

**A critical analysis of the use of IP as a form of information warfare
against the developing world**

by

William Rasebabele Tlhapi

Thesis

Submitted in partial fulfilment of the requirements for the degree

D Phil (Information Science)

in the

Faculty of Engineering, Built Environment and Information Technology

University of Pretoria

Pretoria

March 2004

Summary

A critical analysis of the use of IP as a form of information warfare against the developing world

The initial intention of the intellectual property regimes (IPRs) was to promote intellectually produced assets and also to ensure that they are accessible. Modern-day intellectual property regimes put more emphasis on the protection of intellectual products. This has led to lesser emphasis being placed on optimising access to protected information in general.

Indigenous knowledge (IK) has recently attracted more attention from different role-players who are interested in exploiting its economic potential. This has resulted in some IK-based products being patented. Consequently, indigenous communities may no longer have free access to these products. Access to protected information has been limited by higher prices of products protected by IPRs. In some cases it became illegal for the indigenous communities to utilize the resources they had used for centuries. Various organisations interested in IK have already made it available over the Internet, in some instances without the consent or recognition of the indigenous people. This situation translates into a form of information warfare in which the original indigenous owners of knowledge have no access to their own IK resources. Although various measures have been implemented to promote and protect IK, these have not proved to be very efficient.

Based on an Information Science perspective of information warfare, this research suggests that there is a need for improved access to protected information, with special reference to IK. It is proposed that all national governments, especially those of the developing world, should initiate projects to document, digitise and store information on IK resources in repositories or rather databases. An international repository with a union catalogue, as well as the local and national repositories, should be established to enable access to the IK resources via the Internet. The World

Intellectual Property Organisation would take responsibility for the creation and maintenance of the international repository. It is further proposed that information and communication technologies be employed to protect and promote access to IK. Digitised IK will have to be catalogued or organised according to Dublin Core Metadata Element Set and stored as such in repositories to ensure uniform storage. Cryptography and digital watermarking techniques are technologies that could be employed to protect digitised IK.

The Open Archives Initiative Protocol for Metadata Harvesting is a transport protocol which is recommended for information retrieval from the repositories. Metadata such as Resource Description Framework which is a standard for the management of IK on the World Wide Web, and MPEG-7 that would ensure implementation of multimedia objects, would be implemented. These ICT mechanisms also allow for the management of IPRs, which would assist in the prosecution of those who infringe IPR. Such infringements have not always been easy to prove with regards to electronic IP infringement.

The following key terms are covered in this thesis:

Information warfare; Information and communication technologies; Indigenous knowledge; Intellectual property; Information Science; Repositories; Dublin Core Metadata Element Set; Open Archive Initiative Protocol for Metadata Harvesting; Digital watermarking; and Cryptography

I declare that

A critical analysis of the use of IP as a form of information
warfare against the developing world

is my own work and that all the sources that I have quoted have been indicated and
acknowledged by means of complete references

Acknowledgements

The author wishes to express his gratitude:

- To my promoter, Prof. JJ Britz, and co-promoter Prof. TJD Bothma, for their ongoing support and guidance during this project
- Financial assistance of the University of Pretoria towards this research is hereby acknowledged. Opinions expressed and conclusion arrived at are those of the author and are not necessarily to be attributed to the University of Pretoria.
- I am indebted to Penny Kokot-Louw for her excellent and thorough editing. What errors remain are most assuredly mine.
- My friend, Somerset Morkel, for diligently reading through this thesis and his valuable comments.
- My immediate family's ongoing support and encouragement.
- Colleagues and friends for their unique and indispensable support they showed.

In memory of a dear colleague and friend, Rina van Zyl.

May her soul rest in peace...

Contents

Summary.....	ii
Table of Contents.....	viii
List of Figures and Tables	xvi
Chapter 1.....	1
Chapter 2.....	13
Chapter 3.....	43
Chapter 4.....	83
Chapter 5.....	116
Chapter 6.....	145
Chapter 7.....	157
Chapter 8.....	188
Annexure	203
References	210

Table of Contents

Chapter 1 Introduction

1.1	Introduction	1
1.2	Aim of the study	1
1.3	Objectives of the study	2
1.4	Research problem	2
1.5	Research methodology	4
1.6	Point of departure	6
1.7	Background	7
1.8	Related research	8
1.9	Concepts	10
1.10	Organisation	10
1.11	Road map of this thesis	11

Chapter 2 Overview of information warfare

2.1	Introduction	13
2.2	Background	14
2.3	Forms of information warfare	15
2.3.1	Militaristic warfare.....	17
2.3.1.1	Intelligence gathering.....	20

2.3.1.2	Introducing disinformation	21
2.3.1.3	Resource denial	22
2.3.1.4	Resource destruction	22
2.3.1.5	Protection	23
2.3.2	Intelligence-based warfare	24
2.3.3	Electronic warfare	25
2.3.4	IW as a form of psychological warfare	26
2.3.5	Hacker warfare	27
2.3.6	Economic information warfare	28
2.3.7	Cyber warfare	30
2.4	Summary	32
2.5	Information Science perspective on information warfare	33
2.5.1	Background	32
2.5.2	Information Science as a discipline	35
2.5.3	IW defined within Information Science	37
2.5.3.1	Commoditisation of Information	38
2.5.3.2	Barriers of access to information	40
2.5.3.3	Current trends in IPR regimes	40
2.6	Summary	41

Chapter 3 Historical framework of IP within the global context

3.1	Introduction	43
3.2	Philosophy of IP	44
3.3	Perspectives on IP	46
3.3.1	Western perspective of IP	48
3.3.1.1	Origin of copyright	50
3.3.1.2	The Paris Convention of 1883	52
3.3.1.3	The Berne Convention of 1886.....	53
3.3.1.4	World Intellectual Property Organisation.....	54
3.3.1.5	The General Agreement on Trade and Tariffs.....	57
3.3.1.6	Trade Related Aspects of Intellectual Property (TRIPS).....	60
3.3.2	Summary	64
3.3.3	Evolution of IP in other parts of the world	64
3.3.3.1	Eastern perspective of IP	65
3.3.3.1.1	China	66
3.3.3.1.2	India	67
3.3.3.1.3	South Korea and Taiwan.....	68
3.3.3.2	African perspective of IP	70
3.3.3.2.1	South Africa	72
3.3.3.2.2	Nigeria.....	73
3.3.4	Summary.....	74

3.4	Forms of IP	74
3.4.1	Copyright	75
3.4.2	Trademark	76
3.4.3	Patents	77
3.4.4	Plant breeders' rights	79
3.5	Summary	81

Chapter 4 IK within the global IPR context

4.1	Introduction	83
4.2	The concept of indigenous knowledge.....	84
4.3	Types of indigenous knowledge.....	86
4.4	Indigenous knowledge versus Western knowledge	89
4.4.1	Globalisation and its impact on IK	93
4.5	Importance and value of IK for the world.....	97
4.5.1	Dynamics of indigenous knowledge.....	98
4.5.2	IK for sustainable development	100
4.6	Links between IK and IPRs.....	101
4.6.1	General Agreement on Tariffs and Trade (GATT) on IK.....	106
4.6.2	The Convention on Biological Diversity	107
4.7	Exposure of IK to Western researchers.....	109
4.8	The current status of IK.....	112

4.9	Summary	114
-----	---------------	-----

Chapter 5 IW perpetrated against the developing world

5.1	Introduction	116
5.2	IK as property	117
5.3	Effects of biopiracy on IK	120
5.4	Case studies	124
5.4.1	Biodiversity	124
5.4.1.1	Thaumatococcus and Africa IP legislation	124
5.4.1.2	India: Neem case	127
5.4.1.3	Australian biodiversity and the Aborigines	129
5.4.2	Names	130
5.4.3	Tourism	132
5.4.3.1	Toraja case	133
5.4.3.2	Jivaro dance case	134
5.4.3.3	Sacred sites and trade issues	134
5.5	Health-related issues	136
5.6	First World benefits	140
5.7	Reasons for protecting indigenous knowledge	142
5.8	Summary	143

Chapter 6 Current measures employed to protect IK

6.1	Introduction	145
6.2	Recognition of IK and indigenous people.....	145
6.3	Documenting IK.....	147
6.4	Joint ventures and collaborative research.....	148
6.5	Possible compensation mechanisms.....	149
6.5.1	Funds.....	150
6.5.2	Contracts and IPR agreements.....	150
6.5.3	Non-binding agreement	151
6.5.4	Defensive publications.....	151
6.6	Systems for IK protection	152
6.7	Summary	155

Chapter 7 Using ICT to protect and promote IK

7.1.	Introduction	157
7.2.	Background	158
7.2.1	Internet as an important tool of communicating digital IP	158
7.2.2	IK on the Internet.....	162
7.3.	Management structures to protect and promote IK.....	163
7.3.1	Repositories.....	163
7.3.1.1	Local repositories.....	165

7.3.1.2	National repositories	166
7.3.1.3	International repositories	167
7.3.2	National IK Resource Centres	168
7.3.3	International IK Resource Centre	170
7.4	Deploying ICT to protect IK	171
7.4.1	Cryptography	171
7.4.2	Digital watermarking	174
7.5	Deploying ICT to promote IK	175
7.5.1	Organising and retrieval of digital IK	175
7.5.1.1	Dublin Core Metadata	176
7.5.1.1.1	Resource Description Framework	177
7.5.1.1.2	MPEG-7	178
7.5.1.2	OAI	183
7.6	Summary	185

Chapter 8 Conclusions and recommendation

8.1	Introduction	188
8.2	Research summary	189
8.3	Answers to research questions	189
8.3.1	What constitutes information warfare?	190
8.3.2	What is IP and what role does it play in globalisation?	191

8.3.3	What constitutes IK and how is it treated in the global IP regimes?	192
8.3.4	What is the current state of IW against IP?.....	193
8.3.5	Which measures are currently used to protect and promote IK?	194
8.3.6	What ICT solutions exist to promote and protect IK?	195
8.4	Conclusion.....	197
8.5	Recommendations	198
8.6	Value of the research.....	199
8.7	Limitations of the research.....	200
8.8	Recommendations for further research	200
8.9	Final comment.....	201

List of Figures and Tables

Table 1.1 Overview of the thesis	11
Figure 1.1 Road map of the thesis	12
Figure 2.1: Forms of IW	17
Figure 2.2: Military IW activities	20
Figure 2.3 Information sources diagram	34
Figure 2.4 Problems with information flow diagram.....	35
Table 3.1 Major international conventions on IP	49
Table 4.1 A comparison of indigenous and Western systems of thought.....	92
Figure 4.1 Factors in the generation of new indigenous knowledge.....	99
Table 4.2 A comparison between IK and IP systems	105
Figure 5.1 Biotechnological research and production process	122
Table 5.1 National legislation in relation to the provisions of the African Model Law (AML)	126
Figure 5.1 Indigenous names used as domain names	131
Table 7.1 Overview of MPEG-7 descriptors.....	180
Table 7.2 Description of DC with proposed added subdivisions	181
Figure 7.1 IK-based OAI	184
Table 7.3 Components used in prototype system	185