

UNIVERSITITEKNOLOGIMARA

**DEVELOPMENT OF GIS FOR WATER PIPE
DISTRIBUTION NETWORK**

NIK ADIB NIK DIN

IT Project/Dissertation submitted in partial fulfillment
of the requirements for the degree of

Master of Science (Information Technology)

Faculty of Computer and Mathematical Sciences

January 2013

ABSTRACT

Urban infrastructure management is becoming more and more important for cities around the world. This paper present one of the management strategy for water distribution network, which to ensure GIS technology could be a cost effective way to help reduce of water loss over extended period of time. This project aims to demonstrate a prototype of GIS for water pipe network by gather user requirement and designing the GIS database. This study will be significance for SATU staff and for organization in order to improve their decision-making and also their services. SATU not have any digital data or any systems regarding the water pipe network accept in AutoCAD format. They still use conventional method in their daily job. They do not have proper recorded information regarding leakage or new development. In term of water pipe network, they do not have overall view for their area. It could make some tacit knowledge will loss within new staff. The coverage area for this study is at Kemaman area under SATU authority. This study is focusing in design of GIS for water pipe network including its component. In this study, data preparation and verification process occupied above 70% of the project time. The development of the prototype system also includes the creation of spatial database to cope with the spatial features which exist in the system. GIS functionality also involves the design and customization of the interface, where among the system can be adjusted to suit the style of the organization, functions, computer literacy, and frequency of use. This study also suggests that a common sense approach to adaptive interface is through a consultative process that enables fast design prototyped. This is called Rapid Prototyping. Rapid prototyping strategy involves three stages: defining the requirements specification, prototype design specifications, and evaluated the prototype to achieve this specification. Adaptation strategies have been used to improve system usability and user performance in Syarikat Air Terengganu (SATU). It also offers specific techniques to achieve three-level rapid prototyping. Based on customization and system prototype design which have been done by 'walk through' method, user from SATU absolutely can use this prototype system. All objectives of this project are achieved. As a conclusion this project is significant not only for SATU but also for the researcher. This study also can be recommended to explore the maximum potential of GIS adoption in any organization.

ACKNOWLEDGEMENT

Many people contributed to the success of this paper. We would like to take this opportunity to acknowledge these people and express our gratitude. A special thanks to supervisor of this project, Madam Nalini Dharmarajan who was abundantly helpful and offered invaluable assistance, support and guidance. Special thanks also to En Annuar Yaacob as SATU's staff which always help me in water pipe data verification process and all SATU's staff which involve in this project. Lastly, thanks to my family who supported the endeavor from start to finish.

TABLE OF CONTENTS

	PAGE
STUDENT'S DECLARATION	i
ABSTRACT	ii
ACKNOWLEDGEMENT	iii
TABLE OF CONTENTS	iv-vii
LIST OF TABLES	viii
LIST OF FIGURES	ix

CHAPTER 1: INTRODUCTION

1.1	RESEARCH BREAKGROUND	1
1.2	PROBLEM STATEMENT	2
1.3	PROJECT AIM	4
1.4	PROJECT OBJECTIVE	4
1.5	PROJECT SCOPE	5
1.6	PROJECT SIGNIFICANCE	5
1.7	RESEARCH DESIGN	5
1.8	CONCLUSION	6

CHAPTER 2: LITERATURE REVIEW

2.1	INTRODUCTION	7
2.2	GEOGRAPHICAL INFORMATION SYSTEM (GIS)	7
2.3	GIS TECHNIQUES AND TECHNOLOGY	9
2.4	GIS DATA REPRESENTATION	9
2.5	GIS DATA CAPTURE	10

2.6	GEOMETRIC NETWORKS	12
2.7	GIS DEVELOPMENT	12
2.8	GIS AND WATER SUPPLY	13
2.9	EXAMPLE PROJECT RELATED TO GIS AND WATER PIPE NETWORK	13
2.10	RAPID PROTOTYPING METHODOLOGY	16
2.11	ARCGIS	18
2.12	USABILITY	20
2.13	CONCLUSION	23

CHAPTER 3: METHODOLOGY

3.1	INTRODUCTION	24
3.2	RAPID PROTOTYPING: A CUSTOMIZATION STRATEGY	24
3.3	PHASES IN RAPID PROTOTYPING METHODOLOGY	27
3.3.1	PROBLEM IDENTIFICATION AND PLANNING	28
3.3.2	DETERMINE REQUIREMENT SPECIFICATION IN RAPID PROTOTYPING	28
3.3.2.1	Table of Specification Goals	28
3.3.2.2	Table of User Requirements	29
3.3.2.3	Table of Task Requirements	29
3.3.2.4	Summary User Report	29
3.3.2.5	Create GIS Data Model For Water Pipe Network	29
3.3.2.6	Collect and Verify Specified Data	30
3.3.3	DESIGNING PROTOTYPES TO MEET WITH REQUIREMENTS	30
3.3.4	EVALUATING PROTOTYPE	30
3.3.4.1	Analytic Evaluation	31
3.3.4.2	Observational Evaluation	31