



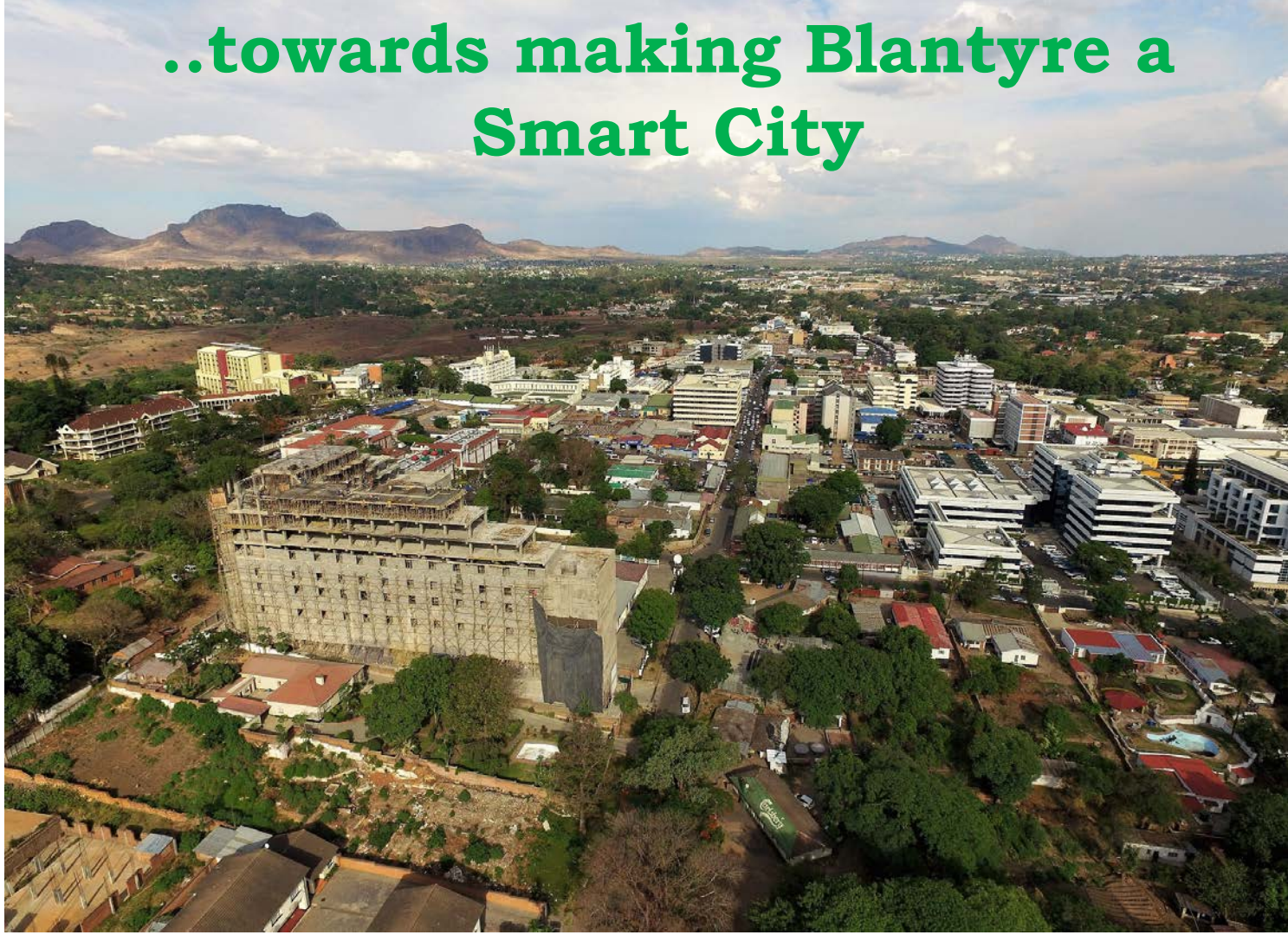
# INTEGRATING LOW COST/OPEN SOURCE GIS AND REMOTE SENSING IN URBAN PLANNING IN DEVELOPING COUNTRIES – CASE OF BLANTYRE CITY, MALAWI

Costly Chanza  
Director of Town Planning and Estates Services  
Blantyre - MALAWI  
[c.chanza@bccmw.com](mailto:c.chanza@bccmw.com)

14 – 16 November 2017  
Barcelona



# ..towards making Blantyre a Smart City





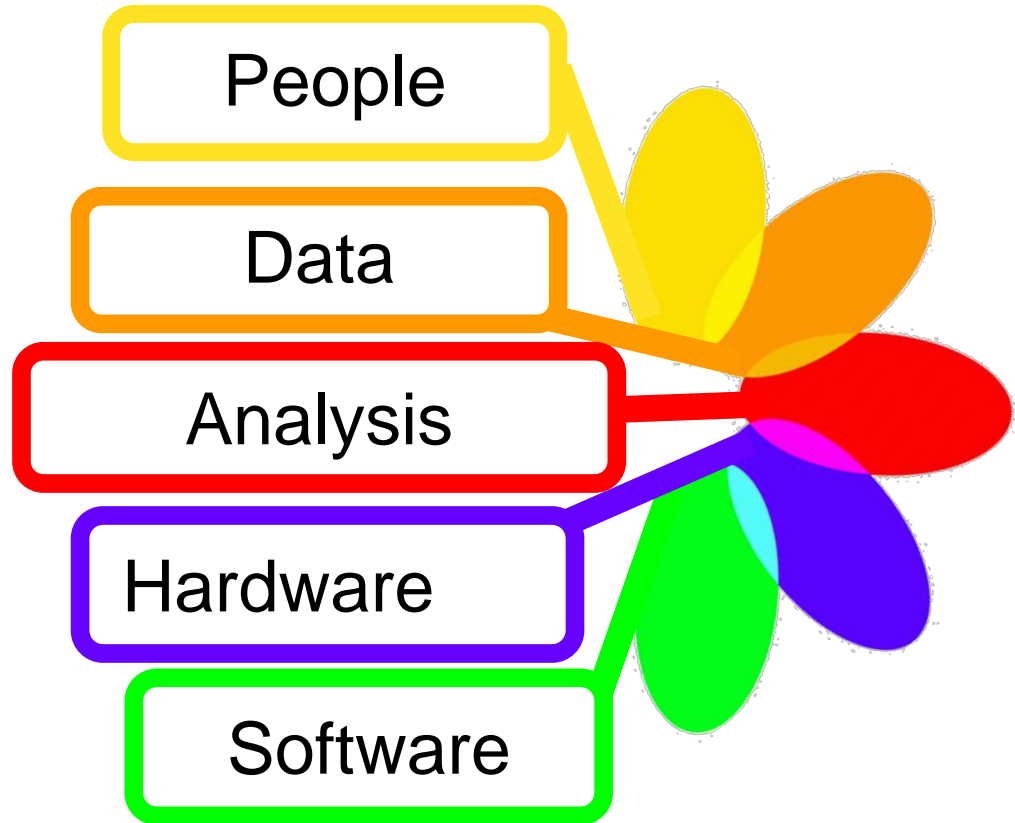


# Blantyre City - Malawi



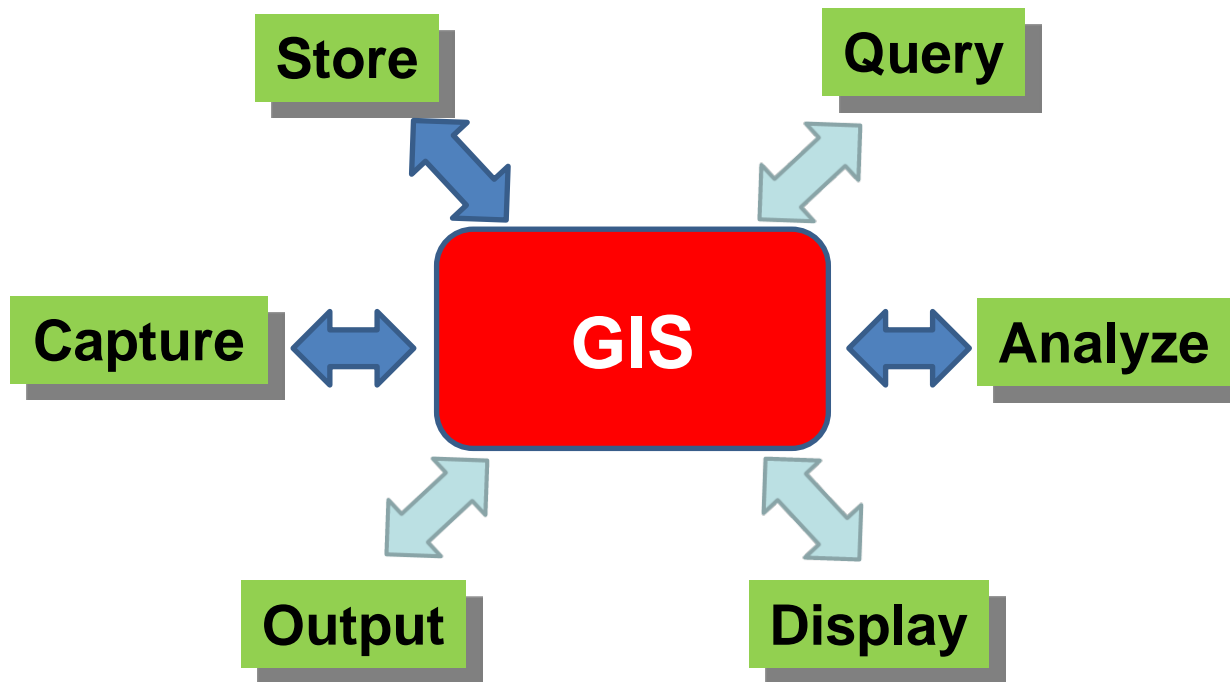


GIS integrates  
5 components

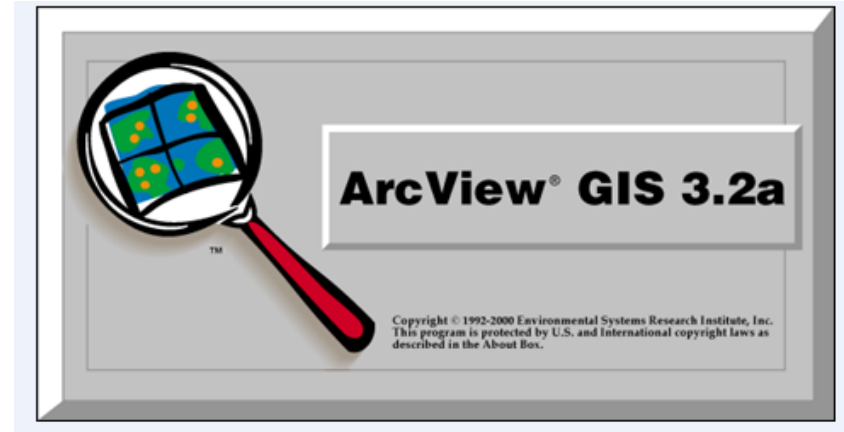


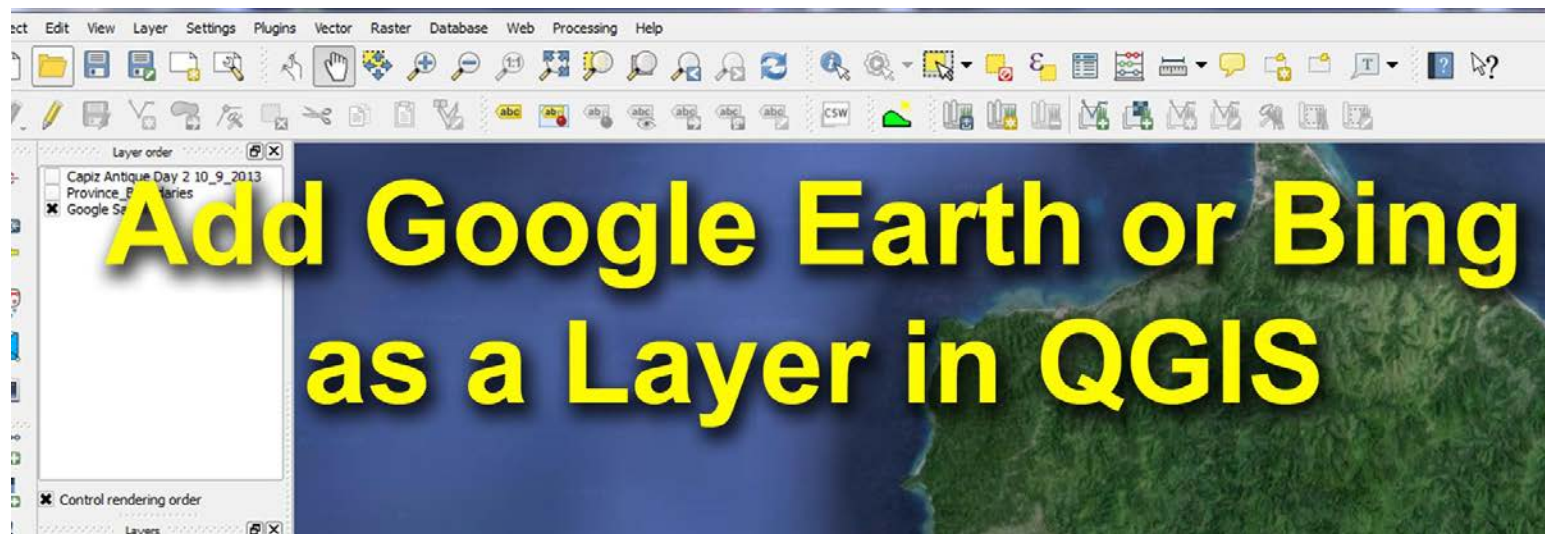


# GIS functions



## Low Cost/Open source GIS Software









## Objectives

- How low cost GIS can be used in developing countries to improve urban land use management
- How remote sensing can help in urban sprawl study
- Utilising remote sensing to determine land suitability analysis in urban development control



## Scope of Implementation

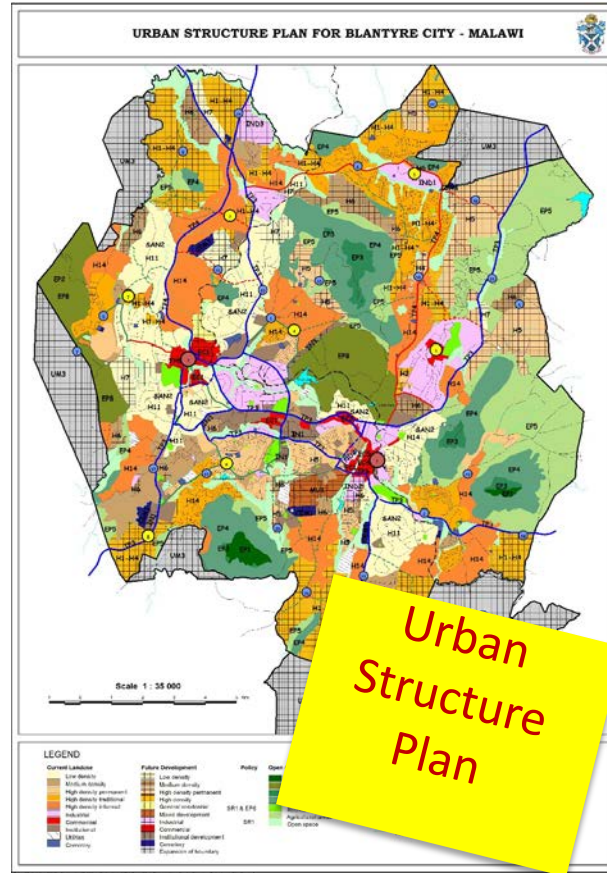
- Accessing open source GIS software online  
– QGIS or ArcView
- Accessing free satellite images - Google images
- Geo-referencing satellite images
- Digitizing satellite images; scanned map images
- Arranged basic GIS training to staff
- Simple GIS database management
- Field data collection with hand held GPS



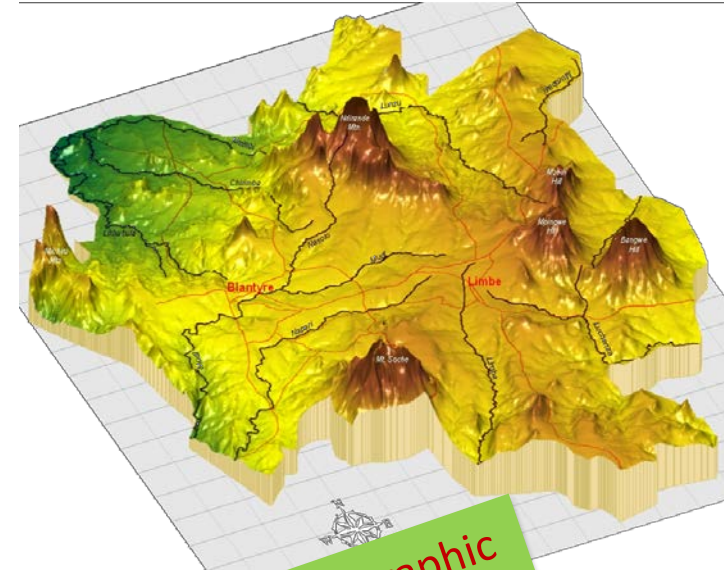
# **Current State of Implementation**



# GIS applications in municipal development planning system



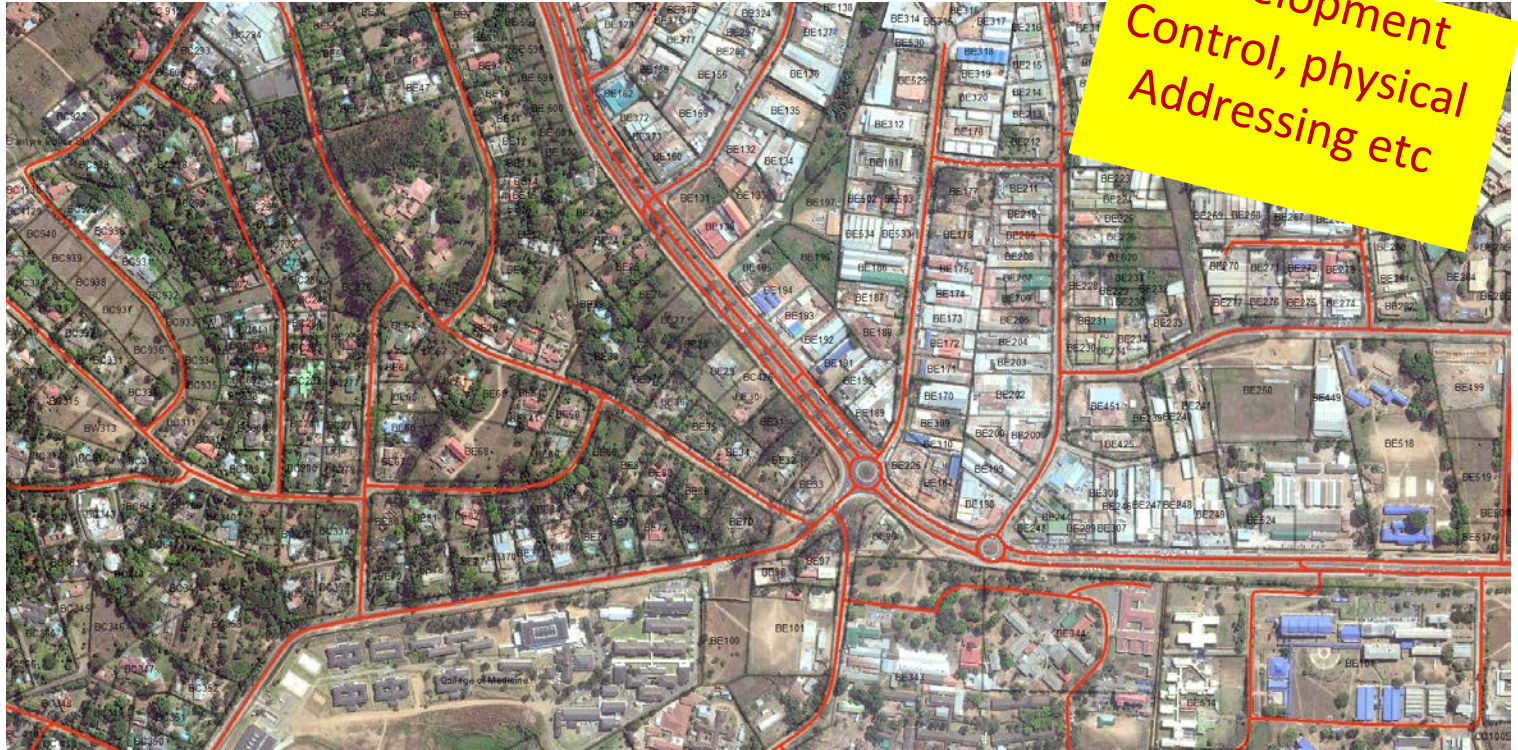
Urban  
Structure  
Plan



Topographic  
map



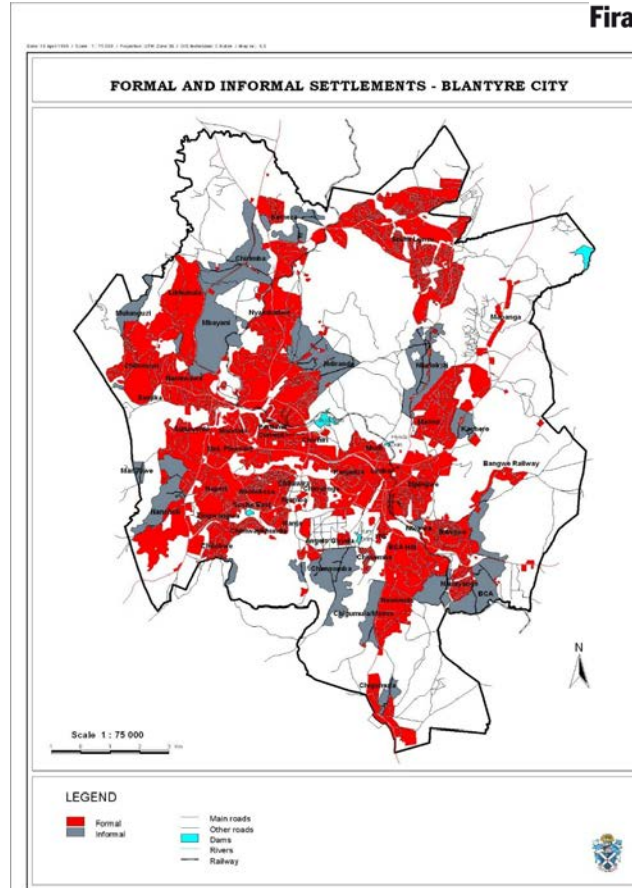
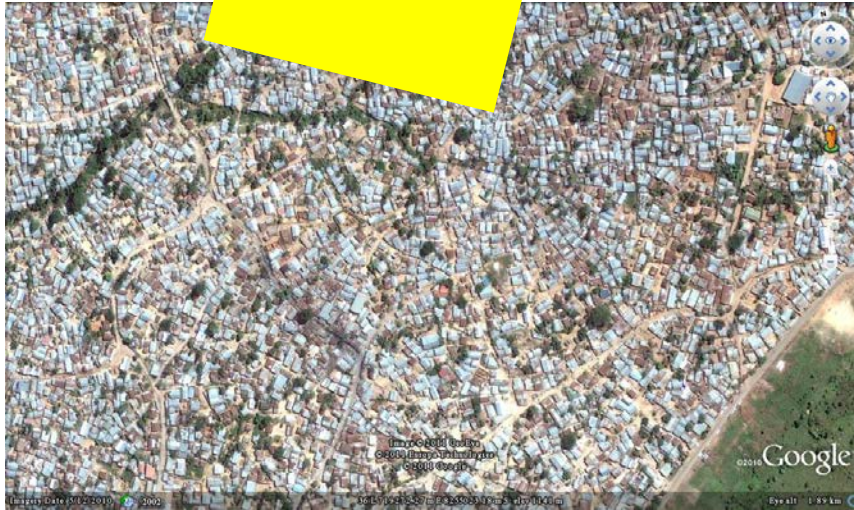
Satellite  
imagery,  
Ginnery  
Corner,  
Blantyre  
City (2016)







Urban sprawl  
study





**Preparation  
of land use  
maps**

**Study of  
urban  
sprawl**

**Land  
suitability  
analysis**

**Infrastructure  
planning**



**Solid waste  
management**

**Development  
control  
compliance  
Urban  
renewal**

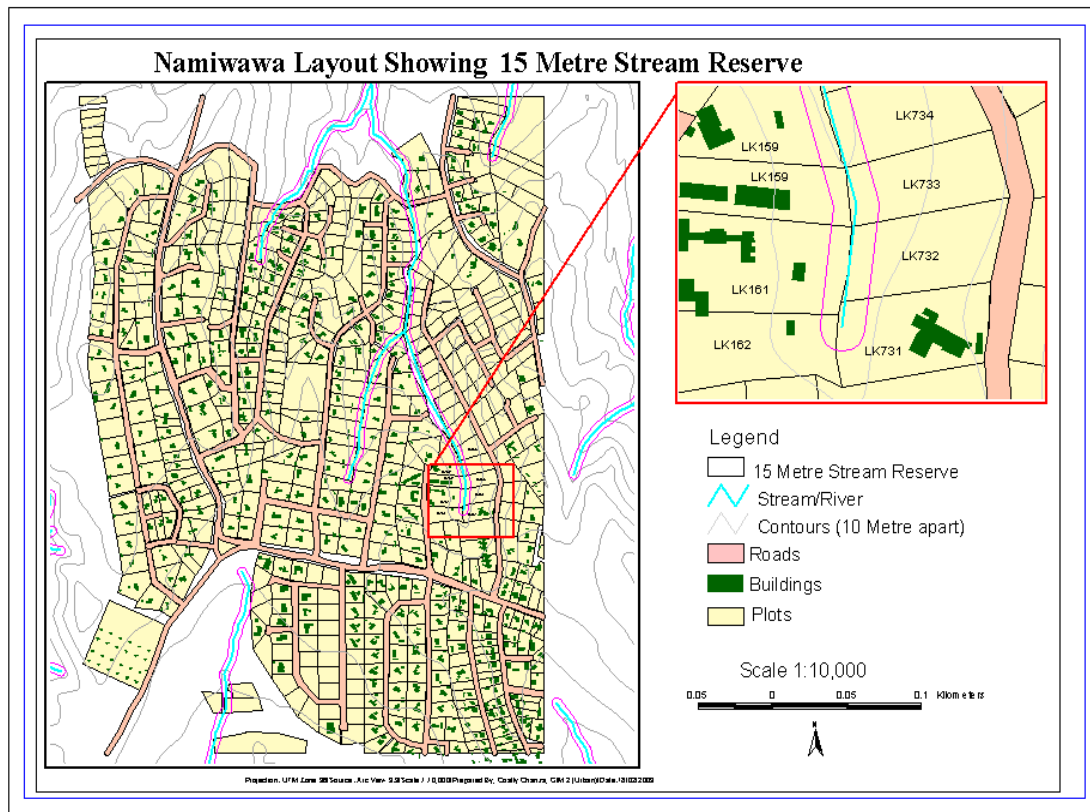
**Disaster  
mitigation  
measures**

**Interfacing  
with  
expert  
system**



Development  
Control  
compliance

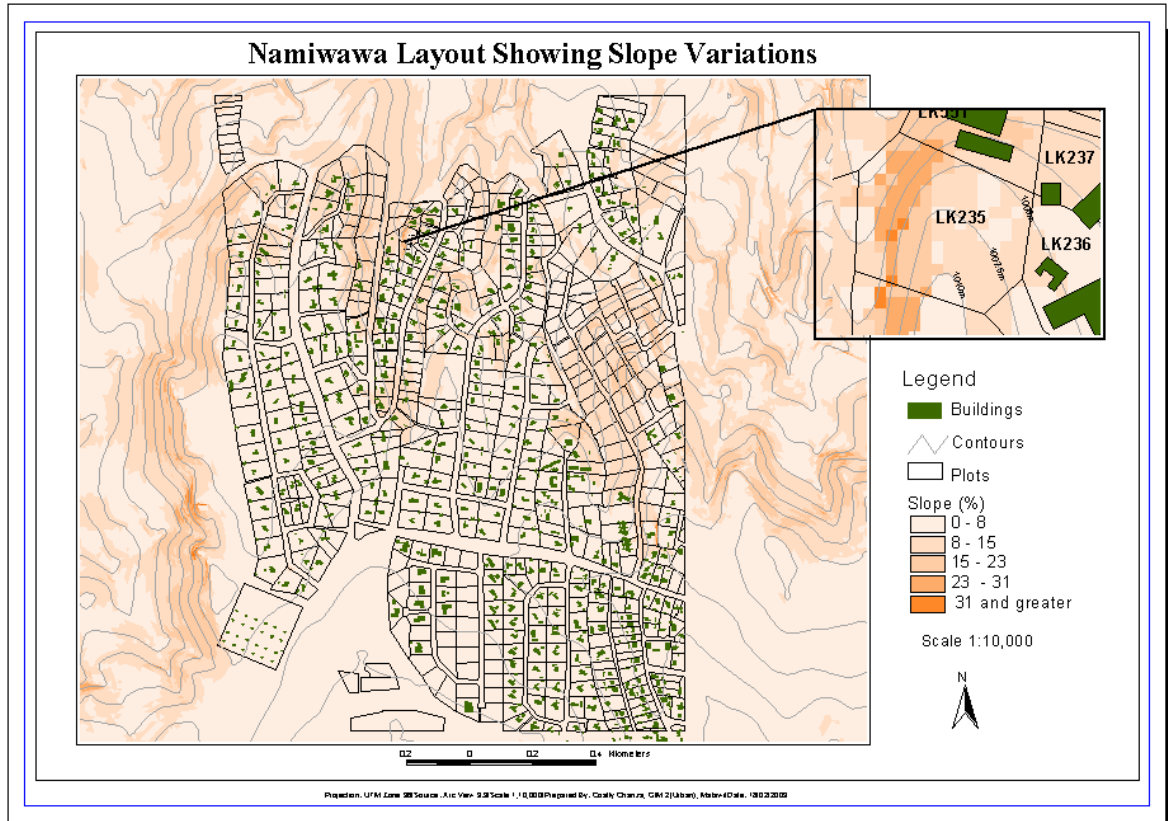
Road  
infrastructure





A triangulated irregular network (TIN) - digital data structure used in a geographic information system (GIS) for the representation of a surface.

Site suitability  
analysis

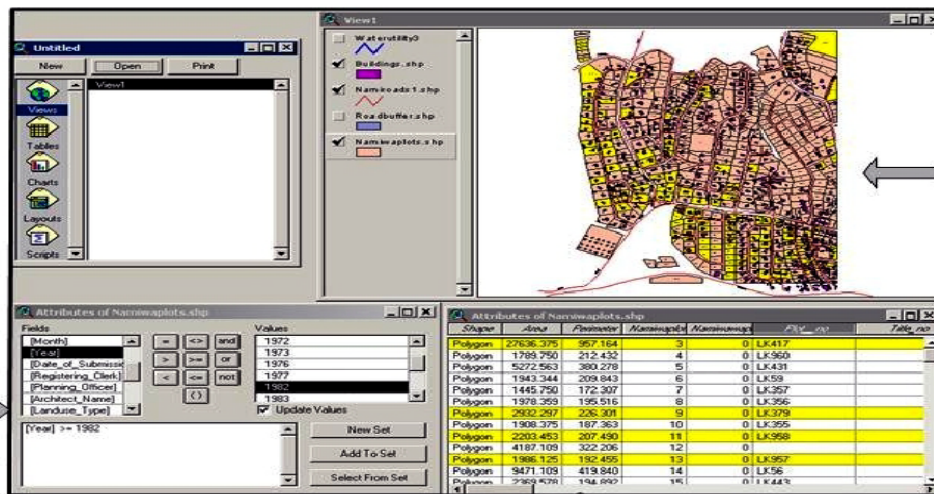






GIS integration

Querying info.  
from joined  
table



Results  
displayed

Joined  
table

Planning Officer	Architect Name	Plot No	Landuse
MADINGA	NDEGE	LK958	RESIDENTL
NANGUWO	KHONDE	BW56	RESIDENTL
	MOD	BW8	RESIDENTL
	MOD	BW24	RESIDENTL
	MOD	BW27	RESIDENTL
	MOD	BW25	RESIDENTL
	MOD	BW37	RESIDENTL
	MOD	BW26	RESIDENTL
MADINGA	S.H.C. MUNTHALI	LK660	RESIDENTL
KARYENGE	S.H.C. MUNTHALI	BW653	RESIDENTL
KASENDA	CSE	BW33	RESIDENTL
KHAMULA	S.H.C. MUNTHALI	LK197	RESIDENTL
	H. DAVIES	BW85	RESIDENTL

Spatial Data Table

SQL Join  
(Plot\_No as Common field)

Shape	Area	Perimeter	Nameplots	Nameplots	Plot_no	Table no
Polygon	2203.453	207.490	11	0	LK958	
Polygon	4187.109	322.206	12	0		
Polygon	1386.125	192.455	13	0	LK957	
Polygon	9471.109	419.840	14	0	LK56	
Polygon	2369.578	194.892	15	0	LK443	
Polygon	1341.359	183.479	16	0	LK956	
Polygon	2319.781	198.553	17	0	LK444	
Polygon	5495.391	441.708	18	0	LK951	
Polygon	2133.078	201.090	19	0	LK955	
Polygon	7402.656	334.000	20	0	LK123	
Polygon	4554.344	290.401	21	0	LK671	
Polygon	3045.109	215.738	22	0	LK441	
Polygon	5216.984	300.657	23	0	LK445	


Thematic Data Table (Plan Process Info)



Microsoft Access


File Edit View Insert Format Records Tools Window Help

Registration2



**Blantyre City Assembly**  
**Town Planning and Estates Services Department**  
**Development Application Registration**

Basic Data		Application Data	
Application Number	101985	Plot Number	LK958
TP Ref. Number (File)	TP/BL/9701	Title Deed Number	
Date of Submission	8/1/1985	Land Tenure Status	
		Landlord	GVT
		Location Area	NAMTAWA
		Landuse Type	RESIDENTIAL_LD
		Nature of Application	New_Development
		Type of Application1	DWELLINGHOUSE
		Type of Application2	SERVANTSQUARTER
		Type of Application3	
		Adequate Plan Drawings	YES
		Architect Name	NDEGE
		Eng. Certificate Submitted	N/A
		Est. Dev Cost (MK)	3,065,834.00
		Scrutiny Fee (MK)	24,526.67
		Receipt Number	4061476
		Planning Officer	MADINGA
		Registering Clerk	MGOB00LA

 Run App

Personal Data

Applicant Owne ID APPL1

Salutation MR

First Name N.M.

Last Name PATEL

Address C/O BOX 457

District BLANTYRE

Phone Number

Fax Number

Email Address

Add Record Undo Record Find Record Save Record Print Record Close Form

**Find and Replace**

Find Replace

Find What: Savjan Find Next

Cancel

Look In: Registration2

Match: Whole Field More >>

Record: 1 of 166

Search

Start

Namiwawa : Database

Registration

Registration2

Document1 - Microsoft ...

12:00 PM

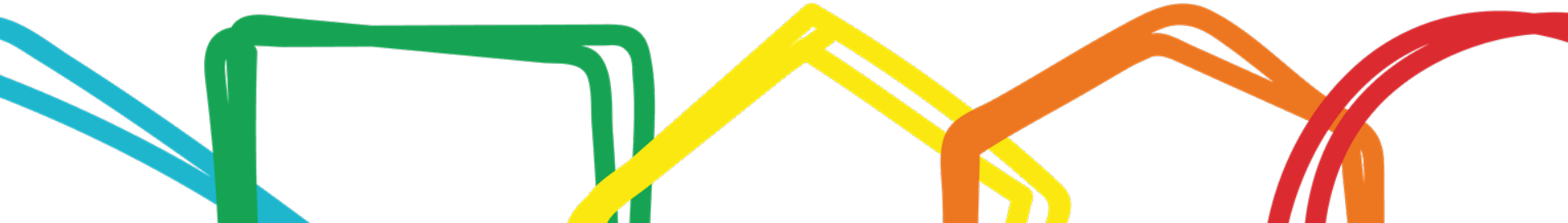


## Implementation Constraints

- Lack of appropriate base maps
- Correlating remote sense data and cadastre info
- Availability and digitisation of certain data products
- Inadequate funds to upgrade hardware
- Lack of maintenance
- Data sharing; data cost
- High staff turn over

## CONCLUDING REMARKS

- Low cost GIS can be used in developing countries to improve urban land use management; urban sprawl study; land suitability; development control; mapping etc
- The proposal can be a launch pad for further full fledged development of GIS in a municipal council when resources have been identified.



# SMARTCITY

EXPO WORLD CONGRESS

