NETS RECOMMENDED ROAD SAFETY PRACTICES™

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For Employers with Large or Small Fleets and New, Developing, or Advanced ROAD SAFETY Programs

Network of Employers for Traffic Safety
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NETS® Network of Employers for Traffic Safety

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Introduction

Acknowledgment

This document was prepared for NETS by SWOV, a Netherlands-based road safety research organization. It was funded by Shell International Petroleum Company, a NETS board member. It is intended for use by employers with large or small fleets and has global applicability. Please address any questions to Susan Gillies at sgillies@trafficsafety.org.

About these recommended practices

The NETS benchmarking effort identifies interventions that can help companies improve their road safety practices in order to work toward achieving the level of the best performing companies.

By analyzing companies' fleet safety records, in combination with their road safety measures and activities, it is possible to identify particular types of interventions that are related to higher safety levels. However, what remains unknown is how these interventions are interpreted, designed and implemented. For example, the finding that driver training is related to lower crash risk is an important first step. However, it does not give any information about the training methods, the curriculum, the frequency, etc. Research has shown that the effectiveness of training largely depends on its content and that some forms of training can even be counterproductive. Skid training is an example of a counterproductive type of training because it can lead to unwarranted overestimation of a driver's skills.

These recommended practices address the main road safety policies for companies with fleets and represent elements of a company's safety culture. The interventions relate to:

- Driver and driving training:
    - Behind-the-wheel driver training
    - Hazard perception training

  - Road safety awareness training
- Company road safety rules and procedures:
  - Road safety rules and regulations
  - Safe vehicles
  - Fatigue and workload management
  - Distracted driving
  - Enforcement: punishment and reward
- Monitoring and feedback:
  - Incident and collision monitoring
  - In-vehicle monitoring of driving behavior

For each of these interventions, the recommended practices include a brief description or definition, an overview of effective actions and main challenges, and some suggestions.

The recommended practices provide a *glimpse* of the intervention, its main features and its main do's and don'ts. They are by no means exhaustive. They are meant to encourage and guide reflection on the company's road safety programs/policies. For more details, we refer to the literature and to national or regional road safety organizations. For each of the described interventions, a few suggestions for further reading are provided, again by no means exhaustive. Websites with free downloads of useful documents on a variety of topics include:

- European Transport Safety Council (ETSC) reports and business cases from the project Preventing Road Accidents and Injuries for the Safety of Employees (PRAISE): http://etsc.eu/projects/praise/
- NETS Comprehensive Guide to Road Safety: http://trafficsafety.org/
- RoSPA Driving for Work reports: http://www.rospa.com/road-safety/resources/free/employers/
- U.S. National Institute for Occupational Safety and Health (NIOSH) Motor Vehicle Safety web page: http://www.cdc.gov/niosh/motorvehicle/
- National Road Safety Partnership Program (Australia), Knowledge Centre: http://www.nrspp.org.au/

Lastly, it is important to be aware of cultural and economic characteristics that influence how to organize and implement road safety programs. Most information about effective interventions comes from western industrialized economies. Hence, the best practices are biased towards these countries, requiring some creativity to tune and tailor the general principles to specific characteristics of other cultures and to intermediate and emerging economies.

Safety Culture

Brief description:

Safety culture refers to the attitudes, beliefs, perceptions and values toward the importance of safety shared by all employees of a company, at all levels. It includes safety at the physical workplace and when driving. If widely supported and maintained, a road safety culture can contribute substantially to the reduction of crashes and incidents. This benefits employees, their families and society in general, as well as the company. Indeed, the company will reduce crash-related costs and avoid damage to its reputation.

Effective actions:

- Safety culture is not a safety intervention itself, but it sets the scene for implementing interventions in the areas of driver and driving training; company rules and regulations; and monitoring and feedback.
- Safety culture concerns everyone in the company, from CEO-level through all management levels to planners, drivers and maintenance staff.
- Safety culture should not rely on just one champion. It requires commitment from everyone at every level and leadership/sponsorship by an executive champion.
- Safety culture cannot be realized overnight. Resistance to change might hamper progress; it requires change management and a careful transition process.

Main challenges:

The implementation of sustainable road safety interventions is key to promoting a road safety culture.

For example:

- Drivers are told to keep to the speed limit, but are judged on timely delivery.
- Safety rules and regulations are put in place, but not enforced.
- Rule violations by management is condoned; they seem to be above the law.
- Activities are introduced with great enthusiasm, but not maintained. Hence, they slowly lose interest and attention.

Another challenge is maintaining motivation when the return on investment (time and money) is not immediately visible. By monitoring and analyzing several quantifiable performance indicators (accidents, damage, sick leave), longer term returns can be quantified both individually and companywide.

Suggestions:

- Appoint one person (per branch or location) who is responsible and who has a real mandate and access to fleet-safety funding.
- Combine principles of reward and disciplinary action.
- Convince management to lead by example.
- Monitor incidents and collisions and analyze circumstances.
- Involve workers in group discussions aimed at resolving safety problems.
- Encourage employees to report unsafe situations and critical events.
- Avoid rewards or incentives designed to improve productivity or to compensate for working in hazardous conditions. This can compromise safety.

Additional Sources:

Gadd, S & Collins, A.M. (2002) Safety Culture: A review of the literature. HSL/2002/25. Health and Safety Laboratory, Sheffield.

Gregersen, N.P., Brehmer, B., Morén, B., 1996. Road safety improvement in large companies. An experimental comparison of different measures. Accident Analysis & Prevention 28 (3), 297-306.

Hudson, P. (2007) Implementing a safety culture in a major multi-national. Safety Science, 45, 697-722.

Newnam, S., Griffin, M.A., Mason, C., 2008. Safety in work vehicles: A multilevel study linking safety values and individual predictors to work-related driving crashes. Journal of Applied Psychology 93 (3), 633-644.

Salminen, S., 2008. Two interventions for the prevention of work-related road accidents. Safety Science 46 (3), 545-550.

Ward, N.J, Linkenbach, J., Keller, S.N. & Otto, J. (2010) White Paper on Traffic Safety Culture, Montana State University, Bozeman, USA.

Driver and driving training

On-road driver training

Brief description:

On-road driver training refers to practical (behind-the-wheel) instruction for drivers. The focus is on motor and cognitive skills for safely operating the vehicle in actual road and traffic conditions. All drivers need a valid driver's license. In most countries, a specific license for driving heavy-goods vehicles or buses is required. In many countries, a certificate of professional driver competence is also obligatory (e.g., the EU Code 95 requirement). Additional company training may include a tailor-made approach for the tasks and operations required of the driver, exceeding the minimum requirements of state or national law.

Effective actions:

Safe operation of a vehicle requires safe interaction with other road users and vehicles and avoiding single-vehicle crashes. Hence, on-road driver training needs to address:

- An anticipatory driving style, including
    - Choosing an appropriate speed given the prevailing conditions.
    - Maintaining a safe distance from the vehicle in front.
    - Timely perception and recognition of actual and potential hazards.
    - Anticipating and reacting safely to unintentional errors and deliberate mistakes made by other road users.
- Understanding features of the vehicle in different circumstances and the consequences for interacting with other road users, including dealing with limitations in maneuverability, braking efficiency, acceleration power and field of vision (blind spots).

Driver training is more effective when the curriculum is structured according to well-defined educational objectives. Hence, it is advised to formulate concrete and measurable objectives of the on-road training.

Main challenges

Bad driving behavior easily becomes habitual; habitual behavior is difficult to change. Hence, it is important to focus on preventing undesirable behavior by organizing regular refresher behind-the-wheel training.

- Different types of vehicles have specific characteristics and requirements that influence their safe operation in traffic. Hence, the educational objectives and curriculum need to be tailor-made for the vehicle.
- Training may lead drivers to overestimate their capabilities and take higher risks. Hence, training should focus on avoiding risks and hazards, rather than on the skills for dealing with them.
- Professional drivers generally consider themselves good drivers and may not be very open to comments and instructions from non-professional drivers. Hence, involving senior colleague drivers as instructors might increase acceptance.

Suggestions

- Apply the commentary driving technique during training—i.e., while driving, ask the driver to give an oral running commentary on what (s)he thinks, sees and plans.
- Organize the on-road training session with two or three people on board, each driving in turn, followed by combined peer and instructor feedback.
- If available, use a driving simulator to let drivers experience specific risks that should not be simulated on the road—e.g., risks related to mobile phone use, the use of navigation equipment and other distractions.

Additional Source:

McKenna, F.P., Horswill, M.S. & Alexander, J.L. (2006).
NETS' Guide to Defensive Driver Training™, available 1Q16 at www.trafficsafety.org.

Hazard perception training

Brief description:

Hazard perception refers to the timely perception and recognition of hazards, as well as the judgement of their seriousness and means to avert them. Trainers should distinguish between visible hazards and potential hidden hazards. Inexperienced drivers have more difficulties with this skill than experienced drivers. Trainers can teach hazard perception outside real traffic. Hazard perception develops through practical experience, but training can help accelerate learning.

Effective actions:

- Hazard perception training best focuses on the recognition and judgment of hidden, not-yet-visible hazards.
- Trainers can teach hazard perception through static schematic drawings, dynamic video clips (usually recorded from the driver's viewpoint) or in a driving simulator.
- An advantage of a driving simulator is that trainers can present situations that are too dangerous to attempt in real traffic.
- The best training combines the instructor's comments on the situation, the learner's comments on the situation and the learner's prediction on how a potentially dangerous situation could evolve.
- "Error learning," allowing learners to explore, make errors and learn from them, is more effective than the more traditional approach in which learners are instructed on what to do.

Main challenges:

- Several effective computer-based training programs, simulator and practical training programs have been developed. We recommend that you do some research to find the most appropriate type of training for your drivers.
- Available hazard perception training programs target private car drivers and mainly focus on novice drivers. Training professional car, van, bus and HGV drivers should

include vehicle and operation-specific scenarios—e.g., blind spots and on-road loading and unloading.

- Hazard perception training can be organized individually (simulator training) or in small groups (video- or PC-based training). Please note that learners learn more from their own errors than from errors made by others. Hence, each learner should have sufficient opportunity to practice.

Suggestions:

- Supplement the classroom approach to hazard perception training with commentary driving during behind-the-wheel driver training.
- Hazard training refresher courses are recommended in order to maintain the benefits of hazard perception training.
- Following are some examples of organizations that can help with the development of tailor-made hazard perception training:
    - Nottingham Trent University, Division of Psychology (UK)
    - SWOV Institute for Road Safety Research (NL)
    - University of Massachusetts Amherst, College of Engineering (US)
    - University of Queensland, School of Psychology (AU)

Additional Sources

SWOV Factsheet Training hazard perception skills. September 2014.

SWOV Factsheet Simulators in driver training. December 2010.

Vlakveld, W.P. (2011). Hazard anticipation of young novice drivers: assessing and enhancing the capabilities of young novice drivers to anticipate latent hazards in road and traffic situations.

Road safety awareness training

Brief description:

Road safety awareness training increases the motivation to drive safely and to comply with traffic and company rules. Training should focus on increasing a driver's insight into their own physical and cognitive limitations and by clarifying their relationship between the cause of crashes and the severity of injuries. Road safety awareness training helps drivers recognize their driving ability limitations and the effect of external and internal factors on driving ability. It also helps them understand their responsibility towards other road users and the major influence they play in preventing crashes.

Effective actions:

- This training needs to cover the nature, size and consequences of road safety issues and demonstrate what the driver can do to mitigate the risk. Relevant issues include:
    - Speed and speeding in relation to mass, mass differences and human vulnerability.
    - Distraction—e.g., by hand-held and hands-free mobile phones—in relation to limited information-processing capacity.
    - Tailgating, in relation to response time and braking distance (including pavement friction in different weather conditions).
    - Fatigue, in relation to levels of attention, response time and motivation.
    - Alcohol and drugs—both legal and illegal—in relation to lowered inhibition, reduced concentration and increased overestimation of one's skills.
    - Aggression, anger and other emotions, in relation to decision making, driving behavior and interaction with other road users.
    - Anticipating and accepting errors and mistakes by fellow road users.
- Road safety awareness training generally takes place in the classroom. On-line training is less suitable when focusing on motivations.

Main challenges:

- Please note that road safety awareness training does not necessarily affect road traffic behavior. It is, however, necessary to understand and accept other measures. Therefore, awareness training must be part of a package of training interventions.
- Many drivers consider themselves better than average drivers and many consider training to be necessary for others, but not for themselves. It is important, therefore, to focus the efforts on personal circumstances and experiences.

Suggestions:

- Ensure an interactive training approach (between instructor and learners and among learners) and a multimodal approach, with practical, realistic examples, including learners' experiences. Consequently, work with small groups (up to around 12 participants).
- Provide the curriculum to homogeneous subgroups of drivers, based on their driving tasks and vehicle characteristics in order to optimize recognition, acceptance and applicability.
- In addition to organizing training for drivers, also provide training for planners, middle management and other employees who indirectly may influence a driver's behavior, focusing on the their specific roles and responsibilities.
- Avoid focusing on negative driving outcomes. It is more effective to emphasize positive feelings and positive consequences of safe driving behavior.

Additional Sources:

Hatakka, M. et al. (2002). From control of the vehicle to personal self-control; broadening the perspectives to driver education. Transportation Research Part F: Traffic Psychology and Behavior, vol. 5, 201-215.

Washington, S., Cole, R.J. & Herbel, S.B. (2011). European advanced driver training programs: Reasons for optimism. IATSS Research, vol. 34, 72-79.

Company road safety rules and procedures

Road safety rules and regulations

Brief description:

National and local road traffic regulations form the basis for an employer's road safety policies and regulations. A company's road safety polices should exceed those required by law. This is to protect the employees and the general population (corporate social responsibility) and to reduce the costs of crash damage, injuries and fatalities.

Effective actions:

Fundamental fleet safety policies include:

Alcohol/drugs:	Prohibiting the use of alcohol or drugs while driving (zero tolerance policy). Immediately report the use of prescription drugs that could affect driving ability.
Mobile phone:	Banning mobile phone or other electronic communication devices (hand-held and hands-free) while driving, other than when parked in a safe location.
Seat belts/helmets:	Requiring seat belt use (or helmets in the case of two-wheelers) at all times
Speed limits:	Respecting posted speed limits and reducing speed as warranted by weather, traffic or road conditions.
Vehicle lighting:	Using vehicle lights (dipped lights/daytime running lights) at all times.

Main challenges:

The main challenges for ensuring compliance with the company's road safety policies are:

Communication:	Ensure everyone knows and understands the policies by giving straightforward, clear, simple messages. Ensure no one forgets the rules

	by providing constant reminders—e.g., during work meetings, via posters in and around the company, via stickers in the vehicle, etc.
Consistency:	Ensure consistency between day-to-day working processes and the company's safety policies—e.g., do not require drivers to be constantly available by phone if there is a ban on mobile phone use; avoid planning trips that may lead to speeding.
Enforcement:	Monitor and enforce compliance—e.g., through in-vehicle monitoring systems. Ensure that feedback is provided to the drivers.

Suggestions:

- In order to increase acceptance of the policies and regulations, clearly illustrate the relationship between the behavior in question and road safety—e.g., during a road safety awareness training or in a brochure.
- Ensure management complies with the rules and that all employees are treated equally.
- Regarding metrics, it is important to communicate the positive message (regulations compliance rates, e.g., most drivers comply) and the negative message (high risk rates, e.g., xx percent of drivers are not in compliance).

Additional Sources

Shell (2012) Road safety in Shell. Brochure.

RoSPA (2011) Driving for work: safer speeds. Birmingham, the Royal Society for the Prevention of Accidents.

RoSPA (2012) Driving for work: drink and drugs. Birmingham, the Royal Society for the Prevention of Accidents.

Safe vehicles

Brief description:

Vehicle safety standards are subject to national laws and regulations. However, these regulations often set out minimum requirements. Enhance the safety of both the vehicle occupants and other road users by ensuring fleet vehicles include safety features, both for active safety (preventing crashes) and for passive safety (reducing injury for those involved in a crash).

Effective actions:

- Define the key vehicle safety features your fleet will have, such as:
  - Electronic stability control
  - Seat belt reminders (audible and visible) for all seats
  - Airbags at all positions
  - Crash protection features according to a high standard (preferably five stars) of the New Car Assessment Program (NCAP) – for passenger cars
  - Blind spot mirrors or cameras for trucks and vans
  - Reflective contour and tailgate markings for trucks
  - Anti-lock brake systems (also on trailers)
  - Front and side underrun protection for trucks

  Note: This listing is representative only and by no means exhaustive.
- Implement a vehicle maintenance program that ensures regular checkups. Following the original equipment manufacturer (OEM) dealer's guidelines should be enough. For older vehicles, at least annual checks are needed that go beyond minimum criteria in mandatory periodic vehicle inspections, especially regarding brake linings and tread depth.
- Develop a checklist for basic vehicle inspections by drivers before each journey, including, at a minimum, lighting, indicators, position of rearview mirror and/or blind spot mirrors/cameras, tire pressure and tread depth, suspension and damping.

Main challenges:

- Generally, safer vehicles are more expensive than less safe vehicles. The main challenge is to convince management that investments in fleet vehicle safety technology are worthwhile
- Vehicle inspections can be regarded as red tape and tiresome. However, 5 percent of crashes are the result of vehicle defects that can be traced to brakes, tires (pressure, tread depth), lighting and suspension (in that order). Inspections are vital to road safety.

Suggestions:

- NCAP (New Car Assessment Program) stars are an easy way to pick the safest cars. High scores recently awarded imply that the car is also safe for other (vulnerable) road users. This can have a positive impact on corporate social responsibility and marketing.
- Develop a standard form and procedure for drivers to report actual or potential technical failures to maintenance staff.
- Ensure that in-vehicle information systems (e.g., navigation systems, speed warning systems, etc.) do not become a source of distraction

Additional Sources

Global NCAP (2014). Global NCAP fleet safety guide and safer car purchasing policy. http://issuu.com/globalncap/docs/gncap_fleet_buyers_guide?e=14626394/10413375.

NRMA Motoring & Services (2010) The safety needs of heavy vehicles in Australia

SWOV Fact sheet (2010) Euro NCAP, a safety tool.

SWOV Fact sheet (2010) Lorries and delivery vans .

RoSPA (2015) Driving for work: vehicle technology. Birmingham, the Royal Society for the Prevention of Accidents.

Fatigue and workload management

Brief description:

Fatigue (lack of sleep, reduced alertness, longer reaction times, memory problems, less efficient information processing) affects the capability and motivation to drive safely. Sleep disorders (sleep apnea, narcolepsy) may also contribute to fatigue. Individuals at high risk for sleep disorders tend to be over 40 and overweight. Driver fatigue is estimated to play a role in 10 to 15 percent of all severe crashes.

Effective actions:

Develop a Driver Fatigue Management Program:

- Set rules for maximum driving and working hours and minimum resting hours that take the need for rest and sufficient night-time sleep into account. Keep in mind that while commercial drivers have regulated driving hours, occupational drivers may not be covered by national regulation.
- Plan work so drivers can comply with the rules; enforce the rules and do not reward extra (long) shifts that violate company policy or national regulations.
- Encourage drivers to report sleeping, fatigue or workload problems to their supervisor, and urge managers to be attentive to fatigue and to respond positively by seeking practical solutions.
- Screen drivers for sleep disorders, especially sleep apnea. Sleep apnea can often be treated.
- Create awareness among drivers of:
    - the causes and consequences of fatigue,
    - that sleep is the only effective measure to combat fatigue (caffeine and power naps are just temporary), and
    - the influence of personal lifestyle.

Main challenges:

- It can be difficult for companies to weigh the benefits/profits of longer working and driving shifts against the benefits of safer, less fatigued drivers. This requires a well-established and supported safety culture.
- A driver's lifestyle is an important part of understanding fatigue. However, be sensitive to the fact that some drivers may believe that addressing one's private lifestyle is an invasion of one's privacy.
- Drivers, in particular younger drivers and new drivers, may feel uncomfortable reporting fatigue to their supervisor because of their concerns of damaging their career advancement. It is the manager's responsibility to create a helpful, open and constructive workplace environment.

Suggestions:

- Make a fatigue management program part of the organization's overall safety management program.
- Ask whether travel by road is needed, and consider telephone or video conferences as alternatives.
- Offer accommodations or transportation to workers who just completed extended work shifts or long flights.
- Ensure company vehicles have working air conditioning. High temperatures cause the consequences of fatigue to manifest sooner.

Additonal Sources

Federal Motor Carrier Safety Administration and Transport Canada. North American Fatigue Management Program. www.nafmp.com.

Lerman SE, Eskin E, Flower DJ, George E, Gerson B. Hartenbaum N, Hursh SR, Moore-Ede M (2012). ACOEM Guidance Statement: Fatigue risk management in the workplace. J Occup Environ Med 54(2): 231-258.

RoSPA (2011) Driving for work: safer journey planner. Birmingham, the Royal Society for the Prevention of Accidents.

SWOV Factsheet (2012) Fatigue in traffic: causes and effects.

Distracted driving

Brief description:

Any non-driving activity is a potential distraction, including controlling and using in-vehicle devices such as mobile phone and navigation systems, eating, reaching for objects inside the vehicle and adjusting vehicle controls. Distraction can be visual (taking your eyes off the road), manual (taking your hands off the wheel) or cognitive (taking your mind off driving). Distraction substantially increases the risk of getting involved in a crash. It is estimated that distraction plays a role in about 5 to 25 percent of car crashes. Contrary to common belief, hands-free mobile phones are also a distraction.

Effective actions:

- Develop and communicate clear and uniform rules and regulations/policies on the use of mobile phones or other electronic communication devices:
  - Ban the use of mobile phones (including hands-free) and other communication devices while driving.
  - Stipulate that the use of such devices is only allowed when parked in an appropriate and safe place.
  - Create awareness and understanding for this policy by explaining the causes and consequences of distracted driving.
  - Enforce compliance by defining, communicating and applying strict consequences in case of violations.
- Plan trips and journeys with regular breaks that allow for checking for and responding to mobile phone messages. This can be related to fatigue management policies.
- Program navigation systems so they cannot be operated manually when the vehicle in motion.
- Ensure good visibility of the information from the navigation system by having the device located within the driver's field of view, preferably using head-up display). Ensure the navigation system has a sufficiently large display.

Main challenges:

- Reconsider working processes and communication procedures so that phone use while driving is unnecessary, both between drivers and clients (e.g., through a standard voicemail message) and between drivers and their managers and colleagues.
- If a company provides mobile phones to employees, explicitly ban their use when employees are driving.
- (Senior) management is subject to the same policy and should lead by example.

Suggestions:

- Ask the employees to sign an agreement to not use a mobile phone while driving.
- Actively ask employees to report their experiences with the company's mobile phone policy in practice and ask for suggestions for improving the policy.
- Regularly repeat the company's policy on mobile phone use, emphasizing positive consequences and compliance rates.

Additional Sources:

ETSC (2010) Minimising in-vehicle distraction. Brussels, European Transport Safety Council

National Safety Council (US). Cell phone policy kit (free download). http://www.nsc.org/learn/NSC-Initiatives/Pages/distracted-driving.aspx.

RoSPA (2011) Driving for work: mobile phones. Birmingham, the Royal Society for the Prevention of Accidents.

SWOV Factsheet (2013) Distraction in traffic.

U.S. Government website for distracted driving and Network of Employers for Traffic Safety (2013). 2013 Drive Safely Work Week Toolkit. http://www.distraction.gov/take-action/employers.html.

Enforcement: punishment and reward

Brief description:

Policies must be followed. Promote this by making employees aware of the reasons for the policies and by creating the motivation to comply with them. In addition, enforcement is necessary. Enforcement is generally associated with punishing unwanted behavior. However, rewarding desirable behavior is also a type of enforcement. Enforcement provides the opportunity to identify and correct high-risk driving and to reinforce/reward safe driving behaviors.

Effective actions:

- Be clear, consistent and fair:
  - Specify and document the consequences and rewards for each violation or success. This needs to apply companywide.
  - Communicate these enforcement rules to employees (staff and supervisors) and ensure they are read and understood.
  - Ensure supervisors and managers apply the enforcement policy uniformly across all company employees, including management.
  - Develop and apply a procedure for employees to complain if they become aware of inconsistent or discriminating enforcement practices.
- Ensure drivers believe risky driving behavior will be detected. This depends on the objective chance of detection (e.g., through regular checks, in-vehicle monitoring, analysis of incidents and collisions) as well as through frequent communication about enforcement results and consequences.

Be swift and certain: Consequences and rewards need to follow the risky or positive behavior as soon as possible after it is detected to ensure a direct link between cause and effect.

Main challenges:

- Saying one thing and doing another undermines the credibility of the company's enforcement policy, thus, consistency is crucial. Policy exceptions must be approved and communicated in advance.
- Rewards should be a component of behavior change.
- Ensure rewards are considered attractive and penalties undesirable. Rewards can be material (a monetary bonus, small gifts, a lottery ticket) or non-material (a personal or public compliment—naming and faming).

Suggestions:

- Write down the rules and regulations and the consequences of violations (and successes). Clarify and illustrate them in working meetings and, for new employees, during introductory meetings. Encourage questions and expressions of concern. Have employees sign the policy document.
- While penalties need to be consistent over time, a reward program can be applied intermittently. A program running for a few weeks can bring about substantial benefits. For more lasting effects, such programs needs to be repeated at regular intervals.
- Consider a combination of enforcement measures. For example, a reward program is more effective when it is combined with traditional enforcement or training.

Additonal Sources

SWOV-factsheet (2013) Penalties in traffic.

SWOV-factsheet (2011) Rewards for safe road behavior.

Monitoring and feedback

Incident and collision monitoring

Brief description:

Monitoring incidents and collisions consists of registering the numbers and costs, as well as several characteristics of the incident or crash. Monitoring serves two goals: 1) It allows companies to review overall road safety performance and related costs, as well as developments over time, facilitating the development of a road-safety business case; 2) It allows companies to gain insights into high-risk transport operations, high-risk driving conditions, and high-risk drivers. These insights can prompt remedial actions.

Effective actions

- Appoint a person to be responsible for the collision and incident investigation and ensure that (s)he is trained for that job.
- Incident and collision monitoring is a five-step activity:
    - Define indicators: Define which types of incidents and collisions will be identified and monitored. Metrics around relevant safe driving behaviors (using safety performance indicators such as driving speed) are also useful indicators.
    - Collect data: Develop a standard reporting form for collisions, incidents, near misses and dangerous situations, including factual information about date and time, vehicle type, resulting injury/damage/costs, type of location, type of event, information about shift and duty times, etc.
    - Identify causes: Look for root causes and contributing factors. Depending on the type and severity of the event, get information from police records. Interview the driver, collision partners and/or witnesses and collect information regarding the vehicle and location and information from the in-vehicle monitoring system(s).

  - Analyze data: Assess the number, severity and related costs of road traffic incidents and collisions to identify trends. Look for commonalities in (underlying) causes and/or circumstances.
  - Define actions: Identify and implement remedial actions to prevent similar occurrences in the future.
- Monitoring should include collisions and incidents on public road and on private property.

Main challenges:

- Encourage drivers to report smaller incidents, near misses and dangerous situations by creating a positive, learning atmosphere rather than a repressive environment. This must be in balance with a company's enforcement policy.
- Incidents and collisions are generally the result of a combination of factors. Therefore, both immediate and root causes have to be taken into consideration.
- Ensure the results of the analyses and the recommendations for remedial actions are treated seriously to prevent recurrence.

Suggestions:

- Distinguish between combinations of factors related to 1) the capability, motivation and rule compliance of the driver; 2) road and traffic conditions; 3) vehicle and on-board technology; 4) the driver's specific tasks/jobs (other than driving the vehicle) and; 5) the company's working procedures.
- Consider the complete chain of events that led to the incident or collision, including the company's policies and regulations, when developing corrective actions.
- Provide regular feedback to management and employees on road safety performance, including the causes of collisions and near misses, and the remedial actions taken.

Additional Sources

Health and Safety Executive (2011) Investigating accidents and incidents, London.
http://www.hse.gov.uk/pubns/priced/hsg245.pdf.

In-vehicle monitoring of driving behavior

Brief description:

An in-vehicle monitoring system (IVMS) registers several basic features of safety-relevant driving behavior such as speed and speeding, acceleration and deceleration forces, seat belt use, use of headlights, as well as some basic background information such as driving times, resting times, distance covered, etc. In addition, IVMS can include cameras focused on the driver and/or the external environment. Generally, IVMS include a GPS function. IVMS data can be used to provide feedback to drivers and to provide objective information as part of the post-incident crash process.

Effective actions:

- Introduce an IVMS program in four steps:
  - Select: Choose an IVMS and conduct a pilot project.
  - Plan: Determine which vehicles will receive monitors, establish staff roles and develop a training and communications campaign for drivers that is launched before IVMS deployment starts.
  - Deploy: Roll out the program
  - Review: Monitor performance and adjust the IVMS where necessary.
- When vehicles are driven by different drivers, it is important that the system can identify individual drivers (e.g., by a personalized ignition key).
- Identify a motivated person to set up and maintain the IVMS program. Ensure commitment from both top managers and middle management.
- The program should include regular feedback to the driver, which can consist of a combination of group-based components, computer-based individual feedback and individual coaching.

Main challenges:

- Drivers are inclined to consider IVMS as a "spy in the cabin." Positive communication, explaining how the system works and how the data is used, emphasizing the overall road

safety objective, and applying positive reinforcement, may overcome the main objections.

- Data analysis and personalized feedback can be time consuming. Automatic data processing and analysis can save time and, at least in part, provide computer-based automatic feedback.

Suggestions:

- In order to increase acceptance among occupational/fleet drivers, it is important to install an IVMS in the cars of managers and to include them in the program.
- The intended behavioral effect of IVMS (slower, less harsh braking and accelerating, etc.) also reduces fuel consumption. Eco-driving could easily be integrated in the program (feedback, rewards).
- Supervisor coaching increases the effectiveness of in-vehicle feedback through lights or sounds and can provide an opportunity for dialogue on other issues.
- Prevent tampering attempts by rewarding desired driving behavior.
- Similarly, feedback is best provided in a positive way. In the event of risky driving behavior, give advice on how to change behavior.
- Some drivers may be illiterate or have not mastered the main, national language. Automated computer-based feedback can make use of infographics and address the drivers in their native language.

Additional Sources:

International Association of Oil & Gas Producers (2014). Implementing an In-Vehicle Monitoring Program; a guide for the Oil & Gas Extraction Industry.

Nijen Twilhaar, D., Van Schagen, I. & Kassar, B. (2000). Making in-vehicle monitoring systems work. Proceedings of the SPE International Conference on Health, Safety and Environment (HSE). Paper SPE61089.