vic roads

CARD

Crash Analyser for Rapid Diagnosis

- ◉ Blackspot
- ○ Blacklength
- ○ Run Off Road

Import File

☐ Signalised Intersection?

Potential Countermeasures

☐ CrashStats

Concept and Software by Daniel Mustata and Robin Marston

Print Inspection Checklist

Crash Analyser for Rapid Diagnosis

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Biography

Daniel Mustata joined VicRoads in 2002 and is currently a Senior Road Safety Engineer involved in developing specific road infrastructure solutions targeting road safety. Daniel received his BEng in Civil Engineering from Universitatea "Politehnica", Timişoara.

Robin Marston joined VicRoads in 2006 as a Senior Traffic Systems Engineer from a background in automotive powertrain control system engineering in Great Britain and Spain. Robin received his MEng in Electronic Engineering from the University of Southampton, with a diploma of European Engineering from ESIEE (École Supérieure d'Ingénieurs en Électronique et Électrotechnique) in Paris and Universität Karlsruhe (TH) in 2000.

Abstract

This paper discusses the benefits of an automated system for crash analysis and the quality impact of this new and innovative approach to a road safety investigation.

The need to create more accurate collision diagrams and crash factor grids led to the concept of a computer-based system that would effectively accomplish these goals and enable further capabilities.

CARD (Crash Analyser for Rapid Diagnosis) has been developed to improve the efficiency of the preparation of collision diagrams and to guide in the initial development of Road Safety solutions.

The development of CARD commenced in May 2006 and January 2007 saw the release of the first test version. During and since this first trial, user feedback has been assessed and incorporated to enhance the product.

The current CARD software provides a user-friendly interface that allows the importation of downloaded crash statistics from RCIS (Road Crash Information System), from which the crash factor grid is automatically completed and the collision diagram is also produced with minimal user input. In addition, a list of potential countermeasures is generated that is specific to the type of crashes encountered. CARD is able to distinguish between traditional Blackspot/Blacklength Programs and also specific road safety programs, such the TAC (Transport Accident Commission) funded Safer Road Infrastructure Program which specifically targets run off road crashes.

At this time CARD is primarily targeted to VicRoads systems and has links to VicRoads RCIS, Victoria Police reports and VicRoads Map Library.

1 Introduction

The Government has a strong commitment towards road safety and as part of *Meeting our Transport Challenges* [Victoria], has committed to a further $597 million over 10 years towards providing safer roads.

With such a strong commitment towards safety, an opportunity to improve and automate the way that crashes are analysed (as part of the overall project development process), was considered a task that could save considerable time, and provide substantial benefits to VicRoads,

As such, CARD has been created to assist road safety investigators to improve their efficiency and to guide in the initial development of Road Safety Blackspot and Blacklength projects. It can be especially useful for leading investigators who are inexperienced in Blackspot investigations through the process and delivering the best possible result in an efficient and timely manner.

CARD aims to reduce the amount of time taken to initially assess the eligibility of a site to be developed and funded. CARD could also be further utilised for training purposes.

1.1 The Product

A prototype of the CARD package exists and has been trialled in VicRoads Metro North West region for several months, gathering real-life usage data and feedback from investigators. It is a Microsoft Excel spreadsheet, in which the crash data from RCIS is used to automatically create a crash factor matrix, and the collision diagram is generated with some user input.

Based on the crash patterns for each site, CARD lists possible classic countermeasure treatments and calculates the BCR, based on crash reduction factor. The investigator is not limited to the given list, but also applies his/her knowledge for each specific site.

The collision diagram is created while reading the linked police reports and notes about individual crashes are written in the space provided, so that anyone reading the diagram quickly understands the issues and trends at that location.

In short, CARD has become a serious diagnostic tool that saves time and improves the accuracy of blackspot analysis.

An estimated average of 2 hours per site is being saved by using CARD in place of the existing manual processes. With a current figure of 800 sites to be investigated each year within VicRoads, some 1600 person hours of productive time can be saved per annum.

2 A Case Study – Manual Crash Investigation versus CARD Method

2.1 Manual Crash Investigation

Data were downloaded from RCIS as a PDF (Portable Document Format) file, such as the example shown in Figure 1. The data were then manually transcribed into an Excel spreadsheet to form a crash matrix. This was a time-consuming and error-prone process.

Figure 1 – Data exported from RCIS

The next step was to individually print the police report for each crash, and to cross-check the details against the crash matrix. Thereafter, the collision

diagram was manually created by reading through the details for each crash and selecting the appropriate pictogram, or DCA (Definition for Classifying Accidents), its orientation and other crash details. Figure 2 shows a sample collision diagram that has been created in this manner.
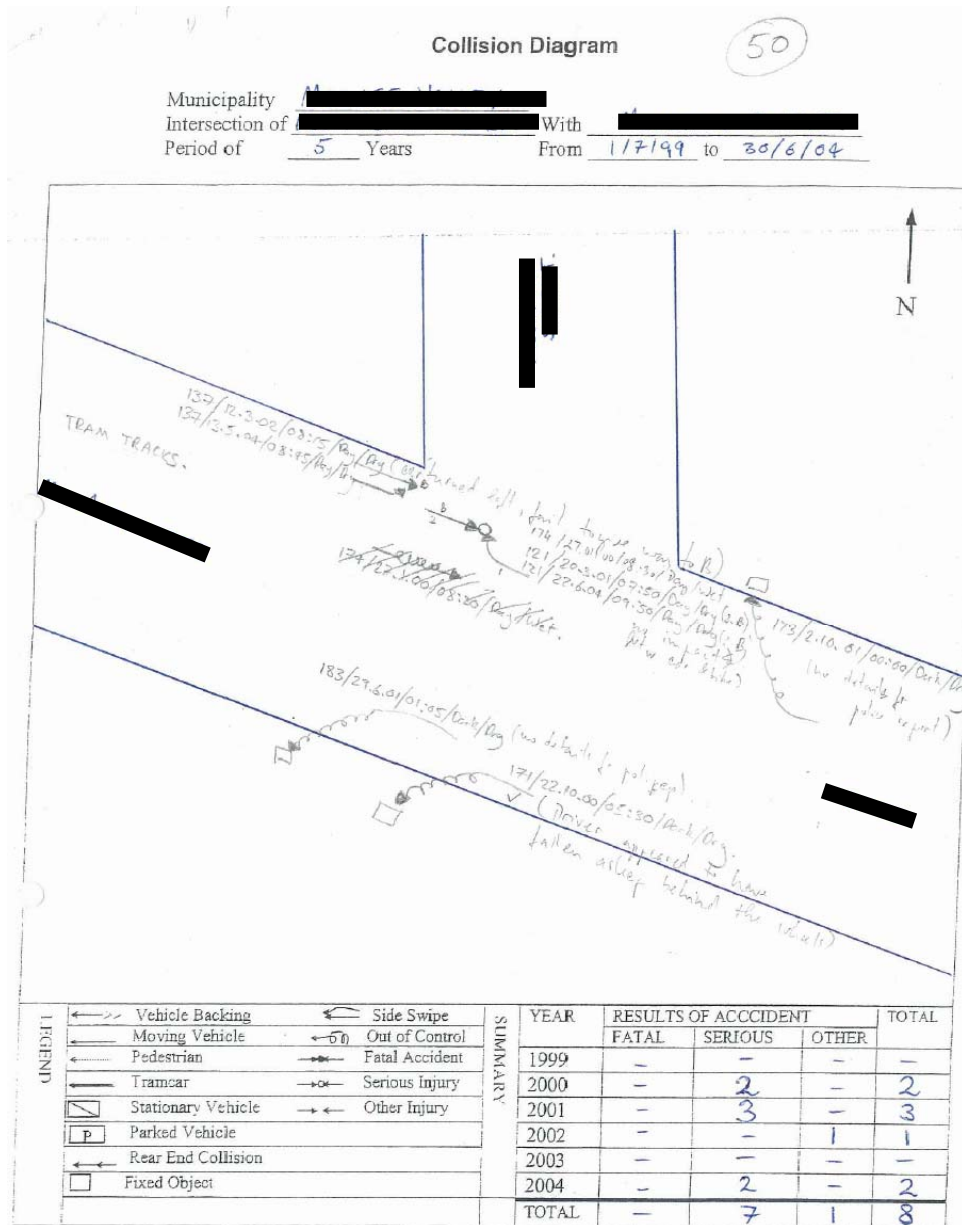

Figure 2 – Sample Collision Diagram, manually drawn

2.2 CARD method

A crash report is saved from RCIS or CrashStats, and automatically processed by CARD. A crash matrix is generated, which can be searched, filtered or sorted as desired. Where possible, each crash is linked to its police

report, allowing a rapid cross-checking of the crash details with a single mouse click. The appropriate DCA image for each crash is pre-selected and correctly orientated, and each is inserted singly, to ensure that the details used are as accurate as possible. A link is made to the VicRoads map library that contains map images for the investigation site as well as further information including street lighting, speed limits and pavement condition.
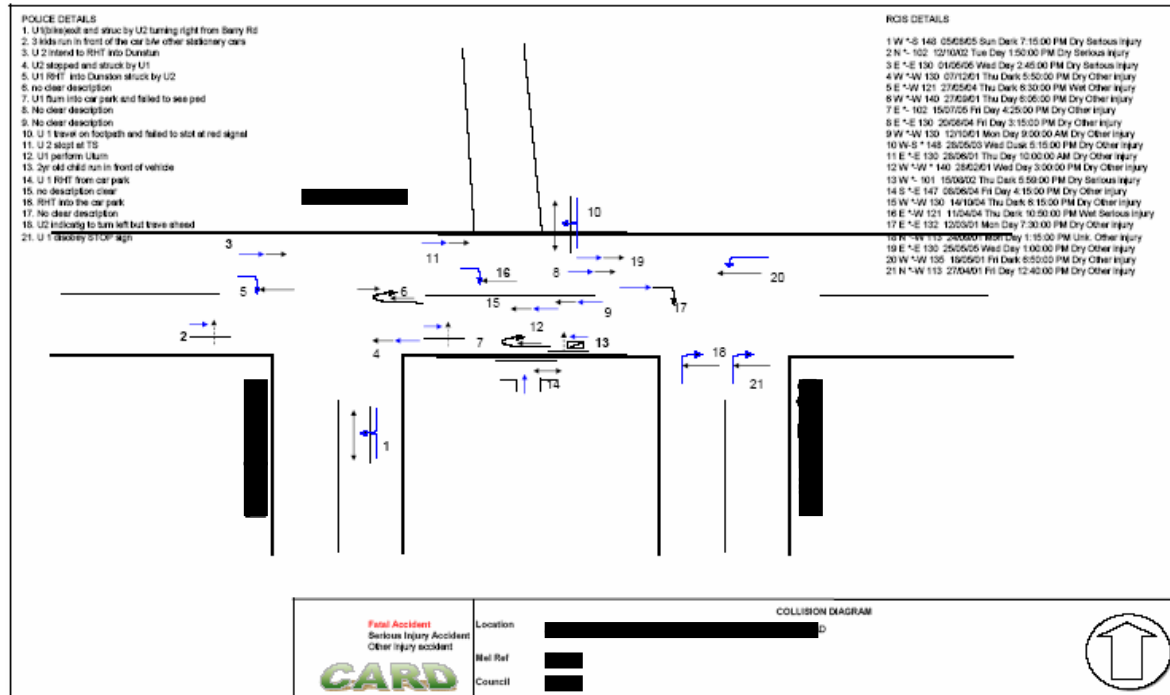
Figure 3 – CARD Collision Diagram

2.2.1 Generation of Potential Countermeasures.

To assist the investigator, a list of potential countermeasures, based on a database of classical countermeasures is generated for each crash site, according to the nature of the crashes and whether the site is signalised or not. This list is useful for ensuring that all appropriate classical countermeasures are assessed for effectiveness by the investigator. It is simple to add further countermeasures to the database as desired.

2.2.2 Affordability

In order quickly to assess whether a particular selected treatment meets eligibility criteria, CARD automatically calculates the BCR based on the crash records, whereby the investigator gains insight into which of the possible treatments would be most suitable and effective.

2.2.3 Ranking

A further tool allows collections of CARD site analyses to be compared and ranked according to the severity and number of crashes, helping to prioritise those sites most urgently in need of action.

3 Summary

The concept of CARD, a computer program to streamline and automate crash analysis, has been brought to fruition within VicRoads with the primary goal of automating collision diagram generation. CARD provides greater accuracy owing to reduced transcription of data. Further analysis capability includes the production of ancillary reports of potential countermeasures and the affordability of each proposed treatment.

CARD benefits are:

- Produces crash factor matrix automatically from RCIS or CrashStats,
- Improves operator ability to create accurate collisions diagrams,
- Prompts engineers to read the Police crash reports,
- Automatic generation of the potential countermeasures based on the crash types at the site, and
- Automatic calculation of the treatment BCR based on the crash reduction factor.

- Collections of multiple sites can be compared to give a quantitative basis for prioritising sites for treatment.

CARD links to VicRoads RCIS and CrashStats crash databases, Victorian Police crash reports and the VicRoads Map Libraries to provide rapid and simple access to relevant information to assist the investigator.

Alongside the quality improvements, substantial time and cost savings are achieved through the use of CARD.

4 References

[Victoria] *Meeting Our Transport Challenges* p.33, State of Victoria, May 2006.

5 Abbreviations and Acronyms

Term	Definition
BCR	Benefit to Cost Ratio
CARD	Crash Analyser for Rapid Diagnosis
CrashStats	Database of crash information, available through VicRoads *(q.v.)* website
DCA	Definition for Classifying Accidents
PDF	Portable Document Format, from Adobe
RCIS	Database of crash information, available within VicRoads *(q.v.)*
TAC	Transport Accident Commission (of Victoria)
VicRoads	Roads Corporation, a statutory Corporation within the Victorian Government infrastructure portfolio

6 Terms

Blackspot:

An intersection (a single location) with significant crash pattern over the most recent five year period for which complete crash data is available.

Blacklength:

Length of road with significant casualty crash pattern and crash pattern per km based on the most recent five year period for which complete crash data is available.

Run off Road:

Length of road with significant off-road casualty crash pattern and crash pattern per km based on the most recent five year period for which complete crash data is available.