IMPLEMENTING ELECTRONIC WORK DIARIES (EWD): SAFETY, PRODUCTIVITY, EFFICIENCY

Chris was appointed inaugural CEO of Transport Certification Australia (TCA) in 2005. Chris has successfully established TCA and made operational a number of national telematics programs, including the Intelligent Access Program, the first land-based voluntary, regulatory telematics program in Australia. With more than 30 years’ experience, Chris has held senior executive positions nationally and internationally, in both public and private sector organisations. Chris has Bachelor and Masters Degrees in Engineering. He and is a Member of the Australian Institute of Company Directors, and a Board Member of the International Society of Weigh-in Motion, and of Intelligent Transport Systems Australia.

Gavin has a diverse background in the area of road transport regulation and national reform, and addresses public policy needs through the use of telematics and other intelligent technologies. Gavin has managed the implementation of national regulatory and non-regulatory telematics and ITS programs, and led national and state-based reform to deliver public purpose outcomes.

CHRIS KONIDITSIOTIS
Transport Certification Australia

GAVIN HILL
Transport Certification Australia

Abstract

For the purposes of fatigue management, drivers of fatigue-regulated heavy vehicles in most Australian jurisdictions must comply with national laws and regulations that require them to record their work and mandatory rest times in a standardised, hard copy National Driver Work Diary.

Although Electronic Work Diaries (EWD) have been recognised in regulations since 1999 and their benefits have been long identified, questions remained.

Following an Operational Pilot in 2011, the development of an EWD Functional and Technical Specification, and amendments to national laws in 2015, work is now underway to implement EWDs as a voluntary alternative to written work diaries. Regulated EWDs will be type-approved, and available through certified Service Providers.

This paper provides a technical and operational overview of EWDs, their benefits, and focuses on the work currently underway to implement the EWD.

Keywords: Automation, Telematics, Fatigue Management.
1. Introduction: The National Telematics Framework

TCA is a national government body responsible for providing assurance in the use of telematics and related intelligent technologies, to support the current and emerging needs of Australian Governments.

TCA administers the National Telematics Framework on behalf of Australian Governments.

The foundations of the National Telematics Framework were established by Australian Governments between 2005 and 2008, when decisions were made about the Intelligent Access Program (IAP) – and future applications of telematics driven by the policy needs of government – to enable a sustainable approach to the use of telematics and related intelligent technologies in Australia.

1.1 What is telematics?

‘Telematics’ means the integrated system of information, communications and sensor solutions used in surface based transport to improve the mobility of people and freight, through infrastructure to somewhere, vehicle to somewhere (V2X), vehicle to infrastructure (V2I) and vehicle to vehicle (V2V) applications and programs not limited to the following:

- Monitoring and reporting of vehicles and infrastructure;
- Providing information from and to vehicles;
- Connected and cooperative vehicles; and
- Automated and autonomous vehicles.

1.2 The need for a framework

Over the last decade, governments have become increasingly interested in using telematics for regulatory purposes and to realise public purpose outcomes through policy. Simultaneously, telematics devices have come to perform multiple functions, and industry is realising the benefits of adopting intelligent transport technologies. The National Telematics Framework provides a nationally-agreed, sustainable environment to support the current and emerging needs of government, industry sectors and end-users.

1.3 Principles of the framework

The Framework acknowledges that a nationally and internationally-oriented, sustainable and scalable approach to telematics – which encourages private sector innovation – is critical. The principles of the Framework are:

- In-vehicle hardware which can perform multiple applications – ‘one box, many uses’
- Avoidance of proprietary-based systems to ensure national and international interoperability
- A multi-provider model to promote innovation, competition and consumer choice
- Performance based, rather than prescriptive, specifications to promote innovation
- Supported by an independent certifier and auditor to ensure technology and services work, and continues to work, as intended
• Underpinned by a strong, deliberate separation between technology and policy use
• Defined roles and responsibilities between users, regulators and technology providers (to minimise real or perceived conflicts of interest in the management of data and information)
• Supports Cooperative ITS (C-ITS) applications – including Vehicle-to-Vehicle (V2V) and Vehicle-to-Infrastructure (V2I)
• High levels of system security.

The Framework allows governments to overcome the need to develop bottom-up technical solutions, and provides an effective nexus between the public and the private sectors. Technology-based operational programs with public-purpose outcomes can be delivered – without significant up-front costs to government and/or industry.

1.4 High level architecture

Figure 1 provides a high level architecture of the roles and responsibilities established in the National Telematics Framework.

![Figure 1 – Roles and Responsibilities – Architecture for the National Telematics Framework (Source: ISO 15638)](image)

The Framework provides a critical intersection between public and private interests by:
• Providing a central point of reference for the deployment of telematics and related intelligent technologies in Australia
• Enabling the market to develop and deliver innovative technical, commercial and operational outcomes
• Ensuring public purpose outcomes are delivered through the use of telematics and related intelligent technologies by aligning policy and end-user intent
• Being technology agnostic and capable of being extended as needed to new applications as necessary
The National Telematics Framework provides the EWD with the associated institutional environment adopting a standards and a privacy-by-design approach to ensure the EWD can co-exist with other regulatory and/or commercial telematics applications.

2. Fatigue Management

The Heavy Vehicle National Law (HVNL) requires that a Written Work Diary (WWD) (or an approved EWD) is used by drivers of fatigue regulated heavy vehicles to record hours of work and rest.

A fatigue regulated heavy vehicle is defined as a vehicle with a gross vehicle mass (GVM) of more than 12 tonnes (t), a combination of a GVM of more than 12t or bus over 4.5t with a seating capacity of more than 12 adults including the driver.

Drivers are exempt from this requirement where they are driving locally (less than 100km from their base within their state). Drivers who are participating in fatigue management schemes provided for in the law, or are driving under a work/rest hours exemption or have done so in the last 28 days, are required to keep a diary for all work.

For many drivers and Transport Operators, fatigue management laws - especially those relating to long hours and/or night hours - are complex. EWDs can make complying and demonstrating compliance with fatigue laws less onerous than with a WWD.

Automation of the diary process also has the potential to reduce instances of intentional and accidental record-keeping errors, and ease the administrative burden associated with collecting, checking and storing records.

EWDs enable drivers to plan their work and rest, and also receive alerts of impending breaches. They also automatically alert the EWD Service Provider responsible for supplying the EWD of instances of non-compliance. The fatigue risks of drivers can be monitored from a back office environment, and fatigue data can also be used to influence trip schedules, rosters and planned rest breaks.

The Operational Pilot of EWDs and Speed Monitoring Systems (The Pilot) found that “EWDs improve compliance with fatigue rules through:

- Improved data accuracy and transparency to Drivers, Transport Operators and Authorised officers
- Provision of real time data which enables transport operators to respond immediately to actual breaches and monitor performance over time
- In-vehicle driver information which enables Drivers to plan their work and rest and take action when alerted to an imminent or actual breach”.

3. The EWD as a voluntary alternative to the WWD

The Pilot identified a number of benefits associated with the use of an EWD compared to a WWD. Chief among these were:

- An EWD allows the Driver and Transport Operator to more easily review past work and
rest records using data stored in electronic form to ensure they operate in compliance with fatigue laws

- The EWD will automatically pre-populate records with default information and reduce the time it takes Drivers to manually record work and rest times
- The EWD will record time and location to provide greater accuracy for recorded information
- An EWD will automate and reduce the time taken for a compliance check for both the Driver and Authorised Officer who must manually calculate compliance with the WWD especially during on-road intercepts
- Through the use of Compliance Assessment Software (software capable of assessing Driver’s records of work and rest against fatigue regulations), the EWD has the potential to allow more efficient use of Authorised Officer time in assessing fatigue compliance reducing business interruption for Drivers and Transport Operators during an intercept
- The migration of Drivers from WWD to EWD will reduce the quantities of WWDs which jurisdictions are required to print and issue, a significant number of which are reported as lost or stolen.

4. Safety benefits

An EWD is at its core a transport safety reform, which also provides improved productivity, and is enabled by telematics technology. More broadly, the EWD project is not simply the automation of a manual process, but rather a tool that is part of an emerging alternative approach to compliance and enforcement.

EWDs can contribute to safety-focused practices and a safety-focused culture by providing specific types of data to multiple parties across the supply chain.

An EWD operational environment is not simply one in which data is collected and used to identify every instance of non-compliance. Rather, the data is intended to be used to identify unsafe patterns and practices in both the short and long term, and to in turn influence company policy and daily operations (e.g. driver training, workload and shift planning, rostering) and positively impact driver safety. In addition to the proactive approach adopted by Drivers, the EWD enables Transport Operators to take a proactive approach to fatigue management, by enabling them to notify Drivers of unsafe or potentially illegal practices. Transport Operators can also provide assurance to customers by demonstrating their voluntary adoption of technologies and policies that meet regulatory requirements, and by taking a proactive approach to their role in the chain of responsibility.

As outlined in The Pilot, “Improved compliance with fatigue rules is expected to ultimately contribute to a reduction in heavy vehicle crashes”

The Pilot developed the Safety Logic Model, (Figure 2) which identifies how components of the EWD and its operational framework interact to produce positive safety outcomes. The model is consistent with the Safe System approach – the global standard framework for understanding and improving road safety. The approach has been adopted in the Australian Transport Council’s National Road Safety Strategy 2011 – 2020.

The Safe System approach accepts that unexpected events and human error on our roads are inevitable, however their incidence and consequence can be reduced and / or improved.
The EWD aims to achieve these outcomes by providing accurate real time data to Drivers and Transport Operators, to enable better planning and rostering. Furthermore, the accuracy of data also enables more effective identification of patterns of behaviour and risk, which can in turn influence commercial driving practices.

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**Figure 2 – The Safety Logic Model**

5. **EWD Technical Overview**

The primary functions of an EWD are:

- To allow a driver to identify and authenticate themselves and declare their periods of work and rest.
- To provide records for Authorised Officer review
- To provide records for the Record Keeper / Transport Operator

An EWD includes the following key technical elements:

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<tr>
<th>Key element</th>
<th>Description</th>
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<tr>
<td>In-Vehicle Unit (IVU)</td>
<td>The physical telematics device or box that is tethered to the heavy vehicle.</td>
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<tr>
<td>User Interface (UI)</td>
<td>The screen and touchpad/keypad used by Drivers to access and enter information.</td>
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<tr>
<td>EWD-SP System</td>
<td>The EWD-SP’s hardware and software (excluding the IVU and UI) used in the collection, processing, testing, storage, transmitting and reporting of EWD data.</td>
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<tr>
<td>Remote Connection Access Framework (RCAF)</td>
<td>A defining feature of the EWD under which Driver Data Records, inclusive of Authorised Officer Annotation Records, are made accessible across EWD-SP system(s), via remote access. Critically, it provides a means to manage privacy and security of information, Drivers’ working hours across more than one Transport Operator, and remote access for roadside review. For interoperability purposes, the interface of the RCAF is being prescribed and developed by TCA.</td>
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| EWD Registry | Maintains the details of:  
- EWD-SPs (including relevant systems)  
- Drivers (authorised and subsequently registered to use EWDs)  
- Enables the verification and authentication of Authorised Officers (registered to enforce fatigue regulations under EWDs)  
The EWD Registry acts as a directory to facilitate record access by Drivers, Authorised Officers and between EWD-SPs. The EWD Registry contains the address of where Driver Data Records are stored and the currency of those records, but does not store the actual records. The EWD Registry shall be designed by TCA. For interoperability purposes, the interface of the EWD Registry will also be fully prescribed by TCA. The EWD Registry shall be developed as a part of the RCAF and the information it contains is to be maintained and audited by TCA. |
| Compliance Assessment Software | The client-server software allows Authorised Officers to assess driver compliance with the fatigue rules. For interoperability purposes, the interface of the CAS, |
including how the client software application interacts with the server portion, will be prescribed by TCA. There shall be two accessible forms as follows:

1. Access via an Authorised Officer ICT mobile device and integrated with a hosted service for simplicity and ease of maintenance. This version shall be operated and maintained by TCA
2. Stand-alone and accessible via an Authorised Officer ICT laptop device (for specialist use and back office assessment of records)

**Table 1 – Technical elements of the EWD**

As a minimum, an EWD must:

- Record a Driver’s work and rest for 28 days
- Provide records to the Record Keeper
- Not allow for multiple recordings for the same period
- Follow the Driver (between trucks and Transport Operators)
- Be viewable by the Driver, Chain of Responsibility entities and Authorised Officers
- Allow annotation by Authorised Officers
- Provide evidence
- Be of an evidentiary standard

Figure 3 below provides an overview of how the EWD works and how the Driver and Authorised Officers interact with the EWD.

**Figure 3 –The EWD, Driver and Authorised Officer**

6. **EWD Operational Environment Overview**

Participants in the EWD Operational Environment are as follows:
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<thead>
<tr>
<th>Definition</th>
<th>Description</th>
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| EWD Regulatory Framework Owner    | Lead agency on the EWD initiative, with key responsibility for:  
  - Policy setting and on-going roll-out strategy for transport industry  
  - Fatigue operations policy consistency  
  - Operational activities relating to Transport Operators and drivers  
  - Compliance and enforcement operational policy setting and ongoing monitoring |
| EWD System Manager (i.e. TCA)     | Responsible for the certification and auditing of EWD-Service Providers (EWD-SPs), and administering the technical and operational environment with which EWD-SPs interface.  
  TCA shall also develop, maintain, provide oversight and manage the Remote Connection Access Framework (RCAF) inclusive of the EWD Registry and Compliance Assessment Software (CAS). This permits the compliance and enforcement task to be undertaken. |
| EWD-SPs                           | Participating private sector entities that provide telematics services (i.e. hardware, software and associated processes) certified for provision of EWD services by TCA.  
  This entity ensures that the EWD is correctly installed and performs during day-to-day operation in accordance with the Specification. |
| Record Keepers                    | Entities responsible for the record keeping task; this can be a Transport Operator, including an owner driver, and some of the duties of this entity can be delegated to the EWD-SP. It is assumed that the technical and operational function of the Record Keeper shall be undertaken by the EWD-SP. |
| Drivers                           | Drivers of heavy vehicles using the EWD to meet their fatigue management obligations.                                                                 |
| Transport Operators               | Transport Operators of one or more heavy vehicles who have adopted the use of EWD.                                                                 |
| State Road Transport Authorities  | Participating Jurisdictional Authorities for the performance of roadside and / or back office assessment of Driver records (i.e. compliance and enforcement tasks). |
| Police                            | Participating Police for the performance of roadside and / or back office assessment of Driver records (i.e. compliance and enforcement tasks). |
| Authorised Officers               | A person who holds office under the law as an authorised officer and is authorised to review Driver Data Records (effectively either State Road Transport Authorities or Police). |

**Table 2 – Participants in the EWD Operational Environment**

The interaction between responsible participants is outlined in Figure 4 below:
7. EWD Operation

The EWD requires a number of core components and functionalities to be working together harmoniously. These core components are outlined here.

7.1 A driver receives an Identification and authentication method

The driver provides proof of their identity either directly or through their Transport Operator to the EWD – SP whose system they intend to use. The EWD-SP uses the Driver’s details to program their electronic system and supplies the Driver with a unique method to identify and authenticate to the IVU. This will be used by the Driver each time they wish to make a declaration of work or rest.

7.2 A Transport Operator installs an IVU and UI

Prior to a Driver being able to make a declaration of work or rest, the Transport Operator must have an IVU and UI installed into their heavy vehicle by an EWD-SP. The IVU and UI are used by the Driver to make declarations and generate records.

7.3 A Driver makes Declarations

When a Driver wishes to record work or rest, he or she will use their Identification and Authentication method (supplied by the EWD-SP) with their IVU and then declare wither work or rest. The UI displays the information entered by the Driver verification and confirmation.

Identifying information is pre-populated by the IVU (from the Identification and Authentication method.) Depending on the design of the IVU, other information may also be
pre-populated into the declaration ready for the Driver to verify and confirm. Amendments to the information can be made by the Driver.

7.4 IVU records and Driver declarations
A declaration by the Driver creates an electronic record known as a Self-Declaration Activity Record. This record contains the information required by national law as well as information about the system and the location of the declaration.

By law, the Driver is required to declare as they change from work to rest and vice versa, or as soon as practicable in the case of becoming aware that they are about to change from local to 100km+ work. In this situation, the Driver is able to back date work by changing the self-declaration time. Changes to the Driver’s details or context of the record do not alter the original Self Declaration Activity Record, but rather creates a new Self Declaration Commentary record. The Self Declaration Commentary record contains the information within the Self Declaration Activity Record and the fields altered by the Driver.

7.5 Driver data records are sent to an EWD-SP
Once generated, Driver Data Records are stored in the IVU until they are able to be transmitted to the EWD-SP. The EWD-SP uses the records to assist in determining that the EWD is operational and if they are not assisting with the record keeping task, forwards the records on to the Record Keeper.

7.6 IVU provides fatigue information to the driver
The IVU, via the UI, provides the Driver information regarding the latest time the next rest break may occur and details of the required rest break.

7.7 Driver data records follow the Driver
Drivers may not always work for one Transport Operator. In the case where a Driver works across more than one Transport operator that supports EWD, the Driver’s records are shared between the associated EWD-SPs using the EWD Registry and the RCAF. As a Driver starts with a new EWD-SP’s IVU, the EWD-SP uses the RCAF to update the EWD Registry with their association with the Driver. EWD-SPs are required to keep their association status with Drivers current on the EWD Registry allowing other EWD-SPs to identify any shared Drivers. Where shared Drivers exist, the relevant EWD-SPs share Driver Data Records ensuring that all Record Keepers have the complete list of relevant records.

7.8 Driver data records are available to the record keeper and the driver
Figure 5 provides an overview of the information flow within an EWD.
Driver Data Records are made available to the Driver through two independent features:
- The UI that displays records made over the last 28 days
- An alternative facility that allows Drivers to view their records in an easily understood and printable form away from the IVU and UI.

Where the EWD-SP is not assisting in the record keeping task, Driver Data Records are provided to the Record Keeper through an agreed performance based mechanism. Records are maintained in the same format as those provided to Authorised Officers at the roadside.

8. Remote Connection Access Framework (RCAF)

An EWD is a distributed system. Driver Data Records are used by Authorised Officers from the various Authorities, Drivers, Transport Operators, Record Keepers and other parties within the chain of responsibility.

From an enforcement perspective, Driver Data Records are required to be available at almost any location and time, should be able to be accessed without entry into the Driver’s vehicle and must be able to be annotated by the officer.

From an Industry perspective, Driver Data Records must be transferable between different vehicles, across different systems, and able to be provided to multiple Record Keepers.

The interactions that occur under a RCAF are as follows:
- Each EWD-SP must update the EWD Registry with the details of the Drivers using their EWD
- The EWD Registry contains the address of where records are stored and provides updates of when new records are available
- EWD-SPs use the EWD Registry to identify if a Driver who is using their EWD has used another EWD-SP’s system in the preceding 28 days. Where a driver is identified, the EWD-SP acquires the address of the other EWD-SP and downloads relevant records.
- Authorised Officers use the EWD Registry to identify where Drivers Data Records are located. Authorised Officers access records from the EWD-SP whose system the Driver last used.
- The EWD Registry is not a central repository for records and for privacy reasons is never used to store actual Driver Data Records.

9. Compliance Assessment Software (CAS)

The HVNL requires the EWD to be capable of reproducing information that is readily accessible, able to be understood and can be used as evidence at the roadside by Authorised Officers. In order to achieve this, CAS provides:

- Access to the RCAF to facilitate the download of Driver Data Records from the EWD-SP for a nominated period
- Presentation of information from the Driver Data Records in a readable format
- Assessment of the Driver’s recorded work and rest against legislative fatigue requirements
- The ability to retain a copy of the Driver Data Records if required by the Authorised Officer

CAS offers a consistent and fast assessment of a Driver’s compliance with fatigue regulations. It can combine spatial data to present a holistic picture of the Driver’s actions, highlighting any vehicle movement whilst the Driver has declared they are resting.

10. Next steps

The EWD Reform is comprised of four stages as shown in Figure 6 below. TCA and the NHVR are currently working together to complete the Implementation stage. TCA as System Manager expects to be able to accept applications from Service Providers seeking to become certified for the EWD in 2017.
11. References


3. ISO 15638 Framework for Cooperative Telematics Applications for Regulated commercial freight Vehicles (TARV)