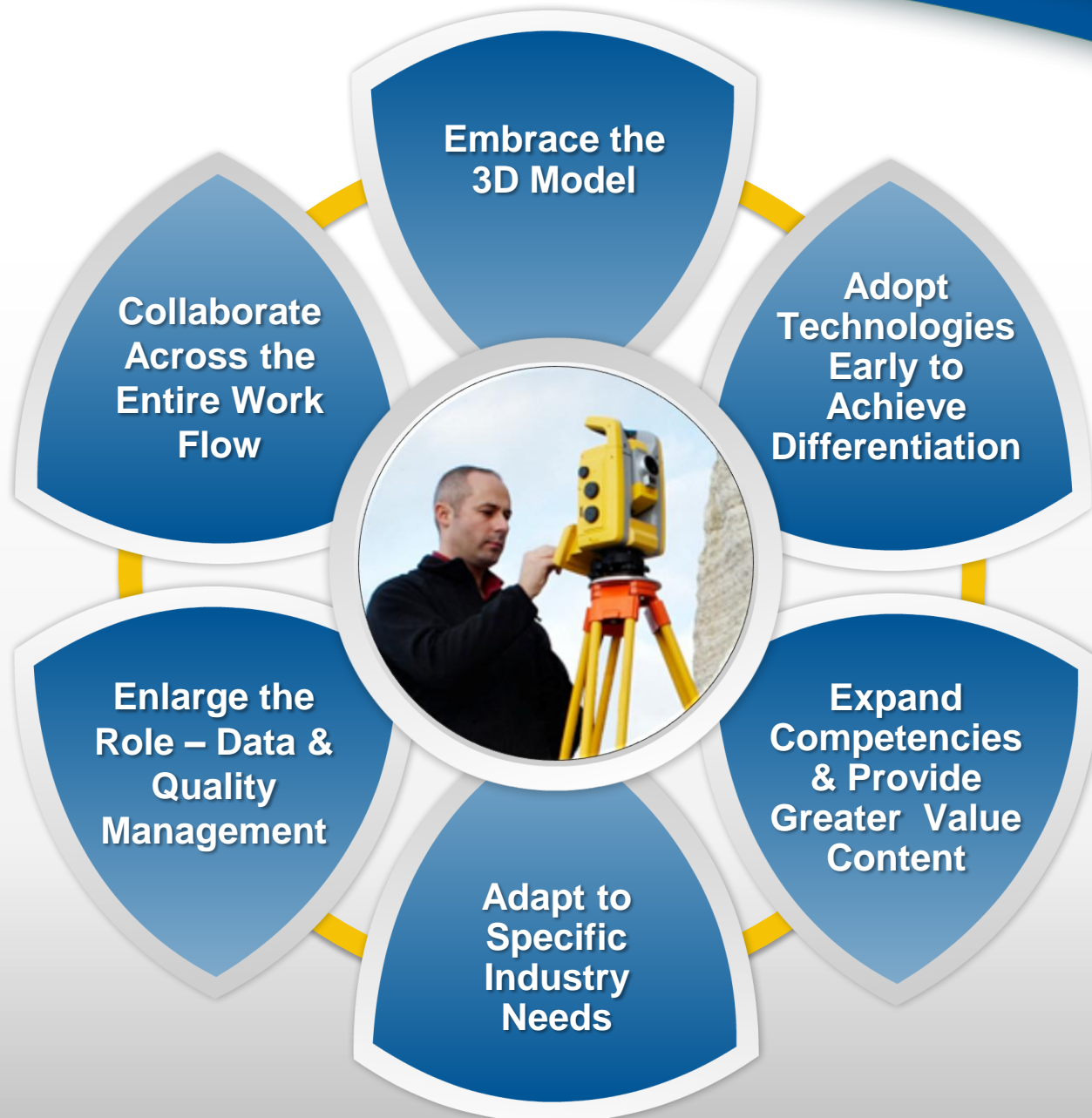
Key Values: Accuracy
Credibility
Reliability
Collaboration





Smart Accessories







transforming the way the world works



Thank you