Unit 4: Transport Operations Control Strategies and Systems

Module 4-4

Overview of Traffic Management Centres

Traffic Management Training Module

Austroads

Today's Presenter

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Outline of this Module

See GTM Part 9 Section 4, Austroads (2020a)

- Role of the Traffic Management Centre
  - monitoring traffic and managing traffic operations
  - managing incident responses, planned disruptions and special events
  - disseminating traffic information to the media and service providers
- Transport Operations Integration and other Traffic Control Centres
- Traffic Management Systems and the Traffic Management Interface System
- Traffic Monitoring on Arterial Roads and Motorways
- Environmental Monitoring
- Central Management Computer System (CMCS)
- Operations Evaluation

Role of the Traffic Management Centre

A **traffic management centre (TMC)** is a:

- central location for **managing** the use of the **road network** in **real time**
- system for delivering **road user support services**
- focal point for **technologies** used in **network monitoring** and **traffic operations**:
  - telecommunications
  - surveillance
  - detection

The Traffic Management Centre in Sydney

Source: University of Sydney 2020

Role of the Traffic Management Centre

Sometimes referred to as '**transport management**', '**traffic operations**' or '**traffic control**' centre, the role of a **TMC** is to act as a focus for:

- **monitoring** the road network
- commanding **traffic operations** on the network
- coordinating the management of **incident responses**, **planned disruptions** and **special events**
- **controlling traffic** through **control systems** at its disposal
- disseminating **traffic information** to the **media** and **service providers**.

Source: abc.net.au

Scale of Traffic Management Centres

Traffic Management Centre, Wellington

Source: New Zealand Transport Agency

Queensland Department of Main Roads (2009)

TMCs range from:

- **large**, purpose built centres in **major cities**, operating **24/7** with staffing levels varied in response to activity levels and peak traffic periods.
- **small** rooms with workstations for one or two **part-time operators** managing traffic in **smaller cities**.

Transport Operations Integration

Large TMCs **integrate broader transport operations** activities such as **public transport** and **special event management**.

Some large TMCs support the full-time presence of **public transport operations personnel**.

Source: abc.net.au

Other Traffic Control Centres

Toll road operators commonly have their **own control centres**, which include some **traffic operations functions**.

Major tunnels often have dedicated control rooms, facilitating the **integration** of traffic **operations systems** with **ventilation** and **communications**.

Source: 7News Melbourne

Communications and **exchange** of **data** and **information** between the toll road or tunnel control room and a city's principal TMC is essential.

Traffic Management Systems

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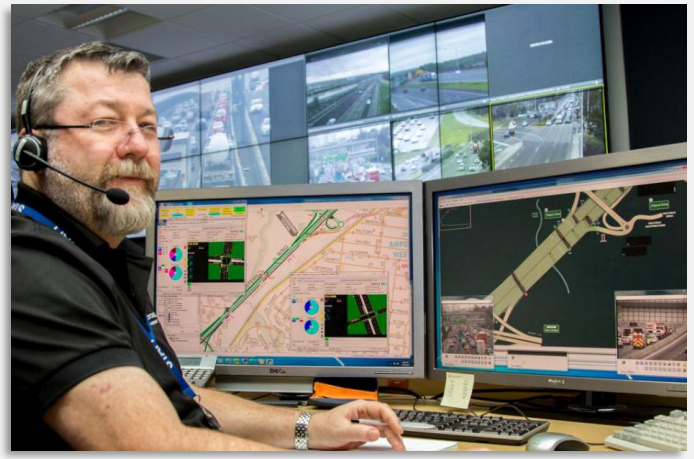
Two types of **systems support** the **operation** of a TMC:

1. systems **directly related** to the centre's **functions**,

   - network monitoring
   - incident management
   - traffic control
   - traffic information



Source: abc.net.au

2. **enabling systems**, which **support** the **TMC functions**,

   - communications
   - human/machine interface
   - video control for CCTV
   - traffic data handling
   - activity scheduling
   - fault management
   - GIS applications
   - web site management
   - databases for transport, infrastructure and event information

Traffic Management Interface System (TMIS)

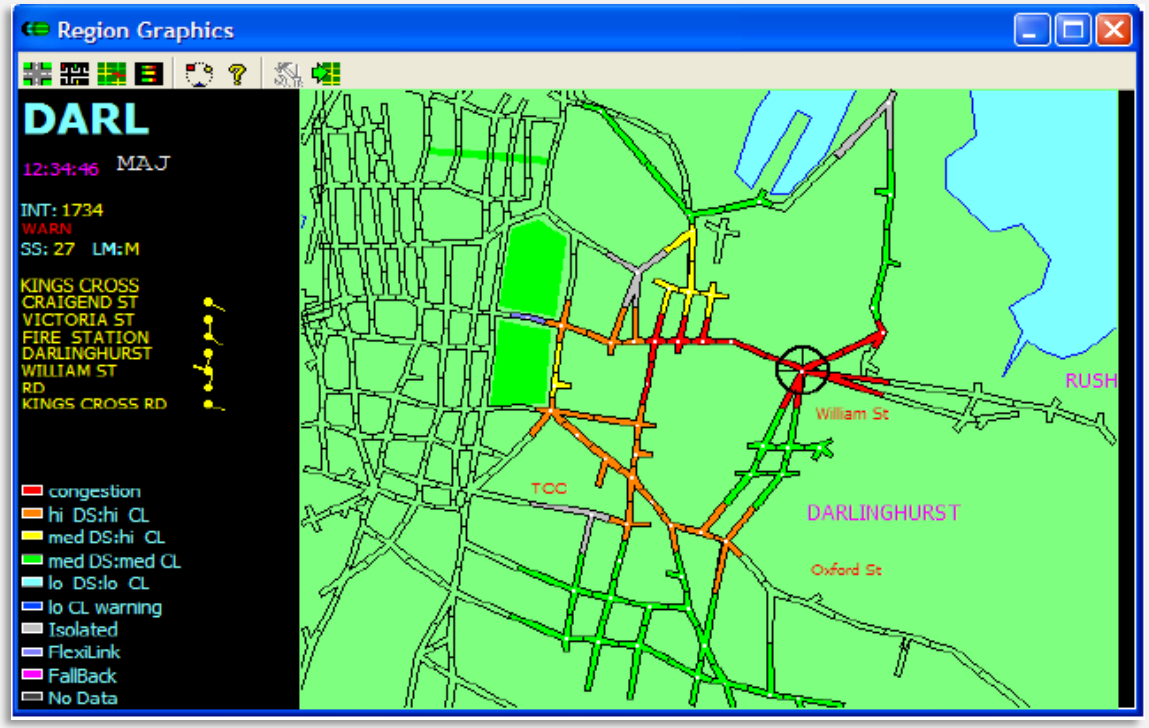
Source: VAGO

A **Traffic Management Interface System (TMIS)** provides a **user configurable map-based interface** for **traffic management software applications**, displaying information such as **site status**, **fault alarms**, **locations** of **congestion**, **CCTV images** and **incidents**.

This **common user interface** enables an **effective integration strategy** to be **implemented** for all **traffic management applications** and **systems** in a TMC.

Traffic Monitoring on Arterial Roads

SCATS display of congestion levels



Source: Roads and Traffic Authority (2000)

On **arterial roads**, traffic signal **loop detectors** provide a **vehicle detection** capability, enabling systems (e.g. **SCATS** and **STREAMS**) to identify traffic **congestion** levels on **intersection approaches**.

Congestion occurring at an **unusual time** and/or **location** can indicate the **occurrence** of an **incident**.

Traffic Monitoring on Motorways

On **motorways** or **freeways**, **in-lane detectors** provide **first line monitoring** capability.

Automatic incident detection (AID) systems **analyse detector data** to **identify** potential **incidents**.

AID systems are **tuned** to be **sensitive** enough to **pick up** most **incidents** but **not too sensitive** to have a high **false alarm** rate.

Source: The Guardian UK

Closed circuit television (CCTV) is commonly used to **verify incidents**.

With **pan-tilt-zoom** capability, **CCTV** can be useful in **monitoring incident investigation** and **clearance** if located near the site.

Environmental Monitoring

Technologies exist for **detecting** **environmental conditions** affecting traffic flow that may require intervention when **extreme**. These technologies include **alarm systems** to notify the TMC.

Examples include:

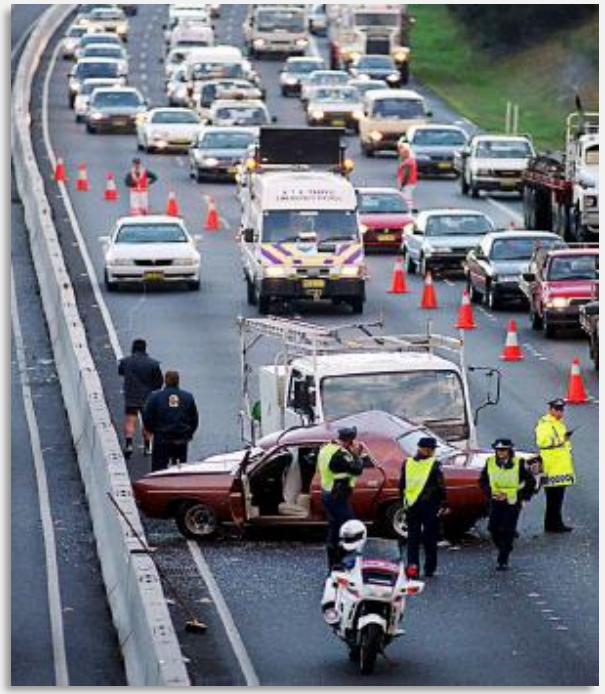
- **high wind warning systems**, typically on bridges
- **fog detection systems** with VMS warning/advisory speed signs
- **rain detection systems** with variable speed limit signs
- **ITS-based flood notification systems**

Source: Austroads 2020b

Central Management Computer System (CMCS)

A **Central Management Computer System (CMCS)** **integrates** the various **monitoring** and **management systems** within the TMC, including:

- traffic data handling
- incident handling
- response handling
- scheduled activities
- setting/monitoring roadside devices
- housekeeping functions
- fault management functions
- human/machine interface



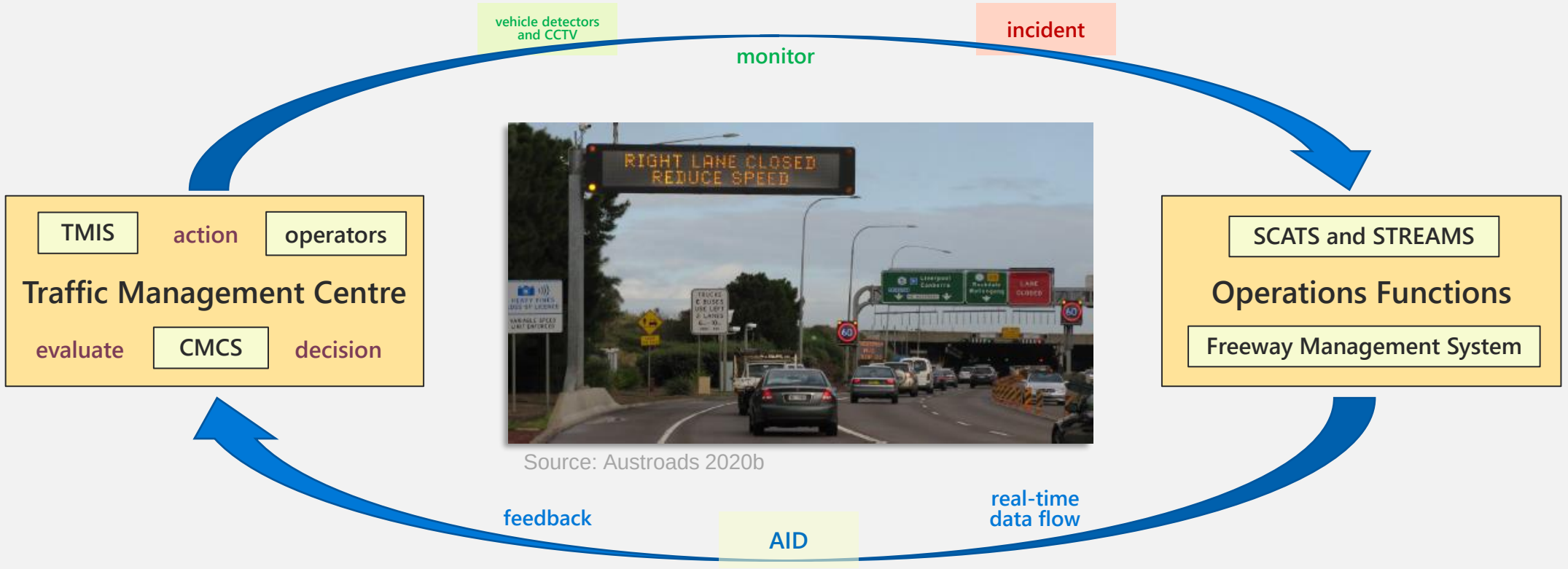
Source: Austroads 2020a

When an incident occurs, a **CMCS** can assist in **enabling rapid response** through providing **intelligent decision support**.

The **CMCS analyses** the **affected area** and prompts operators to **apply pre-defined incident response plans**, which include controlling **VMS**, **variable speed limit signs** and **CCTV** cameras.

Operations Evaluation

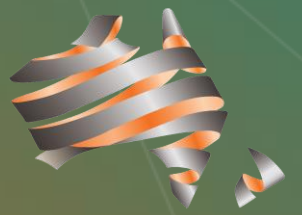
The **impacts** of **operational activities** are **monitored** and **evaluated** to determine further **actions**.



Source: Austroads 2020b

A **feedback loop** to **evaluate impacts** resulting from **actions** is maintained.

Quiz Questions



Time to Reflect

Q1. Three systems all related directly to a TMC's primary functions are:

A. network monitoring, GIS applications, communications

B. activity scheduling, incident management, traffic data handling

C. traffic information, traffic control, incident management

Answer C is correct!

Explanation: traffic information, traffic control and incident management are all systems directly related to a TMC's primary functions.

Time to Reflect

Q2. A Central Management Computer System (CMCS) prompts operators to:

A. apply pre-defined incident response plans

B. identify congestion occurring at an unusual time and/or location

C. verify incidents from CCTV images

Answer A is correct!

Explanation: A CMCS analyses the area affected by an incident and prompts operators to apply pre-defined incident response plans, which include controlling VMS, variable speed limit signs and CCTV cameras.

Time to Reflect

Q3. A feedback loop to evaluate impacts resulting from actions has a sequence of:

A. action – monitor – evaluate – detect – decision – *repeat*

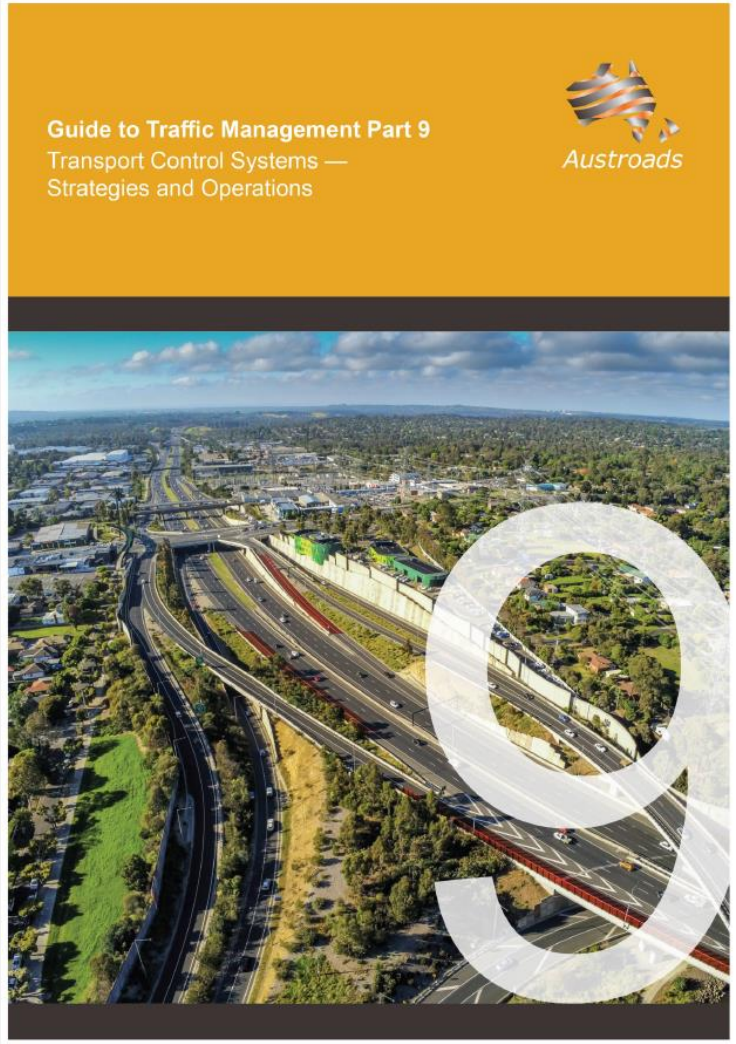
B. monitor – detect – evaluate – decision – action – *repeat* *enables response actions to be evaluated*

C. monitor – detect – decision – action – evaluate – *repeat*

Answer B is correct!

Explanation: The network is continuously monitored. When incidents occur, they can be detected by systems such as AID. TMC operators, with the aid of CMCS decision-support systems, evaluate in-coming information about incidents and make decisions on how best to respond, then carry out actions to deploy an appropriate incident management response.

References



Written content

Austroads (2020a), *Guide to Traffic Management Part 9: Transport Control Systems – Strategies and Operations*. AGTM09-20, Austroads, Sydney, NSW.

Images

Austroads (2020b), *Guide to Traffic Management Part 10: Transport Control – Types of Devices*. AGTM10-20, Austroads, Sydney, NSW.

ABC Radio Brisbane website page, 31st January 2014, 'Step inside Brad the Traffic Guy's office', https://www.abc.net.au/local/photos/2014/01/31/3935780.htm

Seven News Melbourne twitter feed, 7th December 2018, https://twitter.com/7newsmelbourne/status/1070873703817199616?lang=es

The Guardian UK website page, 24th January 2014, 'CCTV cameras on Britain's roads capture 26 million images very day', https://www.theguardian.com/uk-news/2014/jan/23/cctv-cameras-uk-roads-numberplate-recognition

UoS (2020), *ITLS5100 Transport and Infrastructure Foundations -Traffic Management*, Michiel Bliemer lecture notes, University of Sydney, Darlington, NSW.

Victorian Auditor General's Office website page, 11th June 2014, 'Using ICT to Improve Traffic Management', https://www.audit.vic.gov.au/report/using-ict-improve-traffic-management?section=31221--1-background-

Wellington's Transport Operations Centre - The Hub of the Smart Motorway https://www.nzta.govt.nz/assets/projects/Smart-Motorway/docs/wellington-transport-operations-centre.pdf

Thank you for participating

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