

# GEOSPATIAL

TECHNOLOGY

Mapping the  
future

GIS DAY  
2021



## Points for discussion:

- About Geoid Technologies Limited.
- Geospatial Technology
  - Why Geospatial Technology important
  - Surveying as a robust data acquisition tool for analysis using GIS





# GEOID TECHNOLOGIES LIMITED

Geoid Technologies Limited, established on 11th December 2013 is a reputable firm with Registered and Practicing Land and Engineering Surveyors and GIS Experts as well as drone pilots.

We offer diverse geospatial products and services in provision of measurement solutions for Engineering, Smart Agriculture, Surveying, Construction, Outdoor Navigation, GIS and Mapping industries from world known and reliable manufacturers



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# Geospatial Technology

GIS (Geographic  
Information Systems)

Remote Sensing

Positioning Systems





# Why is Geospatial Technology Important?

## Sustainable Development

Geospatial Technology is very central for researchers, practitioners, and professionals who make decisions on agriculture, environment, forestry, mining, resource management, and urban development targeting SDGs

“Knowing where things are, and why, is essential to rational decision making” ~ Jack Dangermond



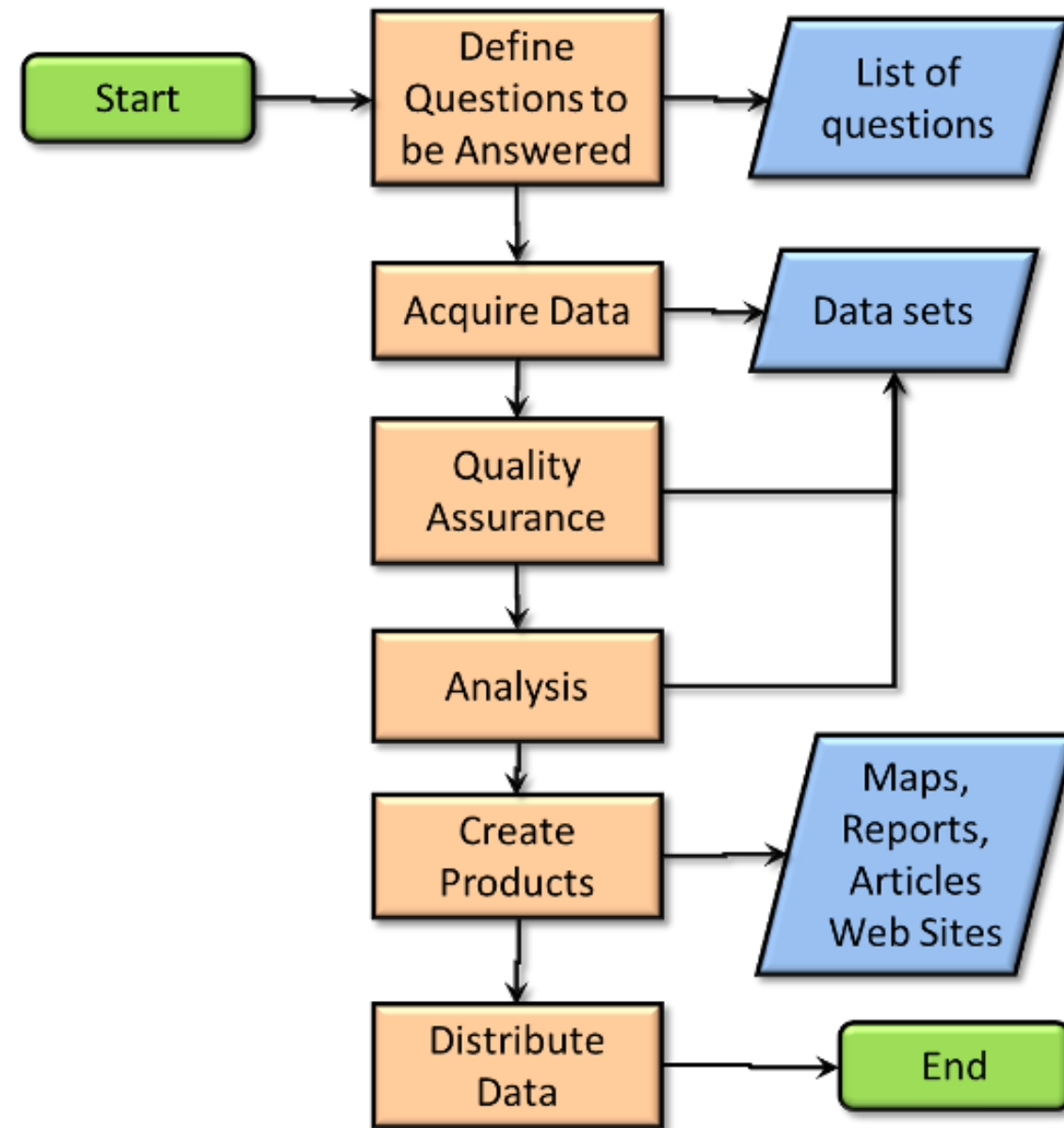


# APPLICATIONS OF GIS

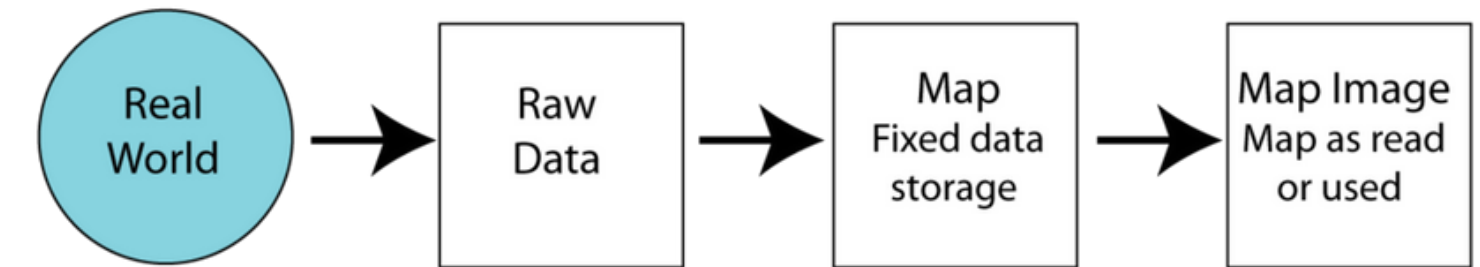


**“The application of GIS is limited only by the imagination of those who use it” ~ Jack Dangermond, Esri**

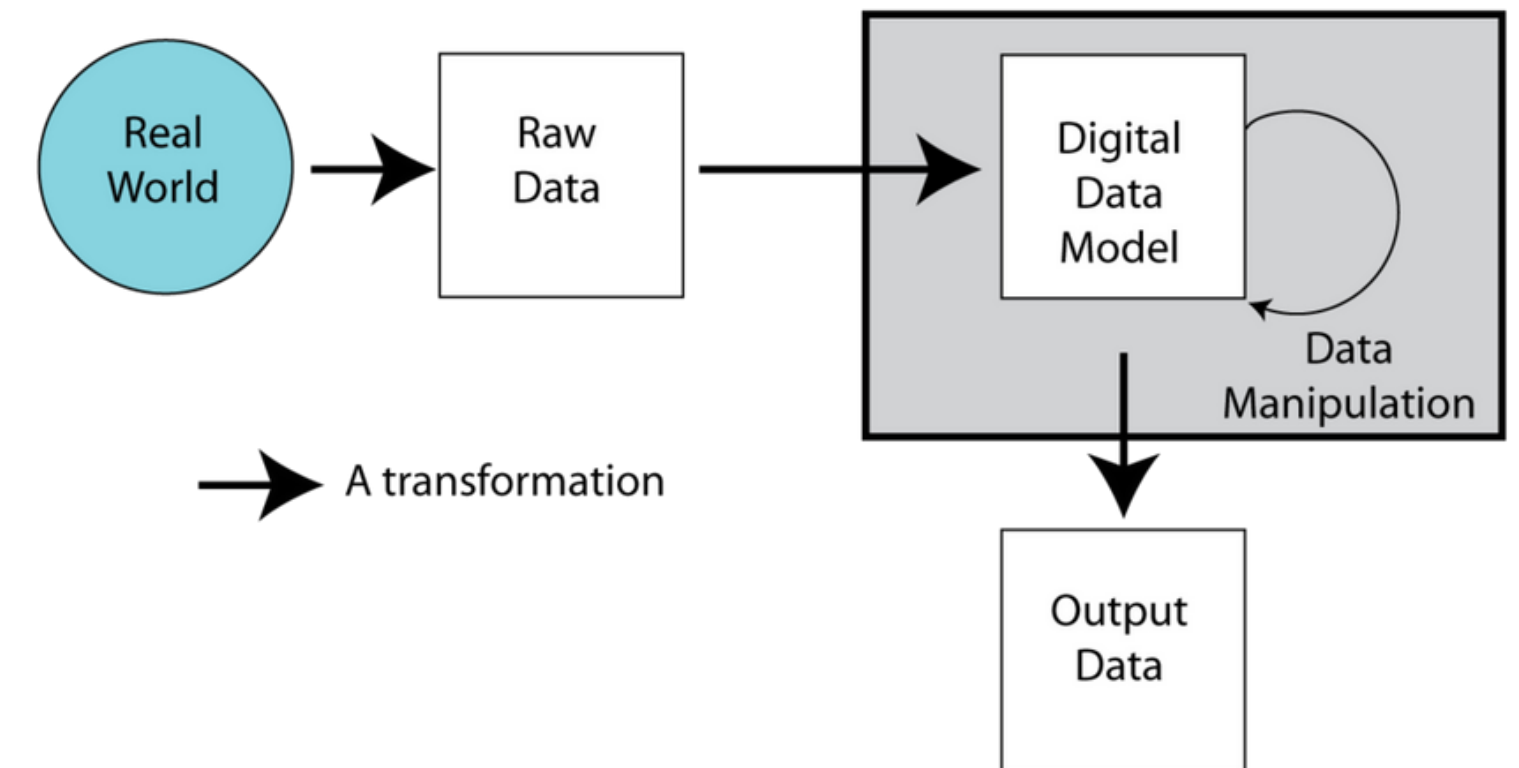
# GIS Processes



## The Traditional Cartographic Process



## The GIS Process





# Surveying as a robust data acquisition tool for analysis using GIS





# SURVEY TECHNOLOGY



## Evolution of survey

Traditional land surveying is now being combined with 3D tools, HD imagery, terrestrial scanning, and light detection and ranging (LiDAR).

## Wide range of Applications

- Measuring and parceling plots of land
- Defining property lines
- Estimating the value of property
- Planning construction work and drainage systems

## GIS & Surveying - Complimentary Disciplines

GIS is the already preferred technology for managing data culled from modern surveying technology – mobile mapping, LiDAR, and laser scanning



# Modern Surveying

**Digital Theodolite**



**Total Station**



**GNSS  
RTK**



**Laser  
Scanners**



**Drones(UAVs)**





# Surveying Drones

- Reduce field time and survey costs

Capturing topographic data with a drone is up to five times faster than with land-based methods and requires less manpower.

- Provide accurate and exhaustive data

One drone flight produces thousands of measurements, which can be represented in different formats (orthomosaic, point cloud, DTM, DSM, contour lines, etc)

- Map otherwise inaccessible areas

You are no longer limited by unreachable areas, unsafe steep slopes or harsh terrain unsuitable for traditional measuring tools.



# Using drones for Surveying

## Cartography

Survey drones generate high-resolution orthomosaics and detailed 3D models of areas where low-quality, outdated or even no data, are available.

## Land management and development

Aerial images taken by drones greatly accelerate and simplify topographic surveys for land management and planning.

## Precise measurements

High resolution orthophotos enable surveyors to perform highly-accurate distance and surface measurements.

## Urban planning

Thanks to drones, urban planners can collect large amounts of up-to-date data in a short period of time and with far less staff

## Boundary Delineation

Drones enable high-accuracy cadastral maps to be produced quickly and easily, even in complex or difficult to access environments.



# Workflow:

## DRONE MAPPING SOLUTION : PHANTOM 4 RTK + TERRA



### Phantom 4 RTK highlights:

- Ultimately compact and portable
- Supporting RTK station/network RTK/PPK
- Meet the requirement of 1:500 scale topography
- Cost-effective

### Workflow:



**Mission planning with GS RTK App**  
Linear Flight Mission  
Mode for roads/corridors



**Data collection with P4R**  
Can work without GCP  
and support NTRIP



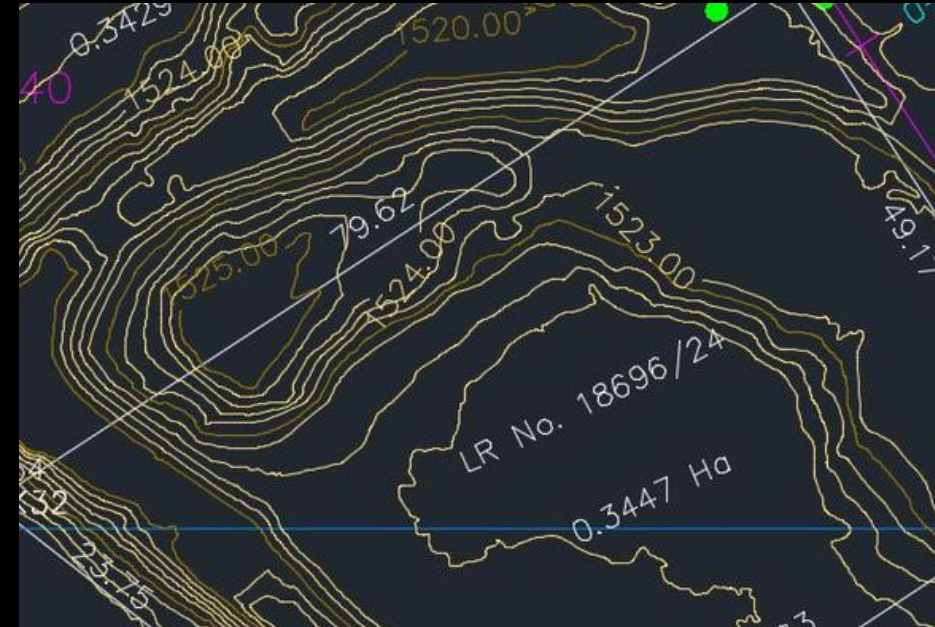
**2D/3D Modelling with Terra**  
High efficiency and  
simplified workflow



# Deliverables you can expect with Drone Surveying



Digital Surface  
Model



Contours



Orthomosaic



3D Point Cloud



Topographical  
Map



# Case Study

## CASE: TANA RIVER CANAL DESILTING

### Project information



A major Tana River tributary spanning 20 km is to be desilted. For canal desilting, it is required to obtain a 1:1000 scale topography.

### Parameter Configuration



Platform: DJI Matrice 300

RTK

Flight height: 120m (400 feet)

GSD: 3.29 cm/pixel Speed: 7 m/s

### Results



- Average check point error: 3 cm
- Only 2 **field personnel** to collect data and 2 **office personnel** for modelling and CAD post processing
- Only 180 min field work duration



# A solution Provider

**KCAA** KENYA CIVIL AVIATION AUTHORITY  
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**APPROVED UAS TRAINING ORGANIZATION  
CERTIFICATE**

Serial No.<sup>1</sup> **007**

KCAA Ref.<sup>2</sup> **KCAA/OPS/2117/UTO-06**

UTO # <sup>3</sup> : <b>07</b>	Operator's Name: <sup>6</sup> <b>Geoid Technologies Limited</b>	Operational Points of Contact: <sup>8</sup>
Expiry Date <sup>5</sup> (day/month/year) <b>04 November, 2022</b>	Operator Address: <sup>9</sup> <b>P.O. BOX 3891-00200, Nairobi</b> Telephone: <sup>10</sup> <b>+254 726 945 420</b> Email: <b>info@geoidtechnologies.com</b>	<b>Astrol Petrol Station Office Block 1<sup>st</sup> Floor Suite C101, Opposite Garden City Mall along Thika Rd.</b>

This certificate certifies that<sup>11</sup> **Geoid Technologies Limited** is authorised to perform UAS training, as defined in the attached Training Specification, in accordance with the Training and Procedures Manual, and the Civil Aviation (Unmanned Aircraft Systems) Regulations<sup>12</sup>

Date of Issue<sup>13</sup>  
(day/month/year)  
**05 November, 2021**

**Capt. Gilbert M. Kibe**  
**DIRECTOR GENERAL<sup>14</sup>**

INSTRUCTIONS (See reverse)

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**REMOTE AIRCRAFT OPERATOR CERTIFICATE(ROC)**

Serial No.<sup>1</sup>  
**008**

KCAA Ref:  
**KCAA/OPS/2117/ROC/20**

ROC # <sup>4</sup> : <b>08</b>	Operator's Name: <sup>6</sup> <b>Geoid Technologies Limited</b>	Operational Points of Contact: <sup>8</sup>
Expiry Date <sup>5</sup> (day/month/year) <b>08 August, 2022</b>	Operator Address: <sup>9</sup> <b>P.O Box 3891-00200, Nairobi</b> Telephone: <sup>10</sup> <b>(+254) 0726 945 420/ 0740 391 372</b> Email: <b>info@geoidtechnologies.com</b>	<b>Astrol Petrol Station Office Block, 1<sup>st</sup> Floor Suite C101 Opposite Garden City Mall, Along Thika Road</b>

This certificate certifies that<sup>11</sup> **Geoid Technologies Limited** is authorised to perform commercial UAS operations, as defined in the attached Operations Specification, in accordance with the Operations Manual and the Civil Aviation (Unmanned Aircraft Systems) Regulations<sup>12</sup>

Date of Issue<sup>13</sup>  
(day/month/year)  
**09 August, 2021**

**Director General<sup>14</sup>**

INSTRUCTIONS (See reverse)

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**UNMANNED AIRCRAFT DISTRIBUTOR/RESALER  
CERTIFICATE**

Serial No.<sup>1</sup>  
**002**

KCAA Ref:  
**KCAA/OPS/2117/DSTR/01**

Distributor # <sup>4</sup> : <b>02</b>	Distributor's Name: <sup>6</sup> <b>Geoid Technologies Ltd</b>	Operational Points of Contact and Principal Base of Business: <sup>8</sup>
Expiry Date <sup>5</sup> (day/month/year) <b>3<sup>rd</sup> May, 2022</b>	Operator Address: <sup>9</sup> <b>P.O. Box 3891-00200, Nairobi</b> Telephone: <sup>10</sup> <b>+254726884224</b> Email: <b>info@geoidtechnologies.com</b>	<b>Astrol Petrol Station Office Block, Wing C Suite C101, Opposite Garden City along Thika Superhighway, Nairobi</b>

This certificate certifies that<sup>11</sup> **Geoid Technologies Limited** is authorised to deal, resell and distribute Unmanned Aircraft Systems, spareparts and accessories in accordance with the Operations Manual and the Civil Aviation (Unmanned Aircraft Systems) Regulations<sup>12</sup>

Date of Issue<sup>13</sup>  
(day/month/year)  
**3<sup>rd</sup> May, 2021**

**Director General<sup>14</sup>**

CONDITIONS (See reverse)

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KCAA/OPS/RPL/2117/01 Vol.2(83) 28 September, 2021

**Mr. Solomon Kariuki Wanjiru**  
P.O. Box 3891- 00200  
**NAIROBI**

Dear Sir,

**REMOTE PILOT LICENCE**

Following the successful completion of your Remote Pilot Licence (RPL) Instructor's course on 02<sup>nd</sup> September 2021, the Authority hereby grants you approval to exercise the privileges of the Remote Pilot Licence in accordance with the Civil Aviation (Unmanned Aircraft Systems) Regulation, 2020 as stated below:

Name:	Solomon Kariuki Wanjiru
I.D/PP No:	25112321
Nationality:	Kenyan
State of Issue:	Kenya
Issuing Authority:	Kenya Civil Aviation Authority
Licence No:	YK-RPL-0023A
Type of UAS:	Multirotor
Endorsement/Rating:	Instructor
Date of Issue:	28/09/2021
Expiry Date:	07/01/2023

You are authorized to exercise the privileges of the licence as indicated herein on a Kenyan registered UAS and the Licence is only valid if accompanied by a valid medical certificate issued in accordance with the Civil Aviation (Unmanned Aircraft Systems) Regulation, 2020.

The Authority retains the right to vary, cancel/suspend and/or revoke this approval.

Yours *Solomon*  
**Capt. Gilbert M. Kibe**  
**DIRECTOR GENERAL**

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TECHNOLOGIES LTD

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**Thank  
You**