UNIVERSITY OF TECHNOLOGY, SYDNEY
FACULTY OF INFORMATION TECHNOLOGY

# A Strategic Analytics Methodology

By Marcel van Rooyen

A dissertation submitted in fulfillment of the requirements for the degree of Master in Computing Sciences

2005

.

# Acknowledgements

Associate Professor Simeon Simoff for his vision of what we had to achieve together in this novel area of research, his insightful guidance about how to achieve it, and his encouragement to perseverance at times of frustration. Professor Ken Miller for his direction about marketing subject matter.

Family and friends for their faith in me during a mid-life career change, and for the neglect they endured for it. Yong Mei Tang (Grace) for her unquestionable support during unquestionable neglect, and for supporting with graphic design.

The University of Technology for an RTS Scholarship and the fantastic research infrastructure.

SAS Institute Australia Pty. Ltd. and key individuals there, for access to their software, training support, professional networking opportunities, access to proprietary research literature, and the introduction to the industrial research partner.

An Australian mobile phone company for the industrial research partnership. In particular their Retention and Business Intelligence Managers for their support and interest in the project, and two analysts who endured me while transferring invaluable knowledge to me.

This work is a celebration of the pleasant surprises life presents to the fortuitous and adventurous

# Table of contents

# Certificate of Authorship and Originality

I certify that the work in this thesis has not previously been submitted for a degree nor has it been submitted as part of requirements for a degree except as fully acknowledged within the text.

I also certify that this thesis has been written by me. Any help that I received in my research work and the preparation of the thesis itself has been acknowledged. In addition, I certify that al information sources and literature used are indicated in the thesis.

Signature of Candidate

_____

# List of figures

# List of tables

# Abstract

Commercial organisations are dependent on generating profit from competitive advantage. Central to this approach, is the Strategic Planning Cycle (SPC). SPC converts new information and new subject matter expertise into competitive knowledge, and then converts that knowledge into executable solutions best suited to the organisation's internal and external circumstances and resources. SPC also maintains the relevance and efficiency of the executed solutions over time.

In order to optimise competitiveness, organisations seek to improve SPC in a number of ways. First, they improve the quality of the informational inputs to SPC. Second, they improve the quality of the knowledge which they develop from that information. Third, they optimise the executibility of the solutions, which were based on the knowledge, for the organisation's particular circumstances and resources. Four, they improve the solutions over time, maintaining competitiveness. All four ways of improving SPC are supported by data analytics. It is therefore a necessity ever to improve the integration of data analytics with SPC.

Data mining is an advanced analytics approach, which has been shown to support SPC. Recognising the complexity of integrating data analytics with the business at the turn of the 21st century, the analytics community developed data mining project methodologies to facilitate the integration. The most widely published methodology is CRISP-DM. SAS Institute's SAS Data Mining Projects Methodology (SDMPM) is a second, albeit proprietary, methodology which is also widely used.

Despite the availability of packaged data mining software and project methodologies for more than a decade now, organisations are still finding the integration of data mining with the SPC process complex and daunting. The current situation is that business leaders and data analysts often express the need for better integration of data analytics with SPC and business goals.

The researcher hypothesized that the data mining project methodologies may be a major contributor to the above situation. The researcher therefore formulated the research objective of evaluating data mining methodology for its support of the SPC process. The CRISP-DM methodology was chosen for evaluation because it is in the public domain

and therefore available to other researchers. (The researcher has evaluated SDMPM in a separate paper.)

The research method chosen was Participatory Action Research, specifically that of action science or *expert reflection-in-action*. The research was industry-based, using data from a real-life Telco customer retention management problem. The researcher and the Telco formulated a data analytics project using CRISP-DM. The project was in support of the Telco's strategic initiative drastically to reduce customer churn in their consumer business.

The data mining project would support the initiative in three ways. First, it would predict customer churn behaviour within an upcoming time window. Second, it would segment the most at-risk customers in strategic marketing dimensions. Third, it would profile the segments in dimensions required for retention campaign re-design.

Using expert reflection-in-action, we evaluated the operating and strategic outcome for the Telco, from the project that was formulated using CRISP-DM as the project methodology. The research findings were that the project based on CRISP-DM would be limited in its executibility and strategic impact. This would severely restrict the competitive advantage realisable from the project.

Our research identified six key limitations of CRISP-DM in the SPC environment:

- diagnostic technique for defining the project's business goals or business deliverables. This is about defining the required informational and marketing components required for the strategic initiative;
- introduction of new business and analytics subject matter expertise into the project environment. This relates to increasing the understanding of the business problem and its possible solutions through new marketing and data mining subject matter expertise;
- mapping technique between the project's business deliverables and the supporting data mining plan. This is about assuring that the data analytics best support the project's business deliverables;
- knowledge management activities required by SPC for assessing discovered information against business deliverables, environmental and circumstantial

factors, for adapting the information, and for developing competitive, executable business solutions;

- monitor and control of business and data mining solutions over time for effectiveness and efficiency; and
- a number of soft project and business solution implementation issues.

The main *research goal*, *which* flowed from the above finding, was to develop a new, more potent data mining project methodology for the SPC environment. In developing this methodology, the researcher used concepts from the Business, Knowledge Discovery, and Data Mining literature, also drawing on his previous corporate management experience and MBA qualification. The researcher called the new method *Strategic Analytics Method* (SAM).

Essentially SAM is the integration of data analytics project methodology and a proven SPC tool, which is known as Strategic Planning Method (SPM). SPM is a generic decision-making process designed for producing competitive outcomes under conditions of uncertainty and limited resources. SPM is widely used in various guises by business, software engineering, the military, and many other applications.

SAM presents a major departure from CRISP-DM's data centricity, to a project centered on the project's business deliverables. SAM is targeted at data miners and data analysts working in a commercial environment, and at business intelligence practitioners.

Practically SAM contributes the following to data mining projects methodology:

- moving the focus from data-related activities to business deliverables;
- insights about the restrictive impact of the pre-project *status quo* on the results of the project, the dimensions of the status quo which must be defined into a business problem, and how to achieve that definition;
- technique for injecting new business and analytics subject matter into the stale business environment, to enable competitive breakthrough;
- technique for developing business deliverables or goals for the project, which will be competitive. This includes considering the new subject matter, and overcoming the restrictions presented by the current understanding of the *status quo*;
- mapping technique between the project's business deliverables and the data mining plan, which assures the data mining outputs optimally supporting the attainment of the business deliverables;

- technique for assessing discovered information for its relevance to the business deliverables;
- knowledge management activities for developing the discovered information into competitive business solutions which are executable under the organisation's limited resources and limiting circumstances;
- substantial qualitative and quantitative technique for developing monitor and control plans for both the analytics and the business solution;
- activities, which pro-actively manage soft issues before they impact on the project negatively. For instance, we reframe data preparation activities as a process, which gradually reduces project risk associated with the data. This offers more understandable and acceptable justification to the business audience about this resource-intensive part of data mining projects;
- insights for distinguishing between *iteration* and *repetition* of activities on advanced SPC projects, and technique for knowing when to start and stop iterating, or repeating. This distinction provides contextual vocabulary for communicating with the business about required project effort.

The research validates SAM on the same Telco ABC problem, which was used for evaluating CRISP-DM. The validation came through being able to formulate a project using SAM in which we:

- assisted Telco ABC in breaking through their limited pre-project marketing perceptions and expectations, to formulate business deliverables based on new marketing and analytics subject matter, which constituted competitiveness in customer retention management;
- formulated and executed a data mining project which produced the information required by the business deliverables;
- improved the Telco's calculation of the extent of the problem;
- developed knowledge from the discovered information which complemented applicable new marketing subject matter;
- developed the knowledge into a competitive retention management solution executable under the Telco's limiting circumstances and limited campaign resources. We presented the solution as new marketing objectives and strategies, and developed these into a retention campaign strategy with various key components;
- developed a comprehensive monitor and control plan for the campaigns and the operationalised data analytics solution;
- quantified the project ROI as about 187 times the investment.

May 2006 m_vanrooyen@hotmail.com / +61-402-032-059