

**ASSESSMENT OF SECURITY IN COLOMBO  
METROPOLITAN AREA**

WMP Wasantha Kumara

5998MD2014060



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## DECLARATION OF THE CANDIDATE

I do hereby declare that work described in this thesis was carried out by me under the supervision of Prof. Sunethra Thennakoon and Dr. Ranjith Premasiri and report on this thesis has not been submitted in whole or in part to any University or any other institution for another Degree/Diploma.

Date 20 March 2016

W M P Wasantha Kumara  
.....  
W M P Wasantha Kumara  
No: 5/C/37  
Kandalanda  
Homagama

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W M P Wasantha Kumara

### ABSTRACT

Geographic Information system technology to ensure public safety and security using dynamic datasets requires systematic development of analysis sequences incorporating sufficient details and establishing flow of each process. Absence of a structured approach would consume a significant time for recalculations with datasets which requires consistent and frequent updating.

A typical case is the modeling of the spatial variations of the security against the risk in specific land extent based on zoning changes, un welcome incidents, national or local ceremonies etc. Apart from such dynamic data the relatively static data such as land use, road network admin boundaries and law enforcement boundaries become a part of a GIS model base data set. A GIS modeler needs the vision to structure a particular security application enabling the generation of output maps on each occasion of changes affected either to one all data layers. Hence it is great importance to identify the method, strengths and weaknesses of such an application ModelBuider is a component of ArcGIS software which enables creating, editing and management of GIS models.

The ModelBuilder creations enable the visualization and exploration of results in ArcMap. The Model Builder also facilitates the changes of parameter values, rerun selected processes, and intermediate data. The present work is an application of GIS based model and ModelBuilder to assess the spatial variability of security against the risk in the city of Colombo during 2009 under the heavy terrorist threat. Data sets of 1:50,000 scale were used with ArcGIS software. The systematic development of GIS model and the potential of ModelBuilder assembly for varying data layers and results generation with ease.

These types of applications enable the field commanders and decision makers to identify location vulnerability as a result of various scenarios such as terrorist attacks, explosions, arrests of terrorists suspects, public rallies or public unrest situations which

may not be predictable therefore, this GIS based model and ModelBuilder application would help field commander and decision makers to customize spatial data set based models to facilitate rapid and rational decision making to ensure Public Safety and Security using GIS.

## ABBREVIATION

MCDA	-	Multi criteria decision analysis
EE	-	Entry Exit
TAOR	-	Tactical Area of Operational Responsibility
AOI	-	Area of Interest
VIP	-	Very Important Personnel
VVIP	-	Vulnerability to Very Important Personnel
HVT	-	High Valuably Target
PSS	-	Public safety and Security
NSDI	-	National Spatial Data Infrastructure
LTTE	-	Liberation Tamil Tigers of Eelam
TAOR	-	Tactical Area of Operational Responsibility
OCC	-	Operations Command Colombo
GIS	-	Geographic Information System
GPS	-	Global Position System
RS	-	Remote Sensing
VPN	-	Virtual Private Network
UAC	-	User Account Control
IPB	-	Intelligence Preparation of Battlefield
IT	-	Information Technology
Recce	-	Map reconnaissance
PHP	-	Hypertext Preprocessor
MOD	-	Ministry of Defense
NGCCS	-	Next Generation Command and Control System
CTC	-	Concurrent Technologies Corporation
ICTP	-	Integrated Common Tactical Picture
COP	-	Common Operational Picture
OPS	-	Operational
INT	-	Intelligent
LOG	-	Logistic
AOI	-	Area of Interest
Div	-	Division
Bde	-	Brigade

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# CHAPTER ONE

## INTRODUCTION

### 1.1 Background of the Study

Osama Bin Laden is an eye opener for the western powers to rethink about their strategy of divide and rule to achieve supreme power over the rest of the world. Aftermath of the 9/11 terrorist attack on peace loving public of New York City, it has clearly demonstrated the importance of geospatial technologies in an emergency situations other than natural disasters. 30 years of prolonged insurgency by the Liberation Tamil Tigers of Eelam (LTTE) played havoc in the lives of innocent peace loving public in almost every parts of the country. There were many occasions that the safety of the public was vulnerable and threatened to a greater degree. Critical infrastructure which includes telecommunications, transportation, ports, airports, electrical power systems, gas and oil storage/ distribution, economic nerve centers like banks and finance, water supply systems, schools, public places, emergency services to become vulnerable targets to terrorists' attacks.

In any emergency situation, immaterial of its origin our nation's survivability and safety is depended on rapid access to and application of countless types of accurate, current and reliable geospatial information. Powerful geographic information systems are now available to fast render single or several layers of digital geospatial data along with heaps of tabular data into any map like product in order to visualize spatial patterns and distributions. These systems can facilitate near real time performance of a wide range of relevant geospatial analysis for the use of public safety by enhancing security. These systems can be used to access and process digital geospatial data virtually anywhere and can be instantly transmitted from and location it is maintained and retrieved at any place where it is needed. This digital geospatial is very much advantageous over the analog data and transitional spatial data.

Dynamic nature of Security and Risk generating factors would cause complex situations in different security scenarios. Diverse characteristics of public safety and security need to formulate geographic information technologies combined with appropriate sets of

geospatial information to form an invaluable tool for handling, display, and analysis of spatial information involved in every aspect of public safety and security.

Geospatial information provides the spatial and temporal backdrop, analysis and decisions upon Detection, Preparedness, Prevention, Protection, Response and Recovery an all security scenarios.

Accurate and timely information easily accessed and capable of being shared across Grama Niladari Divisions, District Secretary Divisions, Province and local law enforcement agencies (Police) and security authorities is fundamental to the decision making capability of field commanders tasked with the public safety and security. But without the real-time ability to quickly visualize the spatial patterns of activities, undesirable incident locations, and understand the multi- layered geospatial context of complex emergency situations in ensuring of public safety and security will not be achieved. Modern state of the art technologies of geospatial information technology can provide decision makers with data they need to confidently encounter a wide variety of threats including terrorist attacks, sabotage, public unrest political rallies, and spontaneous ethnic clashes and natural disasters.

However, the existing implementation of the geospatial technologies across the Grama Niladari Divisions, District Secretary Divisions, Province and local law enforcement agencies (Police) and Security authorities necessary to fully coordinate an effective and efficient response, is seriously lacking in specific areas. As the concept of public safety and security becomes infused into the routine practices of government security forces and the everyday life of citizens, field commanders and decision makers will have to significantly benefit from the crisis situation management "superiority" that GIS provides. Field commander and decision makers of security forces should understand and formulate action plan necessary to fully realize this technology and its capabilities to make the management decisions essential to implement nationwide.

Accurate and comprehensive data is vital for any management information system. 80-90% of the government "Big Data" is well referenced to its geometric location as a key feature. It is critical that as a nation we take necessary actions to assure that strategic spatial information interwoven with public safety and security, particularly geospatial

information assets are created, maintained for currency, accuracy, readily available and are interoperable to those who need them most.

Although field commanders and decision makers engaged in public safety and security also requires much of the same basic real-time or current spatial information needed for their uses and applications.

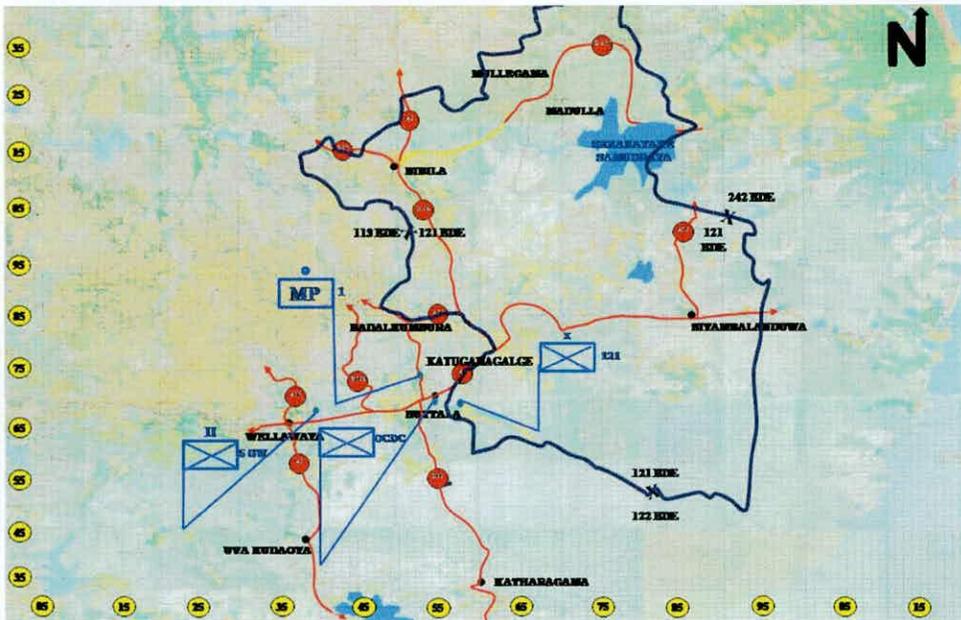


Figure 1- Operational Map

With past and recent undesirable events, it has been well unspoken that it must be immediately and comprehensively available to field commanders and decision makers at all levels.

This is to ensure:

- Implementation of a comprehensive National Spatial Data Infrastructure (NSDI)
- Interoperability of the systems that process geospatial Information.
- A greed common processes to collect, manage, and disseminate geospatial information.