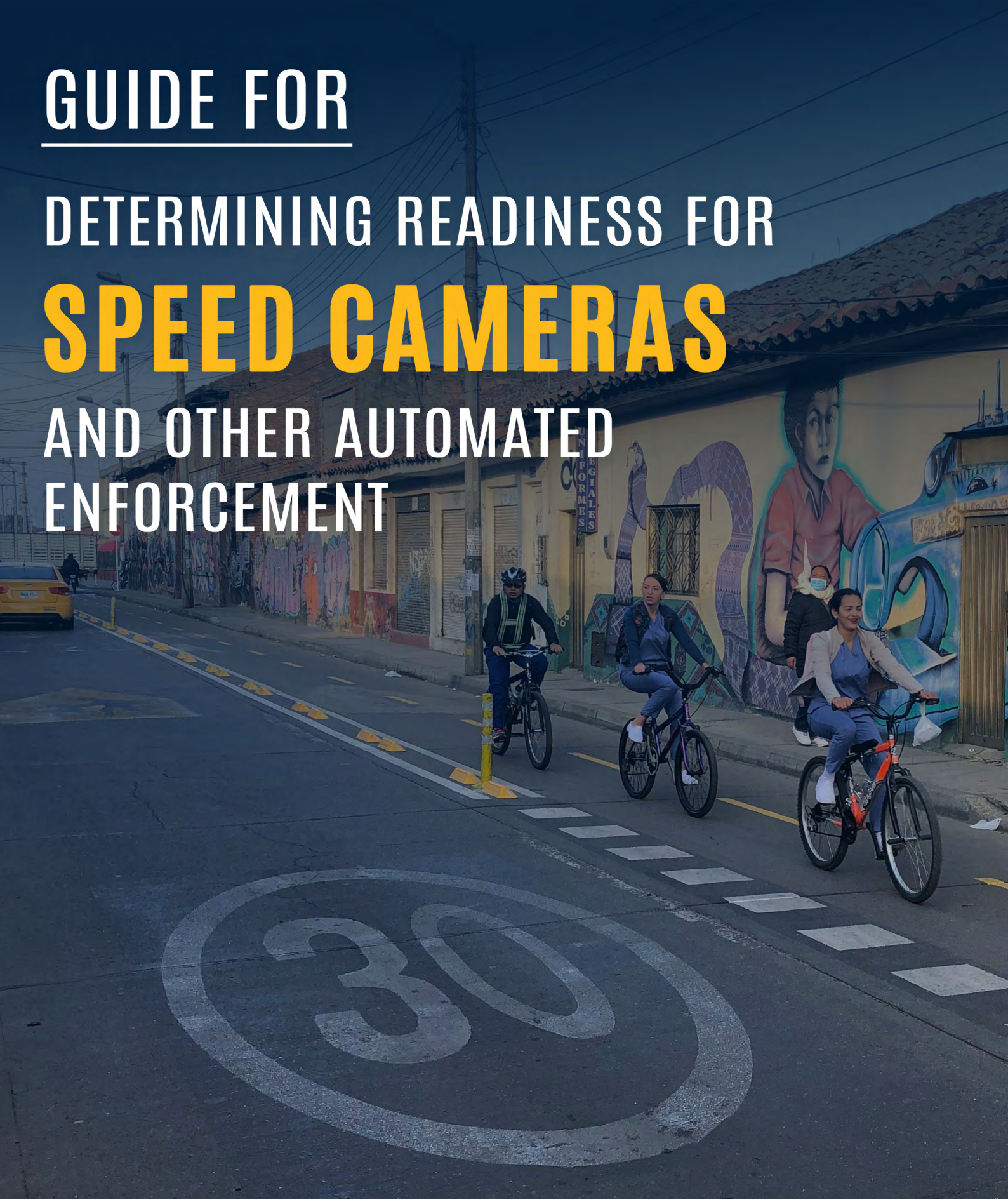
GUIDE FOR

DETERMINING READINESS FOR SPEED CAMERAS AND OTHER AUTOMATED ENFORCEMENT



Global Road Safety Facility

GLOBAL ROAD SAFETY PARTNERSHIP

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Guide for
Determining Readiness for Speed Cameras and other Automated Enforcement

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Glossary

Automated Enforcement: general term for all forms of technology which allow for a violation of a road rule or law to be detected and recorded without direct human involvement.

Fixed Speed Camera: A device mounted permanently beside or over a roadway to check speeds of passing vehicles which photographs vehicles exceeding the speed limit by the prescribed level. The speed camera photographs the speeding vehicle with sufficient clarity to clearly show the speeding vehicle's registration or license plate. It must also record the time, date, location, prescribed maximum speed limit, direction of travel and detected vehicle speed.

Mobile or Vehicle Mounted Speed Camera: A speed camera as described above that is installed in a motor vehicle or mounted on the roadside and can be moved from site to site.

Point to Point Speed Control: Automatic section speed control (also known as Average Speed Control or Section Control, with two or more linked speed cameras to measure the average speed between the cameras, based on the elapsed time to travel a known distance. Average speed may also be detected through vehicle tags at entry and exit points to toll roads (e.g., toll collection system – note that toll collection devices must be also be appropriately calibrated).

Red Light Camera: A device mounted permanently beside or over a roadway to detect vehicles failing to stop for red traffic signals.

Dual Red Light/Speed Cameras: A device mounted permanently beside or over a roadway to detect vehicles failing to stop for red traffic signals and/or exceeding a speed limit in the manner described above.

Enforcement Threshold Tolerance: The margin above the prescribed speed limit within which motorists will not be cited for a speeding violation. A tolerance level is used to account for factors such as inconsistent vehicle speedometers and the calibration of speed detection equipment.

General Deterrence: This principle relies on the perception that detection and apprehension are possible at any time, which therefore deters offending.

Specific Deterrence: This principle relates to offenders who have already been apprehended and have experienced punishment for an offence, which then acts as a deterrent to reoffending.

Automatic Number Plate Recognition (ANPR): This technology automatically identifies vehicles by reading an image of a vehicle registration plate via optical character recognition.

Registration plates: Also known as License plates or Number plates – these plates are issued by a licensing authority and are fitted to a vehicle to provide a unique identifier for each vehicle.

1 Introduction and Purpose

This guide has been prepared to assist a jurisdiction to determine the level of readiness to move to automated enforcement (AE). Speed cameras enforcing speed limits are a common application of AE and there are many systemic legal and operational elements that must be in place before AE can be effective. For example, an accurate image of a speeding vehicle, in the absence of robust driver licensing and vehicle registration systems, is of little road safety value. Importantly, automated speed enforcement should be considered as one part of a comprehensive speed management approach that includes road infrastructure and roadside policing as well. The management of speed is a fundamental element of the Safe System[1].

Aims of this document:

1. To briefly identify the powerful practical value of AE in saving lives and reducing injuries.
2. To identify issues and criteria to be considered before commencing automated enforcement.
3. To identify steps to be taken to achieve readiness for automated enforcement.
4. To identify issues to improve existing automated enforcement systems.
5. To provide a checklist to ensure adequate consideration is given to issues to assess readiness to implement an AE system or improve an existing system.

Other illegal behaviours, including disobeying a red light signal, mobile or cellular phone use, incorrect lane use, and non-restraint use can also be detected using an automated enforcement approach. However, this document applies specifically to **automated speed enforcement**, because speed management requires significant attention worldwide and plays a critical role in reducing road traffic deaths and injuries.

2 Background: The critical need to manage speeding and the powerful practical value of Automated Enforcement

Speed is a key factor in both crash occurrence and severity[2]. Higher speeds increase crash occurrence through several mechanisms: by reducing the capacity to stop in time; by reducing manoeuvrability in evading a problem; by making it impossible to negotiate curves and corners at speeds which are too high for the friction available; and by causing others to misjudge gaps. For example, a vehicle travelling above the speed limit allows pedestrians less gap to cross the road than expected for the distance between the pedestrian and the vehicle. A synthesis of many studies across many countries showed that each 1% decrease in speed will result in an approximate 4% decrease in deaths (see Figure 1)[3]. More recent reviews broadly support the power model, with slightly more distinction between low- and high-speed environments[4]. Therefore, managing speed is vital to achieving strong road safety improvements[5], as well as other benefits such as reducing climate change effects and the harmful effects of road transport noise[6].

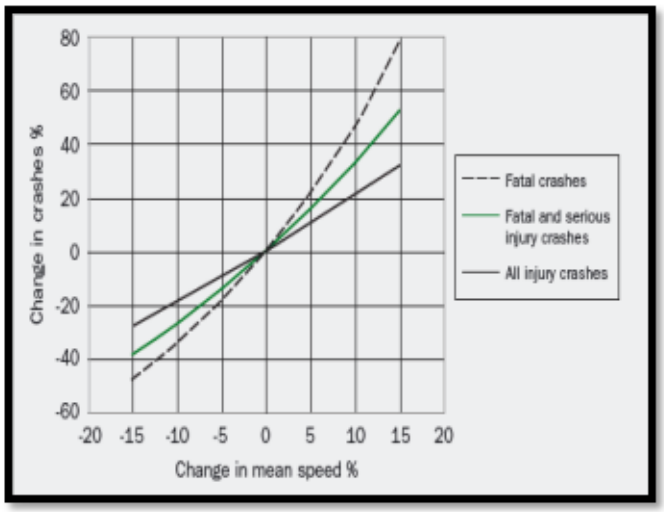

Figure 1: The relationship between speed, deaths, injuries, and crash risk, showing that for each 1% increase in speed there is a 4% increase in deaths (Source: Synthesis of many international studies by Nilsson, 2004).

An irrefutable body of international evidence shows that various means of reducing speeds have led to substantial reductions in deaths and injuries. Conversely, allowing speeds to increase in the absence of significant road safety improvements causes more deaths and injuries. Examples of interventions which deliver safety benefits include: reducing speed limits[7], vehicle-based management of speed[8], and road engineering to reduce speeds[9].

However, one of the most effective, evidence-based, low-cost opportunities to reduce speeds and save lives and injuries is the introduction of speed cameras combined with the promotion of enforcement activity[10]. For example, evaluation of the first 28 speed cameras introduced in the state of New South Wales, Australia, revealed a 71% reduction in speeding which delivered an 89% reduction in deaths at the treated locations[11]. Other studies show consistent though somewhat smaller reductions in trauma. Reduced speeds also deliver large reductions in fatalities and injuries for pedestrians[12].

One of the most effective forms of speed enforcement is point-to-point or average speed camera enforcement, which measures the average speed of vehicles over longer distances, ranging from 1km to over 100km lengths. This technology is most suited to stretches of roadway, such as motorways or highways, that do not have opportunities for drivers to exit or enter the roadway between speed check points. This form of AE has been shown to be effective at reducing speeds as well as in reducing vehicle emissions and noise[13].

3 Issues to Consider for Automated Speed Enforcement

To be effective, automated speed enforcement requires some core background capacities and successful detection levels. These are required to ensure the essential steps in the automated enforcement sequence are possible. There are other issues which apply more broadly, such as extent of corruption in a system, and the extent to which penalties actually deter drivers, but the specific focus here is on automated enforcement.

It is vital that opportunities for road safety benefits through AE are not delayed by waiting for ideal or near ideal circumstances. High-income and middle-income countries with systems that are not 100% accurate (e.g. vehicle registration, vehicle registration plate identification, and driver licensing records) still run highly effective AE systems. Waiting until the systems work extremely well, rather than moving forward with reasonable systems, can delay life-saving interventions. However, there are fundamental issues that must be addressed to a reasonable degree of performance in order to ensure a robust AE system.

The following 11 factors identify vital issues and examples to consider when developing or reviewing an AE system.

A. Political

Achieving a reasonable degree of political acceptance of the road safety value of speed management and AE is important. The introduction of AE should not be delayed by incomplete agreement. Successful speed camera programmes in many countries have continued to save lives and injuries despite vocal opposition. Advice is available on how to manage opposition to AE and to counter the myths associated with speed management and AE, including the use of media to promote the life-saving value of AE, and policies such as dedicating all or a proportion of revenue from monetary penalties (fines) to road safety works[14].

Achieving political understanding or acceptance of administrative and managerial needs is required to allow an efficient enforcement system. It is important for decision makers to understand the role of legislation in assisting with the identification of the offender. A key example is using the concept of *Owner Onus* to ensure that the speeding driver is identified. *Owner onus* legislation compels the vehicle's registered owner to be deemed to be the driver at the time of the offence, or to nominate the offending driver via a legal declaration. Careful briefing of relevant political leaders and of the media are important steps in securing political will for AE. Information should include the scientific evidence, the lives, suffering, and economic loss to be saved, and should note future evaluations as next steps in demonstrating road safety value to the community.

B. Legislation and policy decisions that may be legislated

Many issues relating to legislation (i.e., laws) and to policy (i.e., operational decisions) must be addressed before implementing an AE system.

- Minimal legal requirements for approval based on which camera types have been selected (Fixed cameras, Mobile cameras, Point to Point Speed Control, Red Light/speed cameras, Toll collection system – known as Type approval)
- Calibration of equipment – legislation should include minimum requirements for the legalisation/certification/calibration of all devices (e.g., periodical recalibration, or recalibration after repair of a device). Ideally, the certificate of calibration should have the legal status of proof of accuracy of the camera for a given time period. This could include maintenance schedules, calibration/testing and recertification to be conducted on a regular, periodic basis (e.g., at least annually) to ensure system accuracy and to support the integrity of prosecutions
- Owner/driver responsibility (e.g., Owner onus – described in the section above) and relevant offence investigation process
- Timeliness in processing the initial enforcement intervention (e.g. statute of limitations).
- Which agency/ies are responsible for funding, installing and maintaining devices, and for the infringement management system
- AE can be negatively represented as a mechanism to raise revenue, rather than a safety measure to protect people, especially by the media. This negativity can be countered by adopting a policy of committing all or a proportion of funds received from AE to road safety measures (e.g. road improvements, education) and strongly publicising this commitment.

It is vital to ensure that appropriate legislation is in place before an AE system is launched to avoid expensive and damaging consequences. International experience identifies the following examples which must be considered and can be managed with good legislation:

- loss of public trust and confidence in the accuracy of devices and fairness of the system - this issue highlights the importance of exhaustively testing the accuracy of the system before it is purchased - the AE system must demonstrate accuracy at all times, in complex traffic scenarios and conditions. Ongoing calibration and system checking must be built into the maintenance of the programme;
- highly publicised avoidance of penalties – these experiences of avoiding punishment undermine the integrity of the system and its ability to deter offending;
- inability to identify the vehicle and driver – there is need for robust enforcement of, and deterrent penalties when vehicle registration plates are not displayed, or are obscured or falsified
- excessive proportion of money from speeding infringements going to private camera operating companies.

Other aspects should also be considered and can be included in legislation or managed at policy level. Ideally, these issues should be included in the legislative framework to ensure that public trust and confidence in the system is maintained:

- Data security needs to be ensured. This covers the full range of data sources including roadside data capture and data transfer offsite for processing, secure storage and data use. There are a number of ways that data can be securely collected, transferred, stored and processed (e.g., use of encryption; password/biometric security on data);
- Data security protocols must manage two risks:
  1. Unauthorised people accessing data
  2. Authorised personnel accessing and using data for inappropriate purposes (e.g., removal of penalties from offender record). Robust data security protocols can assist with management of corruption
- Enforcement tolerance thresholds (i.e., a level of speed above the posted speed limit that will be allowed by the enforcement agency before an infringement is issued)
- Proportion of enforcement that is overt (visible) and covert (hidden). Research has shown that a mix of overt and covert speed cameras generates greater road safety benefits than either one alone[15]
- Public Information about camera operation. For example, this might include signage to give advance warning that cameras are operating. Signage could be general (e.g., 'safety cameras used in this area') or location-specific (e.g., 'safety camera ahead'). It might also include the publication of street names on which speed enforcement is operating (e.g., via police media channels);
- Hypothecation of funds (e.g., use of the funds collected from monetary fines for road safety purposes only);
- Penalties should increase in severity as the speed detected increases. It is important not to set a single penalty for a speeding offence because this may encourage drivers to travel at very high speeds because the penalty is no higher at faster speeds.

An additional step has been taken in some places to assist in improving public confidence and creating a mechanism for independent review of automated enforcement operations. Some jurisdictions have established a Speed Camera Commission as an independent body to oversee complaints/appeals, and to make sure processes and practices follow prescribed policy. Consideration should be given to the establishment of this kind of entity.

C. Organisational and funding

There is need to determine which agency/agencies has responsibility for discrete aspects of the system (for example, police, justice, treasury, road/transport

agencies or departments). In some countries, government agencies have legislated responsibility for all operations and management. In other places, private companies may operate cameras and provide images to government for processing. It is also possible that private companies may execute the full range of processes, from camera operation to issuing penalties. Consideration must be given to appropriate access to relevant data based on which processes are legally allowed to be undertaken by each agency/organisation.

The AE system must be financially viable. Funding for establishment, maintenance and ongoing operation are needed. This can be achieved through government funding and/or public private partnership (PPP) in which the private sector funds the establishment and operational costs (including maintenance) of the program while receiving a proportion of the money from speeding fines. Allowing this proportion of funds to be too high may generate public objection to and mistrust of the program.

It is vital that a sufficiently resourced processing centre is established to allow for a high proportion of offences to be detected, and infringement notices issued and prosecuted, so as to create deterrence from speeding. At a minimum, consideration must be given to meeting the ongoing costs related to maintaining and sustaining the operation of the system and the processing centre.

D. Site Selection and Camera Installation

Site selection: There is need to consider a range of issues when selecting sites to install AE devices. Primary consideration should be given to maximising road safety outcomes and should include:

- sites with a serious crash history (supported by relevant crash data),
- speed profiles that are high or excessive (supported by relevant speed data), and
- the proactive/predictive identification of potential crash sites.

Installation of cameras at serious crash locations, is a good place to start – improvements in crash reductions in a relatively short time can help increase the credibility of AE, public acceptance, and political justification, as well as facilitate evaluations to show road safety impact, particularly in the short term. Focusing on previous serious crash locations is important, however, it should not be the only indicator used to select camera sites. For example, newly built motorways should have AE built into them during construction to prevent crashes from occurring by ensuring speeds are moderated from the beginning.

Not all types of cameras are applicable to be used in all locations. The decision on which type of camera to be used relates to road infrastructure and alignment, roadside access, the type of technology selected to detect speed (e.g., radar, laser, induction loops), and the desired mix of mobile/fixed speed enforcement.

Ideal camera sites should:

- have a history of serious injury crashes - but not at the expense of waiting for serious crashes to occur on newly built roads as described earlier. It is important not to focus *solely* on serious *speed-related* crashes, because many jurisdictions struggle to identify speed as a significant contributing factor to a crash because of minimal crash investigation training
- have a history of speeding / high risk behaviour (as above – new roads should have it built in from the beginning);
- allow for accurate measurement of speed for the location
- facilitate general deterrence (i.e., deter as many people as possible from speeding) – there should be requirements for cameras to be deployed/ operated for a defined number of hours to ensure they operate with sufficient regularity to optimise the deterrence of speeding. Where legislatively possible, enforcement should be deployed across the road network in a random nature. This random allocation will help increase the perception of detection, because drivers will be less likely to guess camera locations which can maximise the deterrent effect. However, the inclusion of serious crash locations is important to facilitate demonstration of early wins through crash, injury and deaths reductions;
- allow for safe operation (including safety of personnel conducting calibration, maintenance and data retrieval, if necessary);
- provide access to power supply and appropriate data transfer capability;
- allow for accurate measurement of speed and readable images to be collected (consider position in relation to rising/setting sun; roadside barriers, and vehicle trajectory etc);

- allow for unchallengeable speed measurement (consider positioning the camera at an appropriate distance from the speed limit signs following a change in speed limit)
- allow for detection and recording of motorcycle speeding and motorcycle registration details
- allow for security of the camera itself from vandalism, possibly including installation of monitoring equipment to watch cameras
- Allow for continuing suppression of serious crashes but retaining cameras at locations where they work and serious crashes are reduced. Cameras can also be installed on a temporary basis to control speeds at specific sites, such as in roadwork zones.

For countries with large proportion of 2 wheelers (e.g., motorcycles/scooters), sites should allow appropriate detection opportunities, including use of cameras that are able to detect motorcycles among other traffic.

E. Camera maintenance and calibration

Regular assessment, validation and maintenance of equipment/technology needs to be conducted (e.g., cameras to be physically inspected every 4 weeks) and funded from operational budgets or required as part of a private partner contract. Best practice calibration must occur safely and regularly (at least annually) or after repair and should be conducted by an independent institution (e.g., Main Measurement Office or Office of Metrology). Calibration requirements should be set in legislation, and evidence of them should be legislated to be proof of accuracy of the device. For example, in some countries, when an AE device is checked and calibrated, a certificate of accuracy is issued for that device with an expiry date. Presentation of that certificate to a court is legislated to be evidence of the accuracy of the device.

F. Unique identification of vehicle from an image (vehicle registration /identification)

An AE system needs to be able to provide unique identification of each vehicle, including motorcycles (which may require dedicated technology or mounting), so that an offence notice can be issued. This is done by taking a photograph of the registration or licence plate and linking that image to a record of registered vehicles. To achieve this, there must be a high proportion of registered vehicles displaying plates that accurately reflect the associated vehicle, and that are legible in the image taken by a camera. This could occur by a person who adjudicates on the image, or by the use of ANPR. The effectiveness of this process requires a reasonable proportion of all vehicles to be registered and to display authorised registration plates. Sufficient legislation should also exist to deter the fraudulent or improper use of registration or licence plates.

It is vital that legislation compels all vehicles to be registered and display registration plates that are correctly mounted, unobscured and legible. Experience from some countries shows that if people realise that there is a high likelihood of them being detected for speeding by AE, there may be a rise in unregistered vehicles or vehicles displaying false registration plates. This risk can be managed by ensuring strong, high profile on-road enforcement of vehicle registration non-compliance, including sufficient penalties to deter offending.

G. Linking vehicle to registered owner and contacting the registered owner when an infringement is issued

There must be a system to enable linkage of a detected vehicle to the vehicle's registered owner. Legislation must ensure a vehicle's registered owner provides their full name and contact details to the vehicle registering authority and provides timely updates when this information changes (e.g., compelling vehicle owners to update a change of address or transfer of ownership of the vehicle). Good practice shows that there needs to be a timeframe (e.g., 1 week to 1 month) to notify the authority that a change has occurred and that suitable penalties are in place to ensure/support compliance.

H. Delivering enforcement notice to relevant offender (investigation/adjudication)

Once the owner of the vehicle has been identified and the offence has been validated, an infringement can be sent. This process can occur in a range of ways (e.g., postal mail, email, sms). Ideally, the delivery would include a mechanism to confirm that the owner received the infringement. In some instances, the registered owner may not have been the offending driver so a process for identifying the driver is needed. There are 2 ways that jurisdictions generally handle this issue:

1. Facial recognition is used to identify the driver and issue the infringement.
2. Owner onus legislation.

A facial recognition system requires an extensive database of every licensed driver, including an image of their face. Front-facing cameras that take a picture of the driver's face and the vehicle registration plate are needed. This may mean that two different cameras are required at each location. This system requires a process by which the facial image of the offender is compared with all facial images of all registered drivers in the database to find a match to the offending driver. There are several challenges associated with this system: 1) it may not be possible to identify drivers registered in another jurisdiction, 2) there may be privacy concerns linked to photographing faces, and 3) identifying motorcycle riders wearing full face helmets or drivers/riders wearing other face coverings such as cultural or religious headdress, or a driver wearing sunglasses.

Due to these challenges, owner onus provisions are considered a better option and should be adopted in policy and legislation to enable better identification of offending drivers. Owner onus provisions allow the vehicle owner, if not the driver at the time the offence was committed, to nominate the offending driver via a legal declaration and then the infringement is subsequently withdrawn and reissued to the nominated driver. Legislation should include a serious penalty for false declarations by registered owners and compel the registered owner to nominate/report who was driving at the time of the offence.

There are some challenges related to identifying drivers of company-owned vehicles and leased or hire vehicles. A number of solutions exist which have been implemented in various jurisdictions to overcome those challenges, such as the registration of every vehicle having to include the name of the person who is nominated by a company as the responsible holder of the vehicle, or keeping formal records (such as electronic or paper logbooks) when a vehicle has been allocated to an employee or is leased or hired by a third party. Owner-onus provisions can be applied to companies, with substantially larger penalties for failure to nominate a driver in the case of companies.

I. System to manage offence contestability

Procedural justice is a fundamental element of an AE system. A judicial system should exist within legislation allowing a driver accused of speeding or other illegal behaviour to legally challenge the offence. This may include a system by which a case may be made in writing to police or appropriate authority and allowance for the accused driver to have the case heard before a judicial officer, such as a judge or magistrate in a court of law. Provision to enable a challenge or review of the alleged offence should be identified/included on the infringement notice. It is also important to ensure that evidence to successfully prosecute defended cases is robust, because prosecution failures through poor evidence collection and presentation of the evidence have the potential to undermine the AE programme. For example, it is worth considering providing the owner of the vehicle with a photo of the offence (along with a report of the violation or at any time during the proceedings) to avoid complaints and legal challenge.

J. Process to ensure the penalty is applied and managing repeat offenders

A system to ensure that non-payment of penalty is followed up and resolved expeditiously is needed. This can be achieved in various ways. Some jurisdictions offer an incentive for penalty payment, such as a discount if paid within a month. Other jurisdictions apply an additional penalty for late payment. If a driver fails to pay the penalty, legislation should include a provision to enforce payment. This may include a notice for the accused to appear in court with severe penalties for failure to appear in court (e.g., an arrest warrant). In some jurisdictions, any unpaid penalties disallow transaction with government agencies (e.g., cannot register a vehicle or renew a driver licence until penalties are fully paid).

Good practice includes a mechanism to manage repeat or recidivist offenders. Repeat offenders should not be allowed to continue paying the same (minimal) penalty each time they offend. The penalty should escalate to deter further offending and be proportionate to the severity of the offence (e.g., increasing monetary fines, loss of demerit points (points which are recorded against a driver's license and lead to license suspension when a criterion level of points are accrued), loss of licence, vehicle impoundment or jail). Evidence shows that speeding offenders are also likely to commit other traffic violations and other crimes, as well as have a higher risk of future serious crashes[16].

For general deterrence (and thus improvement of the behaviour of road users) to be achieved, the penalties received must be set appropriately. This issue is not covered here but is the subject of another guide being developed by GRSP.

K. Evaluation to show road safety improvements

A well-managed automated speed enforcement program will deliver positive road safety outcomes, including significant cost-benefit outcomes through reduced death, injury and risk exposure. Being able to demonstrate such benefits of an AE system is important for a number of reasons:

1. Convincing decision makers of the value of speed management and AE;
2. Communicating safety improvements to the public;
3. Expanding and refining the AE system.

Evaluations need to be planned from the beginning of a camera programme to ensure that baseline speed and crash data can be collected, and that funding is made available for the evaluation research[17].

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5 Checklist for determining readiness for speed cameras and other automated enforcement

Use this checklist to:

- assess your level of readiness to implement AE, and
- determine what actions need to be taken to improve identified issues to allow an effective system to be implemented.

Issues to consider	Minimum requirements	Questions to consider for additional steps to add value (if possible, not essential)	How? Where to find information in this guide?
Political	Do decision makers understand the road safety benefits of managing speeds? Do decision makers accept the value of AE? Is there sufficient political acceptance to introduce an AE program? Is there appreciation of the potential income for Government (which could be used for further road safety improvements)?	Is there a policy to dedicate revenue to road safety activities?	*How? Use evidence to demonstrate effectiveness of speed enforcement in reducing speeds and reducing crashes.* **Refer to:** **Section 3. Background – The critical need to manage speeding and the powerful practical value of AE** **Section 3A. Political**
Legislation and policy decisions that may be legislated	Does legislation identify which agency/ agencies have responsibility for various parts of the AE system? Do you have approval to use camera equipment type (type approval)? Is there a legal process to identify the vehicle and the driver? Is there a legal process to prosecute an offender?	Is there Owner Onus provision in the legislation? Is there a policy on the enforcement tolerance threshold? Is there a proportion of the enforcement that can be conducted covertly (hidden)? Is there a policy on communication about AE operation (e.g., mass media promotion; general or location-specific signage of cameras; visibility of cameras);	*How? Address in legislation and policies* **Refer to:** **Section 3A. Political** **Section 3B. Legislation and policy decisions that may be legislated** **Refer to:** **Section 3F. Unique identification of vehicle from an image (vehicle registration/identification)**

Issues to consider	Minimum requirements	Questions to consider for additional steps to add value (if possible, not essential)	How? Where to find information in this guide?
	Do organisations that need access to AE-generated data; driver licensing data; and vehicle registration data have the legal right to access it? Are there data security policies and protocols to: 1. secure roadside data capture and transfer? 2. secure storage and use? 3. prevent unauthorised access? Is there a policy relating to cameras being fit for purpose (e.g., to operate effectively in the environment where they'll be used such as will they operate in extreme heat, cold or humidity? Are registration plates generally clearly visible at high speeds or in low light?)	Is there provision for a certificate of accuracy of equipment to override legal challenges based on inaccurate equipment? Has a decision been made to commit money from speed camera-detected fines to road safety? Are there penalties for driving an unregistered vehicle? Are there penalties for not having a visible legible registration plate?	
Organisational & funding issues	Is there government funding to develop and sustain an AE program, or a partnership with private sector through which government funding is not necessary? (Either one is sufficient to answer Yes) Do organisations that need access to AE-generated data; driver licensing data; and vehicle registration data have the means to access it? Is there sufficient offence processing capacity to deal with volume of infringements within a reasonable time?	Is the amount of money collected from speeding infringements being paid to a private company operator proportional to the services provided by that company?	*How? Address in legislation and policies* **Refer to:** **Section 3C. Organisational and funding**

Issues to consider	Minimum requirements	Questions to consider for additional steps to add value (if possible, not essential)	How? Where to find information in this guide?
	Is the infringement notice processing system compatible with and able to process notices generated by the intended automated technology?		
Site Selection and Camera Installation	Do all camera sites allow for accurate speed detection and readable images to be collected? (consider position in relation to rising/setting sun; roadside barriers, change of speed limits for certain times of day e.g. school zones) Do all camera sites allow for safe operation and maintenance? Are cameras mounted such that the mounting does not contribute to inaccurate speed recording or data capture?	Are there accurate data on fatal and serious injury crashes available to use as a basis of site selection? Have camera installations been managed to avoid increasing the crash risk (e.g., location choices that minimise risk; protective barriers and safety infrastructure to prevent a vehicle colliding with a speed camera pole) Have the track records of potential speed camera providers been assessed for system durability and maintenance? (This could include conducting in-depth reference checking of the system provider including personal visits to existing product users to test manufacturer claims). Is there a remote device checking system available to monitor device integrity?	*How? Address in legislation and policy* **Refer to:** **Section 3D. Site Selection and Camera Installation**
Camera maintenance & calibration	Is there a protocol and appropriate resources for maintenance of cameras? Is there a protocol and appropriate resources for calibration of cameras?	Is the calibration carried out by an independent authorised organisation? If operated by a private company, are maintenance and calibration requirements specified?	*How? Address in legislation and policy* **Refer to:** **Section 3C. Organisational and funding** **Section 3D. Site Selection and Camera Installation** **Section 3E. Camera maintenance and calibration**

Issues to consider	Minimum requirements	Questions to consider for additional steps to add value (if possible, not essential)	How? Where to find information in this guide?
Unique identification of vehicle from an image (vehicle registration / identification)	Is there a reasonable proportion of all vehicles registered? Is there a reasonable proportion of registered vehicles correctly displaying camera-readable vehicle registration plates that uniquely identify that vehicle? Is legislation in place that compels vehicle registration plates to be correctly positioned so that they can be detected by a speed camera, unobscured and legible that deters drivers from attempting to evade speed camera detection?	Is there sufficient enforcement and penalties to deter widespread failure to appropriately display registration plates?	*How? Address in legislation and with enforcement and robust penalty regime* **Refer to:** **Section 3F. Unique identification of vehicle from an image (vehicle registration /identification)**
Linking vehicle to owner and contacting the owner when an infringement is issued	Is there a reasonable proportion of vehicle registration records that accurately reflect the rightful owner? Is there a system to enable linkage of a detected vehicle to the vehicle owner? Is there legislation to ensure vehicle owners provide their full name and contact details to the vehicle registering authority?	Is there legislation to ensure vehicle owners provide timely updates when their personal information changes or when there is transfer of vehicle ownership?	*How? Address in legislation and having robust database in place* **Refer to:** **Section 3G. Linking vehicle to registered owner and contacting the registered owner when an infringement is issued**
Delivering enforcement notice to relevant offender (investigation/ adjudication)	Is there a system by which the owner can be contacted to receive the infringement notice? Is there a process to identify the offending driver if not the owner?	Are there owner onus provisions to allow the vehicle owner to nominate the offending driver via a legally binding declaration? Is there legislation, enforcement and serious penalty for false declarations by vehicle owners? Is there an obligation on owners to know and report who was driving at the time of the offence?	*How? Address in legislation* **Refer to:** **Section 3H. Delivering enforcement notice to relevant offender (investigation/adjudication)**

Issues to consider	Minimum requirements	Questions to consider for additional steps to add value (if possible, not essential)	How? Where to find information in this guide?
System to manage offence contestability	Is there a process to allow a driver accused of speeding to legally challenge the offence?	Is this challenge process well known to the public?	*How? Address in legislation* **Refer to: Section 3I. System to manage offence contestability**
Process to ensure penalty is applied and managing repeat offenders	Is there a process by which non-payment of penalty can be followed up and resolved?	Does the penalty increase with delays in payment? Is there a process to manage repeat offenders?	*How? Address in legislation and policies.* **Refer to: Section 3J. Process to ensure the penalty is applied and managing repeat offenders**
Penalties for speeding are appropriate	Are the penalties for speeding sufficient to deter speeding? Do penalties increase in severity as the speed detected increases? Penalties can be too high, generating Police reluctance to apply them. Is this risk managed? Is there a mechanism for applying a penalty for falsely accepting responsibility for the offence (e.g., fraudulent use of demerit points belonging to another person)?	Do penalties escalate for repeat offences? Is there an increased penalty for company vehicles?	*How? Address in legislation and policy* **Refer to: Section 3J. Process to ensure the penalty is applied and managing repeat offenders**
Evaluation to show road safety improvements	Is there a plan to evaluate the safety outcomes of the AE system? Is there funding for evaluation? Will baseline speed and crash data be collected for this evaluation?	What are community views of automated speed enforcement? Do views change (improve) over time? Does the evaluation offer the opportunity to defend speed cameras on the basis of safety improvements?	*How? Address in legislation and policy and through Community attitudes surveys* **Refer to: Section 3K Evaluation to show road safety improvements**