Spatial Legal Identity through Spatially Enabled Address System. A Case for Informal Settlements

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Legal Identity

SDG 16.9: Recognition of a person's existence before the law, facilitating the realization of specific rights and corresponding duties

Spatial (Legal Identity)

Context: Legal recognition of a person's specific geographic area.

Compare: Zipcode, Address code, PIN, Postcode, etc.

Ghana digitised its address system: its failure offers lessons to other African countries creating smart cities

Ivory Coast adopts unconventional digital address system

Kampala requires functional street addressing system

President Akufo-Addo Launches National Digital Property Addressing System

Nigeria adopts new addressing system, NIPOST sets 2020 target

Kenya: Nairobi County to Roll Out Physical Addressing System With Physical Identifiers for Locations, Property

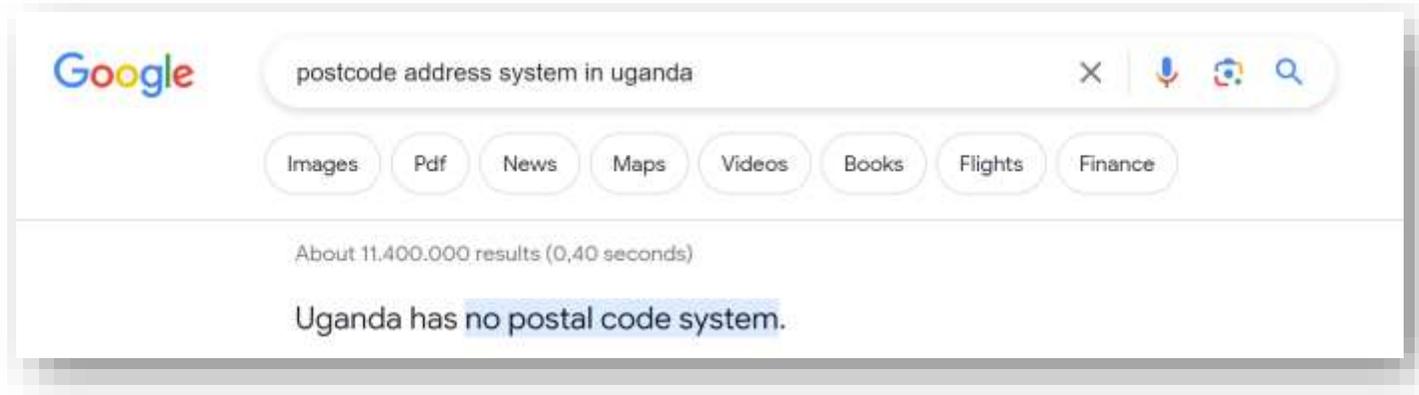Tanzania: Mwanza City Begins Using Postcode System
5 DECEMBER 2021

Finding your way in a country without street addresses

Existing Infrastructure

Post Office Box System
- Located in major town centers
- About 300 Post Office branches; 70,000 post office boxes
- Inherently a spatial

Population ~ 49,932,899

Previous / Current Efforts

City Address Model (CAM) - 2021/22
- Limited extent (Kampala only)
- Missed properties
- Manual procedures
- (Still) aspatial

Computer-Aided Mass Valuation (CAMV) – 2021/22
- Tax specific

SatCodes (Entebbe) – 2014/2016
- ?

Technology-driven, spatially misaligned

House Number Plate for an informal Setting

12A
Kifumbira Zone.

KCCA

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Spatial Legal Identity

Infrastructure
- Enveloping spatial polygons

Conceptualization

Polygonal Bisection problem

- From an original enveloping square

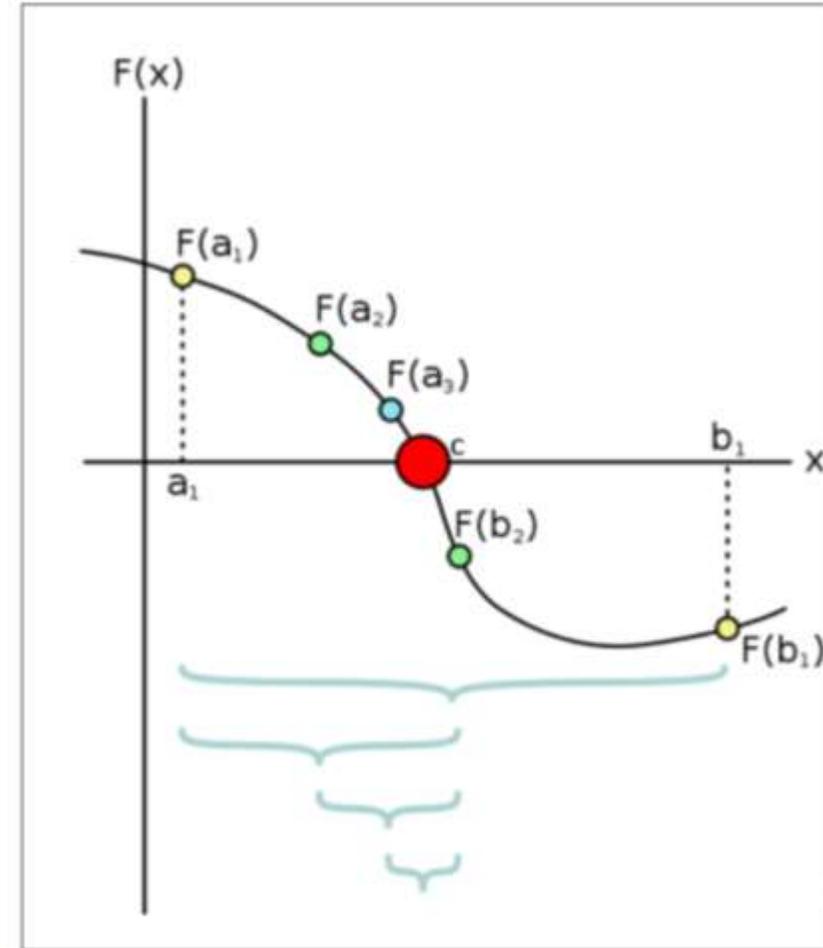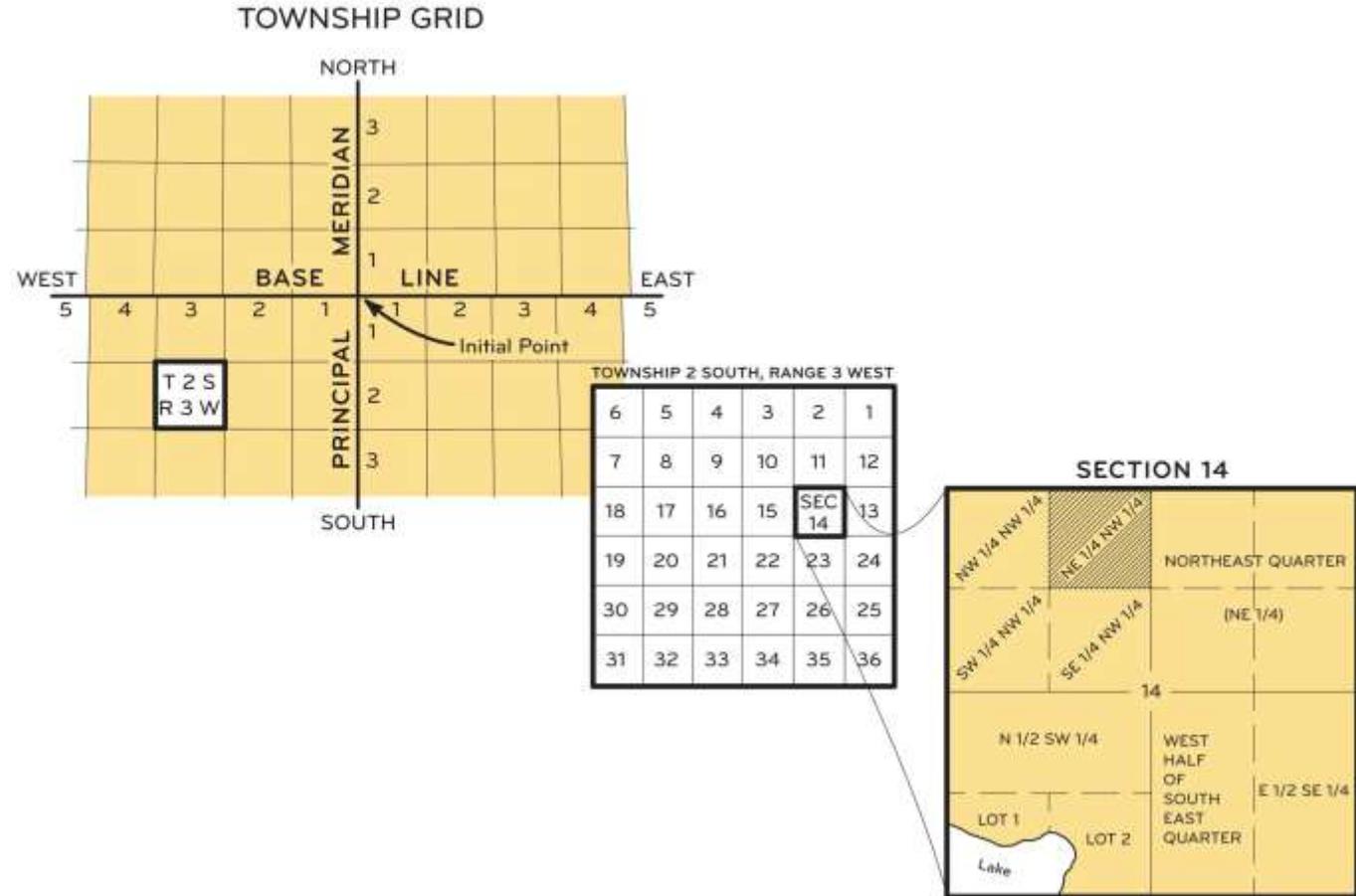- Subdivide until the smallest unit to identify the dwelling

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Algorithm…

Inputs
- OSM building footprint
- Bounding box dimensions

Algorithm 1 Bisection Method for Generating Quadrant Addresses

inputs

Two endpoint values (quadrant extent) a, b for which

An optional tolerance TOL,

Maximum iterations $NMAX$

Require: $f(a) > 0$ and $f(b) < 0$

outputs

A midpoint c is calculated as the arithmetic mean between a and b,

$c = (a + b)/2$

The function f is evaluated for the value of c

if $f(c) = 0$ **then**

we found the root of the function, which is c

else

$f(c) \neq 0$ we check the sign of $f(c)$:

$f(c)$ has the same sign as $f(a)$ we replace a with c and we keep the same value for b

$f(c)$ has the same sign as $f(b)$, we replace b with c and we keep the same value for a

end if

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Realization

- 12.5 m

Address code

7EKM CFC

Advantages

- Unique identification of all housing units
- Logical address – backward retractability
- Automated process
- Up-to-date (Weekly OSM building footprints)
- Navigation-enabled

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Conclusions

- Scalable Solution (Plug and Play)
- Spatially-enabled Address systems
- Technology adaptive
- Logical