



## **CLIENT PROJECT REPORT CPR1268**

### **Categorisation of Side-by-Side vehicles**

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## Executive Summary

Side-by-Side (SbS) vehicles are small, 2 or more person four-wheel drive vehicles intended for a variety of primarily off-road uses, including leisure (recreational vehicles) and utility/work tasks, including for agriculture and forestry. This project is concerned specifically with the categorisation of utility-type SbS vehicles intended for agricultural/forestry and other utility tasks.

This project combines published literature, stakeholder information and comment, and engineering expertise on safety, environmental and vehicle design aspects, to recommend the most suitable approach to the future Regulation of utility Side-by-Side vehicles, and define the classification criteria and performance requirements such vehicles should meet.

The objectives of this project were to:

- Confirm whether utility SbS vehicles should fall within the scope of type-approval legislation or not;
- If confirmed positively that utility SbS vehicles do need to be covered by type approval legislation, to identify appropriate, designated and distinct classification criteria for them, making reference to functional and occupational safety aspects, environmental aspects, vehicle design and construction aspects and usage aspects;
- To issue a proposal listing which safety and environmental requirements the utility SbS vehicles should comply with.

Published printed material and internet literature has been researched and reviewed to establish if and how utility SbS vehicles are regulated in other global legislations (e.g. Japan and the USA), and to identify the characteristics of the vehicles, the different uses that they are put to and any evidence of commercial, safety or environmental problems under current regulatory regimes.

The literature review also involved existing EU legislative frameworks potentially relevant to Side-by-Side vehicle type approval, and an analysis of the main technical characteristics of a wide range of vehicles currently available for sale within EU markets.

The stakeholder consultation was undertaken by two separate means. First a structured e-mail questionnaire was delivered to stakeholders, allowing early consideration of the request and enabling quantitative data to be collected where-ever possible. Second, a stakeholder workshop was held (in Brussels, hosted by the Commission).

A number of regulatory possibilities for the approval of Side-by-Side vehicles have been considered, including:

- Not including them within type approval (e.g. relying on Machinery Directive), and;
- Including them within type approval as:
  - Agricultural or forestry vehicles, or amended versions thereof, or;
  - Light-duty Motor Vehicles, or amended versions thereof.

The first objective of this study was to answer the fundamental question of whether or not utility Side-by-Side vehicles should be more appropriately regulated via new type

approval provisions than they are by the current regulatory regime. The objective information and subjective opinions of stakeholders gathered for this study clearly indicates that new type approval arrangements are the preferred option.

While a range of options are possible, each with various advantages and disadvantages, on balance, the evidence gathered indicates that the most appropriate option is approval via amendments to the T-category of Directive 2003/37/EC (currently applied to agricultural/forestry vehicles).

The study indicates that the two most important distinguishing criteria to use are:

1. to provide for robust demarcation between those vehicles designed for a wide range of primarily functional, professional, utility purposes, and those designed primarily for leisure/sport/recreation, albeit that those vehicles may have features that could be used for utility purposes (e.g. the classification criteria from category G, a tow hitch or small load bed);
2. To ensure as far as practicable through design and performance standards that vehicles approved under the T-category are not likely to be used extensively on road, but in case they are, they should meet similar requirements to closely-related on-road types, e.g. by referring to the substantive requirements from category L.

It is also important to distinguish utility Side-by-Side vehicles from other types of vehicle not suited to T-categorisation. The study indicates that the existing G-symbol criteria (applied to M1 and N1 vehicles to identify off-road vehicle types) are also broadly suitable for use within the T-category framework to identify off-road, Side-by-Side vehicles. Information provided by industry stakeholders suggests that most Side-by-Side vehicles would be designed in such a way as to be able to meet these criteria (except the minimum ramp angle and, in some cases, the minimum ground clearances). The existing minimum ground clearance requirements, however, may need to be reduced slightly, as Side-by-Side vehicles tend to be narrower than cars and vans and thus it is desirable to have a slightly lower centre of gravity to retain lateral stability.

As well as the basic G-symbol criteria, the minimum set of additional technical characteristics that the study indicates are best suited to separating utility, off-road Side-by-Side vehicles from non-utility (pure sport) vehicles are:

- Load carrying capability (defined by load bed size), and;
- Maximum speed (with harmonised maximum vehicle speed plate fitted).

The evidence gathered further indicates that the most appropriate option is to create a sub-category within the T framework specifically for Side-by-Side vehicles (though using some alternative terminology), distinguishing between Side-by-Sides and ATVs (e.g. by seating configuration) and encompassing non-agricultural and non-forestry utility uses.

The study indicates that the main safety risks for utility vehicles stem from their propensity to rollover, especially in challenging off-road environments. Adequate levels of ROPS protection, together with seat belts, should thus be major areas of focus.

The main environmental impacts for the majority of Side-by-Side vehicles (powered by internal combustion engines) are pollutant emissions such as HC and CO.

A detailed set of proposals are provided to assist in the implementation of these findings.

## 1 Introduction

Side-by-Side (SbS) vehicles are small, 2 or more person four-wheel drive vehicles intended for a variety of primarily off-road uses, including leisure (recreational vehicles) and utility/work tasks, including for agriculture and forestry. This project is concerned specifically with the categorisation of utility-type SbS vehicles intended for agricultural/forestry and other utility tasks.

These vehicles are well suited to such tasks because:

- They can be used in extreme, all terrain environments;
- They are lightweight and more fuel efficient than conventional alternatives such as small tractors, making them more economical to run and less environmentally damaging to use;
- They are also less expensive to purchase than larger alternatives.

Concerns have been expressed, however, that such vehicles, even when intended for off-road, low speed, utility uses may be used on-road, to carry goods and/or passengers, or simply for recreational purposes.

Under existing arrangements, manufacturers of some SbS vehicles can choose to apply for type-approval for their vehicles under the L category as quadricycles, approval to the Machinery Directive, or type approval as T3 or T1 tractors (depending on the individual characteristics of the vehicle). There is also a range of other Type Approval options, both nationally and at an EU level.

In 2010, the European Commission adopted a proposal for a Regulation on the type approval of a wide range of agricultural or forestry vehicles, including T-category (wheeled tractors) and U-category (self propelled machinery intended only for agricultural or forestry use).

There is thus a need, and an opportunity, for simplification of the approval arrangements, while ensuring appropriate usage aspects, functional and occupational safety aspects, environmental aspects and vehicle design/construction aspects are considered. Various options for doing this are known to exist; including Type Approval through new L (Light vehicles), M (passenger vehicles), N (goods vehicles), T or U categorisations, as well as the option to not require Type Approval and make use of other legislative mechanisms (such as the Machinery Directive). In practice, though, advice provided at the outset of the project indicated that any further amendments to the already complex and diverse L-category of vehicles is thought to be difficult, especially as none of the L-categorisations are applicable to vehicles primarily intended for off-road use, leaving the three main options, assuming Type Approval is appropriate, of T-category, light duty vehicles (M and/or N) or U-category.

This project combines published literature, stakeholder information and comment, and engineering expertise on safety, environmental and vehicle design aspects, to recommend the most suitable approach to the future Regulation of utility Side-by-Side vehicles, and define the classification criteria and performance requirements such vehicles should meet.

## **1.1 Project objectives**

The objectives of this project were to:

- Confirm whether utility SbS vehicles should fall within the scope of type-approval legislation or not;
- If confirmed positively that utility SbS vehicles do need to be covered by type approval legislation, to identify appropriate, designated and distinct classification criteria for them, making reference to functional and occupational safety aspects, environmental aspects, vehicle design and construction aspects, and usage aspects;
- To issue a proposal listing which safety and environmental requirements the utility SbS vehicles should comply with.



## 2 Research Methods

The project was broken down into three main tasks, as described in the following sections. Each of these three tasks are reported in more detail in the following chapters.

### **2.1.1 Task 1: Literature study**

Published printed material and internet literature has been researched and reviewed to establish if and how utility SbS vehicles are regulated in other global legislations (e.g. Japan and the USA), and to identify the characteristics of the vehicles, the different uses that they are put to and any evidence of commercial, safety or environmental problems under current regulatory regimes.

The literature review also involved existing EU legislative frameworks potentially relevant to Side-by-Side vehicle type approval, and an analysis of the main technical characteristics of a wide range of vehicles currently available for sale within EU markets.

### **2.1.2 Task 2: Stakeholder consultation**

It was agreed at the outset of this project that much of the information required could best be provided by stakeholders. Gathering this information was, therefore, a crucial part of the project.

Relevant contacts have been used to solicit information about the use and characteristics of Side-by-Side vehicles, as well as the approval mechanisms for them. Stakeholder groups contacted include manufacturers, their trade and other industry associations, trade unions and other NGOs, government officials from individual Member States, surveillance authorities, insurance companies and technical services organisations.

The consultation was undertaken by two separate means. First a structured e-mail questionnaire was delivered to stakeholders, allowing early consideration of the request and enabling quantitative data to be collected where-ever possible. Second, a stakeholder workshop was held (in Brussels, hosted by the Commission). This provided an opportunity for stakeholders to clarify any points made in their email responses, to raise any pertinent issues not fully covered by the questionnaire, to understand and consider alternative viewpoints and requirements, and, most importantly, to help develop the study's emerging conclusions and recommendations. Given the timing stakeholder synergies with a sister study (on excluding agricultural vehicles from the machinery Directive), the questionnaire and workshop covered both studies.

### **2.1.3 Task 3: Evaluating the options and, if appropriate, determining the requirements**

A number of regulatory possibilities for the approval of Side-by-Side vehicles have been considered, including:

- Not including them within type approval (e.g. relying on Machinery Directive)
- Including them within type approval as
  - Agricultural or forestry vehicles
    - Category T agricultural tractors
    - Category U self propelled mobile machinery

- A new category, or subcategory of the above, specific to SbS vehicles
- Light-duty Motor Vehicles
  - Category M1 passenger cars (including the off-road, G sub-category)
  - Category N1 light goods (including the off-road, G sub-category)
  - A new category, or subcategory of the above, specific to SbS vehicles

In theory, SbS vehicles could also be considered within the type approval framework for two or three wheel vehicles and quadricycles (category L) which covers light and heavy quadricycles like on-road quads and minicars/quadri-mobiles. However, the co-decision process for revisions to the L-category Framework Directive is well advanced and thus the options for further substantial changes, such as the introduction of a new category specifically for Side-by-Side vehicles, are limited.

The results from the literature review and stakeholder consultation have been combined to evaluate the likely effects of each regulatory approach for utility SbS vehicles. Assuming the conclusion was that some form of inclusion in one of the type approval categories was appropriate, the next stage was to determine classification criteria that enable Side-by-Side vehicles to be identified as a distinct category separate from other vehicles that may share some characteristics, for example, quadricycles, agricultural tractors, or self propelled mobile machinery. Such criteria should consider vehicle characteristics that are unique and/or are likely to be difficult and/or expensive to modify, e.g. seating configuration, off-road capability, method of vehicle control, mass.

Finally, the technical requirements applied to vehicles with characteristics shared by SbS vehicles were considered in terms of:

- Functional and occupational safety aspects;
- Environmental aspects;
- Vehicle design and construction aspects;
- Usage aspects.

It should be noted that while a manufacturer can design a vehicle for a certain usage, it is up to the end user whether or not to "use" it in such a way. A vehicle owner has the liberty (subject to meeting other requirements, e.g. driving licence and insurance) to use a vehicle differently to how the manufacturer intended it to be used. For example, some ATVs are known to be used in city centres, for leisure purposes, instead of (or as well as) their intended off-road use.

Wherever possible, specifications have been based on existing test procedures and limit values already applied to other vehicle types. Allowance was made for the situation that in some specific cases the analysis may identify potential advantages to the development of new procedures and/or limit values that are not currently applied to other vehicle categories. However, the development of such new measures was considered to be outside of the scope of this project.

## 3 Literature study

### 3.1 Essential characteristics of Side-by-Side vehicles

Side-by-Side vehicles are small utility vehicles in which the driver and passenger sit alongside each other in conventional (i.e. sit-in) seats. Most Side-by-Side vehicles are capable of carrying two occupants in this way, although some vehicles are equipped with a second row of seating (and can therefore carry four occupants), and some have bench style seats allowing up to three people to be seated in a row. The majority of Side-by-Side vehicles have four wheels, although six-wheel and full and partially tracked versions are also available. There is usually a cargo bed behind the seating and above the rear axle and most vehicles are also capable of towing a load such as machinery or other equipment. A typical vehicle is shown in Figure 1.



**Figure 1: A typical Side-by-Side vehicle**

The main controls comprise a steering wheel and pedals. The driver does not need to use weight transfer to steer or to stabilise the vehicle. Nevertheless, the distribution of weight on-board the vehicle is important, particularly when carrying a load or on uneven surfaces. To reduce the risk of injury in the event of a roll-over or other incident, Side-by-Side vehicles are often fitted with seat belts as well as a rollover protective structure that essentially forms a compartment around the seating area. The compartment is usually open, although some vehicles are fitted with a windscreen and/or side doors.

Appendix A compares the main characteristics of some typical Side-by-Side vehicles available in Europe. The appearance and features (and also marketing) of some Side-by-Side vehicles suggest they are intended for purely recreational, leisure or sporting use. Other vehicles appear to be designed purely for their utility. However, many also seem to display the characteristics of both recreational and utility vehicles. For the purposes of this project, the pure, "leisure" types, i.e. those without significant utility functionality, are not considered further. The potential applications of utility Side-by-Side vehicles are discussed further in Section 3.2. Table 1 presents some generic specifications for Side-by-Side vehicles, derived from the vehicles compared in Appendix A and manufacturers' brochures.

**Table 1: General characteristics of Side-by-Side vehicles**

	<b>Pure sport</b>	<b>Sport / Utility</b>	<b>Pure Utility</b>
Maximum speed	> 60 km/h	40-60 km/h	24 – 60 km/h
Engine capacity	570 – 1000 cc	450 – 900 cc	400 – 950 cc
Power source	Petrol	Petrol/Diesel/Electric	Petrol/Diesel/Electric
Weight	480 – 690 kg	500 – 800 kg	400 – 1,100 kg
Length	2.6 – 3.4 m	2.7 – 3.9 m	2.7 – 3.5 m
Width	1.3 – 1.6 m	1.4 – 1.6 m	1.3 – 1.6 m
Wheelbase	1.9 – 2.7 m	1.8 – 2.9 m	1.8 – 2.4 m
Minimum ground clearance	250 – 320 mm	200 – 310 mm	150 – 260 mm
Cargo bed area	0.5 – 0.6 m <sup>2</sup>	0.9 – 1.5 m <sup>2</sup>	0.9 – 1.8 m <sup>2</sup>
Towing capacity	0 – 700 kg	550 – 900 kg	270 – 730 kg

Some Side-by-Side vehicles are fitted with a speed limiter (typically set at around 60-80 km/h). However, user forums on the internet often explain how to get around these devices, and to improve the performance of the vehicles in general. One method is to fit aftermarket equipment such as fuel controllers or other devices that can change some of the performance characteristics of the vehicle.

### 3.2 Uses of Side-by-Side vehicles

Side-by-Side vehicles are designed to be used off-road and this is reflected in their appearance and performance characteristics. These vehicles were originally designed predominantly for the US market, characterised by wide areas of open land and unpaved tracks. The traffic situation in the EU (dense traffic, hard-paved public roads) may require different design criteria and may induce a different use. Nevertheless, some road-legal versions are available that can be driven on public roads. This option might be desirable if a user wishes to travel between sites.

Some Side-by-Side vehicles have a sporty appearance and are clearly intended purely for recreational use on trails. Others have a very practical appearance that would appeal to professional users only. However, the majority tend to display the characteristics of both recreational and utility vehicles. This is perhaps in order to appeal to smaller business owners who might wish to use the vehicle primarily for work-related tasks, but who might appreciate a vehicle that is fun to drive for recreational activities as well.

Utility Side-by-Side vehicles are typically used where conventional tractors are too large or too expensive for the nature of the work. In general, there are three main tasks that such a Side-by-Side vehicle might perform:

- i) Generally moving around a site, supervising work and checking the land;
- ii) Transporting small loads, on-board the vehicle or in a trailer;
- iii) Towing specialist equipment that is performing a function, such as spraying or (lightly) ploughing land.

Side-by-Side vehicles can be found carrying out these tasks in a wide range of working environments, including:

- Farmland;
- National parks;
- Leisure parks;
- Golf courses (land management);
- Industrial or commercial premises;
- Construction sites;
- Urban (especially pedestrian) areas.

### 3.3 Legislative options for Side-by-Side vehicles in Europe

#### 3.3.1 Overview

Various different legislative frameworks have traditionally been used for the approval of Side-by-Side vehicles. However, none were designed specifically for these vehicles and their particular characteristics. Principally, Side-by-Side vehicles fall within the scope of Directive 2006/42/EC on machinery for functional safety and within the scope of 97/68/EC on non road mobile machinery with regards to environmental requirements. The Directive applies to a broad range of machinery, safety components and lifting accessories.

Directive 2006/42/EC is a *New Approach* Directive that sets out essential requirements that must be met before products can be placed on sale in the European Union<sup>1</sup>. These requirements generally define results to be achieved or hazards to be dealt with, but do not specify technical solutions for doing so. Harmonised European standards are the main way for manufacturers to show they have met the essential requirements, but they are not mandatory and manufacturers are essentially free to choose any means they wish. Products that meet the requirements of a New Approach Directive(s) carry a CE mark. The majority of machinery within the scope of Directive 2006/42/EC, including Side-by-Side vehicles, may be self-certified by the manufacturer. The new approach is not used for the approval of road vehicles.

Article 1(2) of Directive 2006/42/EC sets out certain exclusions, which include (amongst others):

- Agricultural and forestry tractors for the risks covered by Directive 2003/37/EC;
- Motor vehicles and their trailers covered by Council Directive 2007/46/EC; and
- Two or three-wheel vehicles and quadricycles covered by Directive 2002/24/EC.

These are automotive type-approval Framework Directives. Essentially, the machinery Directive does not apply to a vehicle if the vehicle is covered by one of these Directives, provided that the Directive covers all the risks associated with the product. However, according to Article 3 (of Directive 2006/42/EC), if the other Directive only covers certain hazards associated with the product, such products remain in the scope of the machinery

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<sup>1</sup> In 2008, the New Legislative Framework (NLF) was adopted as a successor to the New Approach model. The NLF contains two instruments: a directly applicable Regulation that sets out the requirements for accreditation and market surveillance (i.e. enforcement); and a decision on a common framework for marketing of products. The machinery directive takes account of the NLF and does not require further alignment.

Directive for the other hazards. In practice, this means that some vehicles could come under two different legislative frameworks.

The remainder of this section summarises the main legislative options for Side-by-Side vehicles. The focus is on European-level legislation although it is recognised that various national mechanisms are also used.

### **3.3.2 Machinery legislation**

#### **3.3.2.1 Safety**

The principal aim of Directive 2006/42/EC is to establish essential health and safety requirements for the design and manufacture of machinery (whilst promoting the free movement of machinery within the single market). The Directive came into force on 29 December 2009, although it follows on from previous versions. Article 1 sets out the scope of the Directive and lists the specific categories of products that it applies to. These comprise:

- a) Machinery;
- b) Interchangeable equipment;
- c) Safety components;
- d) Lifting accessories;
- e) Chains, ropes and webbing;
- f) Removable mechanical transmission devices;
- g) Partly completed machinery.

In the broadest sense, the term "machinery" covers all of the six product categories in a) to f). However, all seven categories are defined further in the Directive and the basic definition of "machinery" (in the sense of product category a)) is:

*"An assembly, fitted with or intended to be fitted with a drive system other than directly applied human or animal effort, consisting of linked parts or components, at least one of which moves, and which are joined together for a specific application."*

Side-by-Side vehicles fall within this definition of machinery and are therefore within the scope of Directive 2006/42/EC. However, as noted in Section 2.3.1, they would be excluded from the Directive if one of the Framework Directives for automotive type-approval applies instead.

Directive 2006/42/EC contains only the essential health and safety requirements for machinery (and general procedures for assessing their conformity). Detailed technical specifications regarding functional safety are not included in the Directive. It also does not contain requirements for the environmental performance of such vehicles, but this would be covered by the Non Road Mobile Machinery Directive 97/68/EC. Instead, manufacturers may use certain European harmonised standards. The standards remain voluntary, but provide a presumption of conformity with the Directive for the essential health and safety requirements they cover. However, there are no specific harmonised standards for the construction of Side-by-Side vehicles and hence manufacturers must find some other means of demonstrating that they have met the essential requirements.

Annex 1 of the Directive sets out a comprehensive list of essential health and safety requirements for machinery. However, the first part of the annex deals with the general principles that the machinery manufacturer (or their authorised representative) must follow. Firstly, they must conduct a risk assessment to determine the health and safety requirements that apply to their machinery. The machinery must then be designed and constructed in such a way that the results of the risk assessment are taken into account. The manufacturer or his representative must then:

- Determine the limits of the machinery, which include the intended use and any reasonably foreseeable misuse;
- Identify hazards that can be generated by the machinery and the associated hazardous situations;
- Estimate the risks, taking into account the severity of the possible injury or damage to health and the probability of its occurrence;
- Evaluate the risks, with a view to determining whether risk reduction is required;
- Eliminate the hazards or reduce the risks associated with these hazards by application of protective measures.

The Directive permits 'residual risks' to remain, due to the shortcomings of the protective measures adopted by the manufacturer. However, the manufacturer must indicate whether any particular training is required and they must specify any need to provide personal protective equipment.

The remainder of the annex lays down a series of mandatory health and safety requirements, which are general in nature, but cover a broad range of topics under the following headings:

- a) General remarks;
- b) Control systems;
- c) Protection against mechanical hazards;
- d) Required characteristics of guards and protective devices;
- e) Risks due to other hazards;
- f) Maintenance;
- g) Information.

The Directive also sets out a conformity assessment procedure that must be carried out before the machinery is placed on the market (or put it into service). Annex IV of the Directive contains a list of machinery where specific procedures must be followed, which typically requires the involvement of a Notified Body. However, Side-by-Side vehicles are not included in this list and hence the manufacturer (or a representative) must apply the procedure for assessing conformity. This involves the creation of a technical file that demonstrates that the machinery complies with the requirements of the Directive. Measures must also be taken to ensure that the manufacturing process results in machinery that complies with the technical file.

The manufacturer of the machinery, or their representative, must then complete the EU Declaration of Conformity and apply a CE Mark on the machinery. The CE mark indicates

that the product conforms to the applicable requirements and that the manufacturer takes responsibility for the conformity of the product.

### 3.3.2.2 Emissions

The principal aim of Directive 97/68/EC is to control the exhaust emissions from non-road mobile machinery and to harmonise requirements among the Member States. It was adopted in 1997 and has been amended several times. Annex 1 sets out the scope of the Directive and the main specifications and tests. In general, the Directive applies to all engines to be installed in non-road mobile machinery, but also to secondary engines fitted into vehicles for passenger or goods transport on the road. In addition, for the Directive to apply, the engines must be installed in machinery that meets certain criteria. Namely, it must be intended and suited to move or to be moved, with or without road, and with:

- A compression ignition engine with net power of 19 – 560 kW and operated under intermittent speed; or
- A compression ignition engine with net power of 19 – 560 kW operated under constant speed; or
- A petrol fuelled spark ignition engine with net power up to 19 kW; or
- Engines designed for the propulsion of railcars, which are self-propelled on-track vehicles; or
- Engines designed for the propulsion of locomotives, which are self-propelled pieces of on-track equipment designed for moving or propelling cars.

Various engines are potentially covered under this scope, such as:

- Construction equipment;
- Agricultural equipment;
- Forestry equipment;
- Fork-lift trucks;
- Road maintenance equipment;
- Mobile cranes.

However, the Directive does not apply to engines for the propulsion of vehicles that are covered by the automotive type-approval legislation and does not apply to ships (except vessels intended for inland waterways), aircraft or recreational vehicles such as snow mobiles, off-road motorcycles or all-terrain vehicles.

The Directive specifies maximum exhaust emissions as a function of the power of the engine. It also includes a series of emissions limit stages (Stage I to IV) of increasing stringency with corresponding compliance dates as well as a type-approval procedure for placing engines on the market.

The emissions tests are performed under laboratory conditions with the engine mounted on a test bench and connected to a dynamometer. The engine is operated over a pre-defined test cycle and the exhaust gases are diluted, sampled and analysed. Compression-ignition engines are operated over the non-road steady-state cycle and the non-road transient cycle. The transient cycle was added from Stage III B to represent



emissions during real conditions. It is run twice; with a cold and a hot start and the results are weighted. Different cycles are specified for spark-ignition engines depending on whether they are handheld or non-handheld and their displacement.

A revision of Directive 97/68/EC is currently being prepared and subject to an impact assessment, the Commission is considering a number of options including establishing a new emission stage, Stage V, based on the requirements of Euro VI standards for heavy-duty vehicles.

### **3.3.3 Automotive type-approval legislation**

Automotive type-approval is very different to the new approach. Manufacturers can obtain approval (Whole Vehicle Type Approval) for vehicles types, systems, components or separate technical units intended for such vehicles in one Member State. If it meets the EU technical requirements then the manufacturer can market it EU-wide with no need for further tests or checks. Registration must be granted on simple presentation of a certificate of conformity. These requirements are contained in various European Union (EU) Directives and United Nations Economic Commission for Europe (UN) Regulations. Each of these EU Directives and UN Regulations require third-party approval by an independent body.

#### *3.3.3.1 General principles*

The EU type-approval system is mandatory for most categories of road vehicles. Traditionally, it was based around Framework Directives that specified a series of separate EU Directives that the vehicle must comply with in order to gain EU Whole Vehicle approval. These specified performance requirements and tests for various aspects of the vehicle ranging from tyres through to exhaust emissions and braking systems. The Framework Directives also listed United Nations Economic Commission for Europe (UN) Regulations that were considered to be acceptable alternatives to certain EU Directives. However, type-approval is undergoing a process of simplification in line with the recommendations contained in the final report of the CARS 21 High Level Group (European Commission, 2006). As part of this process, EU Directives are being repealed and replaced with a smaller number of European regulations that apply directly in each member state<sup>2</sup>. These regulations typically follow a split-level approach, comprising two parts:

- Fundamental provisions are set out in an EU Regulation that is laid down by the European Parliament and Council and adopted through the co-decision procedure<sup>3</sup>;
- Technical specifications and administrative provisions that implement the fundamental provisions are laid down in separate Regulations adopted by the Member States and the Commission with the assistance of committees (typically comprising representatives of EU member states and Commission, the vehicle

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<sup>2</sup> EU directives needed to be transposed by member states into their national legislation; some member states simply referred to the EU directive, while others developed new legislative text.

<sup>3</sup> The co-decision procedure is now known as the "ordinary legislative procedure" after the Lisbon Treaty came into force.

manufacturing industry, component manufacturers, other suppliers and other stakeholders).

These “delegated and implementing Regulations” may include detailed requirements and test procedures, but more commonly, they will refer to UN Regulations instead.

The EU type-approval system requires independent, third-party approval covering all testing, certification and conformity of production assessments. Each member state must appoint an approval authority to issue approvals and a technical service to carry out the testing to the Directives and Regulations. One key principle of the system is that an approval issued by one authority will be accepted in all member states. Another key principle, important for citizens/consumers and aiding the free movement of goods, is that each approved vehicle comes with a Certificate of Conformity.

There are three EU type-approval Framework Directives:

- Directive 2007/46/EC on the approval of motor vehicles;
- Directive 2002/24/EC on the approval of powered two-, three-wheeled vehicles and quadricycles;
- Directive 2003/37/EC on the approval of agricultural and forestry tractors.

These are discussed further in the remainder of this subsection.

### *3.3.3.2 EU type-approval of motor vehicles (categories M, N and O)*

Directive 2007/46/EC applies to Motor Vehicles and trailers. Motor Vehicles are defined as any powered vehicle having at least four wheels and a maximum design speed in excess of 25 km/h. This definition can, therefore, include SbS vehicles. It could also include agricultural vehicles and quadricycles but these vehicles are specifically excluded from the scope in a separate article. The whole vehicle type-approval scheme for motor vehicles was introduced in the 1970s through Directive 70/156/EEC and it became mandatory for M1 category vehicles (i.e. passenger cars) in 1998. The recast Framework Directive 2007/46/EC extended the scheme to larger passenger vehicles (categories M2 and M3), goods vehicles (category N) and their trailers (category O).

Directive 2007/46/EC lists over 40 separate technical EU Directives that the vehicle must comply with, depending on which category it fits into and the number that will be produced. It also lists UN Regulations that are considered to be acceptable alternatives to certain EU Directives. However, as noted previously, these Directives are in the process of being repealed and replaced with European regulations. For example, in 2014, around 50 base Directives covering vehicle safety issues will be repealed. Their requirements will be carried over to Regulation (EC) No. 661/2009 (on the general safety of motor vehicles) and replaced, where appropriate, with reference to the corresponding UN Regulation.

The technical requirements described above are specific to the characteristics of vehicles and thus cannot be uniformly applied on the basis of the definition of Motor Vehicles. For this reason, different vehicle categories are defined, the criteria for which are set out in Appendix B. These categories are defined as vehicles primarily intended for the on-road transport of passengers or of goods. Existing Side-by-Side vehicle designs are not primarily intended for either of those purposes, although may often be capable of both, as well as performing other (off-road) work tasks using specialist equipment. Utility variants are primarily intended for off-road use to enable the mobility of workers (and

their tools/materials) around their work site (be that farm, forest, local park, or construction site) or to perform specialist tasks on that site.

A definition of an “off road” vehicle (denoted by the symbol G being placed against their category, e.g. N1G) is contained within the Directive. Vehicles in category N1 with a maximum mass not exceeding two tonnes and vehicles in category M1 (the M/N categories most closely relevant to Side-by-Side vehicles) are considered to be off-road vehicles if they have:

- at least one front axle and at least one rear axle designed to be driven simultaneously including vehicles where the drive to one axle can be disengaged,
- at least one differential locking mechanism or at least one mechanism having a similar effect and if they can climb a 25 % gradient calculated for a solo vehicle.

In addition, they must satisfy at least five of the following six requirements:

- the approach angle must be at least 25 degrees,
- the departure angle must be at least 20 degrees,
- the ramp angle must be at least 20 degrees,
- the ground clearance under the front axle must be at least 180 mm,
- the ground clearance under the rear axle must be at least 180 mm,
- the ground clearance between the axles must be at least 200 mm

Information provided by industry stakeholders suggests that most Side-by-Side vehicles would be designed in such a way as to be able to meet these criteria (except the 20 degree minimum ramp angle and, in some cases, the ground clearances). In this respect at least, most of those aimed purely at the sport market (i.e. with minimal load carrying capacity) may fit a categorisation of M1G, and those with a load platform could possibly be eligible for classification as N1G (see bodywork definitions and relationships between maximum permitted mass, unladen mass and number of seats in Appendix B for details).

While denoting a vehicle as off-road (G) does allow certain exemptions from the requirements (e.g. vehicles of category N3G would be exempt from the requirement to fit front underrun protection) it would not permit vehicles from category M1 or N1 to be exempt from requirements such as frontal impact protection, ABS, Brake assist, and, in the near future, ESC. Side-by-Side vehicles are not typically fitted with these safety systems and are unlikely to pass frontal or side impact requirements. Thus, approving them under the Motor Vehicle framework would be likely to require substantial changes to their design. The costs and benefits of those changes have not been assessed in detail but the relatively low sales volumes, relatively low proportion of on-road use and relatively large magnitude of design change suggests a significant potential for the costs to outweigh the benefits.

### *3.3.3.3 EU type-approval of two- and three-wheel vehicles and quadricycles (category L)*

Directive 2002/24/EC applies to light vehicles such as mopeds, motorcycles, tricycles and quadricycles. These are designated category L vehicles in the Directive. The categories and criteria are listed in Appendix C. On 4th October 2010, the European Commission published its proposal for a new Regulation on the type-approval of category

L vehicles<sup>4</sup>. This specifies new overall requirements for their functional safety and environmental performance and is intended to simplify the legislation for these vehicles, to cater for technical progress and to introduce market surveillance requirements for the sector. Three delegated acts are envisaged to cover environmental and propulsion performance, functional safety and vehicle construction requirements and test procedures whereas an implementing act would cover all of the administrative provisions for the approval of such vehicles.

The vehicle categories in Directive 2002/24/EC were not developed with Side-by-Side vehicles in mind. This applies also to the separate technical Directives and Regulations. Nevertheless, Side-by-Side vehicles could conceivably gain EU type-approval to Directive 2002/24/EC (by following category L7). The level of safety and environmental performance required would probably not be too onerous for a typical Side-by-Side vehicle. However, one difficulty for some vehicles might be the maximum weight that is specified for category L7 vehicles (maximum acceptable mass 550 kg) and which is deemed paramount by the Commission to maintain in order to be able to separate light vehicles of the L-category technically from other categories covering on-road vehicles with four wheels such as M and N.

In theory it would be possible to define a separate category of "off-road" quadricycle that allowed an increased mass, required sit in seats (rather than sit astride) and pedal/steering wheel controls. The definition of "off-road" could be that already used in Directive 2007/46/EC. This would create a separate category that fit SbS vehicles well. If the safety and environmental requirements were comparable with other quadricycle categories this would be likely to be relatively consistent with existing designs of SbS vehicles. However, depending on the exact mass limit, there could be a risk that small 4 wheel drive vehicles of category M1 or N1 could be encouraged to transfer to approval as an SbS vehicle in order to benefit from a reduction in the regulatory requirements for safety.

#### *3.3.3.4 EU type-approval of agricultural or forestry vehicles (categories T and U)*

Directive 2003/37/EC provides European Union Whole Vehicle Type-Approval for agricultural and forestry vehicles, although the requirements vary between individual vehicle types (such as Rollover Protective Structures being required for T1 and T2 vehicles but not T3). The vehicle categories used in Directive 2003/37/EC are set out in Appendix DA.1.1.1 Appendix D. The Directive became mandatory on 1 July 2005 for new types of tractors from categories T1, T2 and T3 and mandatory for all new tractors of categories T1, T2 and T3 from 1 July 2009. For all remaining vehicle types (categories T4, T5, C, R and S) approval requirements are optional or not yet available and thus national approval is granted to these types of vehicles.

Part 1 of Chapter B in Annex II of Directive 2003/37/EC lists the different areas of type-approval and identifies the separate Directives that contain the technical requirements. Parts 2A and 2B of the same annex, list alternative EU Directives and UN Regulations that may be applied in place of the corresponding Directives listed in Part 1. The alternative EU Directives in Part 2A are separate Directives relating to motor vehicles and so some of the requirements are more stringent than those in the Directives relating

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<sup>4</sup> [http://ec.europa.eu/enterprise/sectors/automotive/documents/proposals/index\\_en.htm](http://ec.europa.eu/enterprise/sectors/automotive/documents/proposals/index_en.htm) (Approval and market surveillance of two- or three-wheel vehicles and quadricycles)

to agricultural vehicles. Part 2C of the Annex lists standardised Organisation for Economic Cooperation and Development (OECD) codes, which may be used in place of the test reports drawn up in compliance with the corresponding separate Directives.

On 23 July 2010, the EC adopted its proposal for a Regulation on the approval of agricultural and forestry vehicles. The intention of the proposal is to simplify the legislation on agricultural and forestry vehicles and to improve safety. Twenty-four base Directives (and around 25 amending Directives) would be repealed and replaced by one Council and Parliament Regulation, which would be directly applicable in each Member State. All of the national implementing legislation would also be replaced, therefore. An implementing Regulation would also be created for the administrative aspects and a further three Regulations are envisaged that contain technical details and test procedures.

The draft proposal and its implementing and delegated acts will carry over the existing requirements laid down in the current acts and will be replaced, where appropriate, with references to the corresponding UN Regulations or to Codes established by the OECD or to CEN/CENELEC or ISO Standards.

In addition, the proposed Regulation would lead to safety requirements on anti-lock braking systems, together with some further updates regarding the braking requirements. No changes are proposed on the environmental aspects, but the Regulation would refer to Directive 97/68/EC on emissions of Non-Road Mobile Machinery, instead of having a specific one for tractors.

Since the Directives on non-road mobile machinery (environmental requirements in Directive 97/68/EC and safety requirements in the Machinery Directive 2006/42/EC) do not provide for harmonised requirements for safety, the possibility is provided for manufacturers to have their products approved in accordance with European standards for the safety requirements under the proposed Regulation; therefore mobile machinery for agricultural or forestry purposes are proposed to be included in the new Regulation for EU type-approval or national approval, with respect to safety aspects. The vehicle categories in the proposed Regulation are identical to those in Directive 2003/37/EC, with the addition of a new category, category U, which "*comprises machinery as defined in Directive 2006/42/EC, which is self-propelled and intended for use in agriculture or forestry*".

### **3.4 Global legislation for Side-by-Side vehicles**

#### **3.4.1 United States**

##### *3.4.1.1 Safety*

The National Highway Traffic Safety Administration (NHTSA) has a legislative mandate under Title 49 of the United States Code, Chapter 301, Motor Vehicle Safety, to issue federal motor vehicle safety standards and regulations. However, this applies only to road vehicles. Off-road vehicles, such as Side-by-Side vehicles, do not fall within their jurisdiction. Instead, they are covered by the Consumer Products Safety Commission (CPSC).

The main role of the CPSC is to protect the public from unreasonable risks of injury and death from a wide range of consumer products. The CPSC sets mandatory standards for

products that potentially pose the biggest safety hazard to consumers. These mandatory standards allow regulators to issue recalls or dispense other penalties if a problem arises with a particular product. However, many products are governed only by voluntary standards set by industry experts.

The CPSC issued an advance notice of proposed rulemaking on a standard for recreational off-highway vehicles in 2009 (16 CFR Part 1422)<sup>5</sup>. This began a rulemaking process under the Consumer Product Safety Act. This activity was a direct response to some incidents in the United States, which will be discussed further in section 3.5.

The proposed standard defines recreational off-highway vehicles as *“motorised vehicles having four or more low pressure tyres designed for off-road use and intended by the manufacturer primarily for recreational use”*. It also comments that their characteristics include *“a steering wheel for steering control, foot controls for throttle and braking, bench or bucket seats, rollover protective structure, restraint system, and a maximum speed greater than 30 mph”*. The final point is a key feature of the vehicle that distinguishes it (according to the proposed standard) from a *“light utility vehicle”* that has a top speed of 25 mph.

Other CPSC literature defines *“utility vehicles”* as *“very similar to recreational off-highway vehicles except that their maximum speed is less than 30 mph”* (CPSC, 2009). CPSC comments that utility vehicles are intended for both work applications and for recreational uses. It also notes that although recreational vehicles have work or utility applications, and are frequently considered to be a type of utility vehicle, they are intended primarily for recreational use.

The main focus of the CPSC and the proposed standard, 16 CFR 1422, is recreational vehicles; however, many of the incidents described by the CPSC involved vehicles that are marketed and sold in Europe as suitable for agricultural and forestry applications.

The CPSC has also participated in two voluntary standard activities. The first of these was a revision of the American National Standard for Recreational Off-Highway Vehicles, ANSI/ROHVA 1-2010, undertaken by the Recreational Off-Highway Vehicle Association (ROHVA). In 2011, staff from the CPSC reviewed a draft copy of the proposed revision of the standard, but concluded that they did not address adequately vehicle stability, handling and occupant protection performance. The revised standard has subsequently been published as ANSI/ROHVA 1-2011, although it is unknown if the concerns of the CPSC were taken into account.

The revised standard, ANSI/ROHVA 1-2011, defines recreational off-highway vehicle as *“a motorised off-highway vehicle designed to travel on four or more tires, intended by the manufacturer primarily for recreational use by one or more persons and having the following characteristics”*. It then lists the following:

- A steering wheel for steering control;
- Non-straddle seating;
- Maximum speed capability greater than 30 mph (48 km/h);
- Gross Vehicle Weight Rating no greater than 1,700 kg;
- Less than 2,030 mm in overall width, exclusive of accessories;

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<sup>5</sup> Federal Register/Vol.74./Wednesday, October 28, 2009.

- Engine displacement equal to or less than 1,000 cc;
- Identification by means of a 17 character PIN or VIN.

The second standard activity relates to the development of the American National Standard for Multipurpose Off-Highway Utility Vehicles, ANSI/OPEI B79.1-20XX, undertaken by the Outdoor Power Equipment Institute. CPSC staff received a draft copy of the standard and, once again, concluded that it does not address adequately vehicle stability, handling and occupant protection performance.

This draft new standard defines multipurpose off-highway utility vehicles as vehicles with *“four or more wheels, a steering wheel, non-straddle seating and maximum speeds between 25 mph and 50 mph.”* In addition, they have *“foot controls for throttle and braking, occupant restraints and rollover protective structures”*. However, the standard also notes that *“multipurpose off-highway utility vehicles with maximum speeds above 30 mph meet the definition of a recreational utility vehicle”*.

#### **3.4.1.2 Emissions**

The United States Environmental Protection Agency is responsible for regulations on the emissions and environmental performance of a range of on- and off-road vehicles and engines. Title 40 of the Code of Federal Regulations (CFR) covers the protection of the environment and Part 1051 specifies regulations for the control of emissions from recreational engines and vehicles.

Four main types of recreational vehicle are covered by 40 CFR Part 1051. These include *“off-road utility vehicles”*, which are defined as vehicles with a maximum engine displacement of 1000 cc, maximum power of 30 kW and maximum vehicle speed above 25 mph (40 km/h). It does not apply to vehicles with compression-ignition engines.

The vehicle is placed on a chassis dynamometer and driven over a specified duty cycle. Performance limits are applied to the mass emission (in g/km) of combined hydrocarbons and oxides of nitrogen, and of carbon monoxide. An optional engine-based test is also permitted. Evaporative emissions requirements are also specified.

Side-by-Side vehicles that do not fall under 40 CFR Part 1051, would be covered by one of the following:

- i) 40 CFR Part 1054 – Control of emissions from new, small non-road spark-ignition engines and equipment (generally covers engines below 19 kW);
- ii) 40 CFR Part 1039 – Control of emissions from new and in-use non-road compression-ignition engines.

The State of California has special dispensation to set more stringent vehicle emissions standards than the nation requirements. Other states can choose to follow the national or the Californian standards. Title 13 of the Californian Code of Regulations (CCR) covers motor vehicles and Chapter 9 focuses on off-road vehicles and engines pollution control devices. Sections 2410 to 2415 apply to off-highway recreational vehicles and engines.

#### **3.4.2 Japan**

No Japanese regulations pertaining to Side-by-Side vehicles were identified during the literature survey, and stakeholders have indicated that none are currently in place.

### **3.5 Commercial, safety or environmental problems reported for Side-by-Side vehicles**

#### **3.5.1 Differentials**

Various stakeholders mentioned the need for a lockable differential to be fitted to Side-by-Side vehicles, as indeed seems (from a review of manufacturer brochures) to be common practice. To allow for different rotational speeds of the wheels while cornering, a differential allows a different torque to be applied to the left and right hand wheels on an axle when cornering (when the outer wheel needs to travel further than the inner wheel). In off-road, low grip conditions, a differential will not transmit torque to a wheel on a (relatively) good surface if the other wheel on that axle loses traction (e.g. when it's going over a very low-grip surface or is off the ground). To enable the vehicle to move in such circumstances, a differential lock is necessary to transfer torque to whichever wheel has grip available. Although this leads to a torque imbalance, the relatively low levels of grip available mean that any turning moment produced is quite small and quite easy for the driver to control. For this reason, all wheel drive vehicles need to have at least one lockable differential for off-road use (or other mechanism achieving the same end result). On road, however, the maximum available grip is likely to be much higher and so there is much greater potential for torque imbalances across a driven axle with a locked differential to be much more difficult to control, e.g. when there is ice on one side of the vehicle or if the vehicle is already near the limit of its cornering traction. Thus a differential is an essential safety element for on-road usage, but must be lockable for effective off-road use.

#### **3.5.2 In-use incidents**

Before issuing the advance notice of proposed rulemaking on a standard for recreational off-highway vehicles (16 CFR Part 1422), the CPSC investigated a number of incidents involving these vehicles. Three hundred and twenty nine cases were reviewed from the period between January 2003 and September 2010. These included 169 fatalities and 299 injuries. The main hazard pattern highlighted by the CPSC was a quarter-turn lateral rollover of the vehicle, with full or partial ejection of the occupant, and subsequent crushing of the occupants head or body by the vehicle.

At least 42 percent of the occupants in the cases reviewed by the CPSC were not wearing a seat belt, and the seat belt wearing of a further 42 percent was unknown. Similarly, at least 53 percent were not wearing a helmet, with the helmet wearing of a further 44 percent unknown.

A more detailed breakdown was provided in a briefing memorandum prior to the advanced notice and dated 7<sup>th</sup> October 2009 (CPSC, 2009). At that time, 181 incidents had been investigated and categorised according to the hazard patterns in Table 2.



**Table 2: Hazard patterns in recreational off-highway vehicle incidents**

Hazard pattern	Number of incidents
Overturning	125
Recreational Off-highway Vehicle (ROV) collision	20
ROV rider struck	3
Bystander struck	2
ROV rider fell or thrown	2
Stunt	6
Mechanical	9
Other	5
Unknown hazard pattern	9

In addition to these general investigations, problems were reported to the CPSC regarding two specific vehicle models, including reports of over 60 fatalities involving the two models. On March 31, 2009, the CPSC announced a mandatory repair programme for those models. The vehicle manufacturer agreed to suspend sales of the vehicles and to offer free modifications to vehicles already in service, to make them less prone to rollover and to improve handling. Two repairs were specified: installation of a two-inch spacer on each rear wheel and removal of a rear anti-sway bar. Around 145,000 vehicles were affected.

### 3.5.3 Previous research

Relatively few studies have been published on the (safety or environmental) performance of Side-by-Side vehicles. Nevertheless, five recent studies have been carried out that can be used to illustrate static and dynamic characteristics of Side-by-Side vehicles:

- i) Scarlett et al. (2006) investigated the potential effect of the fitment of rollover protective structures on the stability of a range of small vehicles intended primarily for use in amenity, turf care and estate applications;
- ii) Roberts (2009) measured static and dynamic characteristics of a common Side-by-Side vehicle using conventional automobile standards and proposed modifications to improve its stability;
- iii) Warner (2010) measured static and dynamic characteristics of another common Side-by-Side vehicle;
- iv) Warner and Bready (2011) performed full-scale rollover tests with two Side-by-Side vehicles at a range of speeds;
- v) Heydinger (2011) measured static and dynamic performance characteristics of nine Side-by-Side vehicles in a range of loading conditions;

Standards for rollover protective structures do not typically cover smaller vehicles. The loading, energy absorption and deflection performance criteria include formulae that relate these characteristics to vehicle operating mass and were generally developed with heavier vehicles in mind. The principal aim of Scarlett et al. (2006) was to determine

whether the performance criteria in these standards could in fact accommodate smaller vehicles, below 600 kg.

A range of vehicles fell within the scope of the study. These included “four-wheel load carriers”, which were essentially Side-by-Side vehicles with no rollover protective structure. However, the computer simulations and practical rollover trials performed by Scarlett were limited to a generic ride-on rotary mowing vehicle (although different chassis configurations were examined). Nevertheless, Scarlett found that “appropriately-engineered conventional rollover protective structure solutions” would appear to be suitable for use in smaller vehicles. In addition, there was insufficient evidence from the work to recommend the use of an alternative to the rollover protective structure energy to vehicle mass relationship (specified in the test criteria), even at the lower end of the mass range examined in the study. Furthermore, Scarlett concluded that on balance, significant evidence existed to support the application of the currently-accepted relationship for vehicles in the 300 – 600 kg mass range.

Roberts (2009) investigated the performance of a typical Side-by-Side vehicle using test procedures in various United States and international standards for automobile dynamics. Roberts described the test vehicle as a “Side-by-Side recreational vehicle”; however, this particular vehicle is also marketed as a potential utility vehicle for working environments.

A static analysis was carried out on the vehicle to determine its static stability factor in four loading conditions. Roberts noted that the unloaded static stability factor was lower than that of any road-going vehicle as reported by NHTSA. It could be argued that the comparison with road-going vehicles was somewhat unfair, given that the test vehicle was primarily an off-road vehicle. Nevertheless, many owners of Side-by-Side vehicles might welcome the opportunity to register their vehicles for use on the road and therefore an understanding of the stability of the vehicle in comparison with other vehicles is potentially useful. Roberts also noted that the low curb weight of the vehicle meant that passenger loading had a large effect on the static stability of the vehicle.

Various dynamic stability tests were also carried out, primarily to determine the understeer/oversteer characteristics and the dynamic rollover resistance of the vehicle. These tests revealed that the vehicle tested in the study became directionally unstable with a transition to severe oversteer at lateral accelerations between 0.25 and 0.3 g. Further testing demonstrated rollovers at lateral accelerations of 0.55 g. Roberts noted that this threshold was very low and could easily be exceeded during proper use of the vehicle. However, no data was presented that showed real lateral accelerations measured during typical day-to-day use of the vehicle.

The test vehicle was modified by Roberts to increase its directional stability and rollover resistance. Two main modifications were made: the rear anti-sway bar was removed with a corresponding modification to the rear drive to prevent a potential unintended consequence of severe tire scrub and understeer; and the track width was widened by placing aluminium spacers at each wheel. Roberts noted a marked improvement in the rollover threshold of the vehicle with lateral accelerations (on concrete) of 0.87 g not resulting in rollover. These modifications were made by the vehicle manufacturer following the mandatory repair programme described earlier.

Warner (2010) performed a series of measurements and tests with another test vehicle type. Warner described the vehicle as a “recreational utility vehicle”, but also noted that many other names and abbreviations have traditionally been used to describe Side-by-

Side all-terrain vehicles. The centre of gravity height and static stability factor for the vehicle in a two loading conditions were calculated. In addition, the vehicle's inertial properties were calculated by suspending it as a pendulum and measuring its period of oscillation. A range of dynamic tests were also carried out, primarily to determine the rollover resistance of the vehicle.

The main conclusions from the study were that the presence of a passenger and a payload in the cargo bed had a significant effect on the centre of gravity and static stability factor of the tested vehicle. During the dynamic testing, the maximum lateral acceleration just prior to two-wheel-lift-off was 0.65 g on hard dirt and 0.74 g on pavement (with the vehicle unballasted). Warner commented that the wider results of the static and dynamic experiments provide a basis for comparison of the inertial properties of a recreational utility vehicle to those published for road-going vehicles, although no further comment was offered on the values measured in this study and their implications.

Warner and Bready (2011) performed full-scale rollover tests on two vehicles. The aim was to understand and characterise rollover events and to provide information that might be useful for the reconstruction of real rollover accidents. Five tests were performed with each vehicle at speeds ranging from 20.8 to 31.6 mph. The range was selected to represent the characteristics of some rollover accident scenarios (in the United States). The test vehicle was towed to the desired speed and then released. The steering system initiated a continuous left turn throughout the test sequence. A range of data were recorded including accelerations, roll rates, steering rates, vehicle positions and trajectories and vehicle damage and scratch patterns.

No attempt was made to compare the performance of the two test vehicles and the study conclusions were limited to a summary of the general kinematics of the rollover events. Nevertheless, a key finding was that the vehicles experienced multiple impacts at different locations along the same side (for the same  $\frac{1}{4}$  roll position), with each impact causing a change in vehicle orientation to the ground. However, Warner and Bready also noted that rollover events have a random nature generally and that recreational off-highway vehicles have unique characteristics, design elements and properties that affect the way they respond in rollovers.

The CPSC commissioned a comprehensive study to obtain data on the characteristics of "commonly available recreational off-highway vehicles" and to compare their dynamic performance. The findings of the study were reported by Heydinger (2011). Measurements were made on nine vehicles, selected for the study by the CPSC; however, the make and model of each vehicle were not published.

Heydinger recorded several weights and dimensions for each vehicle, along with front and rear ground clearances, steering ratio and a range of roll-over resistance metrics such as the location of the centre of gravity, inertia values and tilt angles. These basic characteristics were measured in up to six loading conditions. A suite of seven dynamic tests were carried out on each vehicle comprising various steering manoeuvres. These were conducted in two loading conditions.

The data reported by Heydinger is potentially a valuable resource; however, its value for this project is limited somewhat by the lack of information about the specific vehicles that were studied and their relevance to the utility Side-by-Side vehicle market in Europe. The vehicles were described as "recreational off-highway vehicles" and while this term is generally applied in the United States to vehicles intended primarily for

recreational use, some typical vehicles that might fall into this group could also be used in work environments. Furthermore, although Heydinger made some useful observations about the tendency of certain vehicles to exhibit understeer or oversteer in certain dynamic tests, no overall conclusions are made.

## 4 Stakeholder Consultation

This chapter describes the questionnaire survey, Brussels workshop and other activities to gather information, views, opinions and ideas from a wide range of stakeholders.

### 4.1 Email questionnaire survey

At the outset of the project, a set of questions for stakeholders was developed and agreed with the Commission pertaining to the market, approval frameworks, technical characteristics, usage aspects, safety and environmental measures and published literature on Side-by-Side vehicles. In all, eight separate questions were developed and combined together into a questionnaire which was distributed via email to around 50 organisations. The organisations surveyed came from a variety of sectors:

- Manufacturers & tier 1 suppliers (1 response received on behalf of four individual manufacturers);
- Industry associations (4 replies);
- Insurance companies (0 replies);
- Technical services & surveillance authorities (2 replies);
- Non Governmental Organisations (0 replies);
- Government organisations (4 replies).

Eleven completed replies were received, mostly from manufacturers and their industry associations (5 replies) and government organisations (4 replies). Appendix E lists all the organisations surveyed, identifies those who provided some form of input (which includes some organisations that provided input in other ways to the questionnaire) and reproduces the full questionnaire.

A summary of the responses to each survey question is given in the following sections, be they taken directly from emailed replies to the questionnaire, information provided at the stakeholder workshop, or based on information obtained from other stakeholder sources and contacts.

#### 4.1.1 Q1 - Market

***How many SbS vehicles are produced and/or entered into service each year in EU-27? If data for EU-27 is not available then please provide any data you may have for one or more Member States and indicate this in your response.***

Most respondents were unable to provide data on the existing market for Side-by-Side vehicles. This is likely to be the result of a variety of reasons, including:

- EU-wide sales statistics are not routinely collected for official purposes;
- No single trade body represents all manufacturers;
- Individual manufacturers are reluctant to share commercially sensitive data and the great majority of SbS may be imported from outside the EU;
- Different jurisdictions and organisations use different classification criteria, terminology and vehicle descriptors.

The data that was provided, along with further discussions with industry associations and manufacturers, leads to the overall conclusion that something between 20,000 and 50,000 Side-by-Side vehicles are sold in the EU each year. The lower number is considered to be representative of the minimum likely annual sales of the sorts of vehicles described in the preceding chapter, whereas the higher number reflects a wider definition of Side-by-Side vehicles, e.g. to include golf carts.

There was found to be no clear consensus on which particular broad grouping of SbS vehicles (pure sport, sport/utility and pure utility) was most common, so it seems likely that all three groupings are quite common, and more or less equally so.

Data was provided relating to two individual Member States, suggesting that less than 10% of SbS vehicles sold (in the UK) are registered for on-road use (16,000 vehicles sold between 2006 and 2010, 1,400 vehicles registered at end of 2010), and that SbS vehicles only account for about 2% of T-category registrations (in Finland). Details of exactly what vehicles were registered was not provided, but it is assumed that all were of the pure utility variety (i.e. less than 40 km/h top speed).

#### **4.1.2 Q2 – Uses**

***Please provide details about what these vehicles are primarily used for.***

Respondents suggested a wide range of uses, both professional and leisure. As well as agricultural and forestry uses, respondents also highlighted utility uses in parks and golf courses, game keeping, construction, search and rescue, equestrian, sports fields and zoos.

#### **4.1.3 Q3 - Type approval advantages & disadvantages**

***Do you deem it necessary to harmonise the technical requirements of such SbS vehicles through type-approval legislation and what are the advantages and disadvantages of including SbS vehicles in a type approval system compared to excluding them from type-approval legislation?***

The clear consensus response to this question was that type approval was desirable for SbS vehicles. The main advantages listed include:

- Type approval allows full consideration of all (road) safety and environmental risks, not just the occupational safety issues covered by the Machinery Directive;
- Type approval allows European harmonisation;
- Type approval gives greater certainty, confidence and clarity for consumers and industry;
- Type approval reduces the need for Member States to develop and maintain their own technical requirements;
- Type approval facilitates on-road use and associated vehicle taxation and licensing;
- Type approval gives enforcement agencies the tools to test vehicles and take appropriate action if applicable;

- Cost savings can be realised by manufacturers being able to sell one product across the EU, rather than make a number of modifications to suit varying national standards;
- Eligible users of SbS vehicles could get the same benefits as other T-category vehicles (if approved through this route), e.g. no EU import tax, road tax concessions etc. Safeguards to ensure that non-professional users are unable to mis-use such concessions would be needed, however. Note that such safeguards cannot be based on the safety or environmental requirements or other technical aspects relevant to type approval legislation.

Some disadvantages were also suggested, however:

- Type approval may inhibit innovation if categories are too narrowly defined;
- Type approval may increase costs through mandatory fitment of approved components and systems, built to more exacting standards than may otherwise be acceptable;
- Type approval could encourage much greater use of these vehicles on public roads, with unknown safety, environmental and other impacts and risks;
- If they are to be used extensively on road, T-category approval may allow vehicles to evade more stringent (but more appropriate) safety and environmental requirements. Existing tractor requirements are less stringent because the vehicles are not used extensively on public roads and need certain characteristics to perform their agricultural/forestry tasks.

In summary, therefore, stakeholders felt that type approval was preferred to the existing arrangements, but that adequate provisions would be needed to ensure appropriate safety and environmental protection measures.

#### **4.1.4 Q4 – Classification criteria**

***The classification criteria in particular are deemed to be very important in order to differentiate SbS vehicles from other or similar types of vehicles. What characteristics and classification criteria should be used to identify SbS vehicles?***

Stakeholders suggested various possible classification criteria, including:

- Mass
- Dimensions
- Maximum speed
- Seating configuration and capacity
- Ground clearance
- Wheelbase
- Ground clearance : wheelbase ratio
- Approach, departure and break-over angles
- ROPS and seat belt fitment
- All-wheel drive with diff lock

- Ability to climb an x% gradient
- Size/volume of load bay
- Capacity of load bay
- Area of load bay relative to overall area of vehicle
- Front winch
- Rear tow coupling
- Steering system
- Engine power
- Presence of power take off, three point linkages etc
- 4 or 6 wheels
- Off road tyres and suspension system
- Tippable load platform

The general consensus was that it is important to select criteria that allow, if possible, for clear differentiation between the pure sport/recreational vehicles and those that have some meaningful utility use. The pure sport/recreational vehicles tend to have powerful engines and high maximum speeds, and have smaller, non-tipping load bays than their utility counterparts. Utility vehicles have other features e.g. more torque rather than high-speed, bigger load bays etc to make them technically suitable and financially profitable for professional use.

#### **4.1.5 Q5 – Categorisation options**

***What are the advantages and disadvantages of including SbS vehicles under each of the following vehicle categories?***

##### **Agricultural vehicles (T-category)**

Stakeholders strongly favoured this categorisation route (i.e. as T-category vehicles). Relevant reasons given include:

- That utility SbS vehicles are used for many of the same purposes as tractors and designed for similar work activities, i.e. off-road use on difficult terrain with limited on-road use;
- Occupational safety issues could be captured in a similar way as those for tractors (e.g. ROPS).

Some difficulties/disadvantages were also suggested:

- Existing (OECD Code) ROPS standards are not well adapted to all SbS types (e.g. those with bench seats);
- The existing 40 km/h top speed restriction for tractors (other than T5 category) might limit the functionality and productivity of some SbS vehicles;
- The suspended seat requirement may not be relevant to SbS vehicles with full suspension;
- There are at present no adequate emissions requirements for petrol-engined T-cat vehicles with >19kW power;



- The difficulties in ensuring that vehicles were not used predominantly on road;
- That SbS vehicles are designed primarily for the carriage of people and load, rather than as tools for the use of interchangeable equipment;
- That some SbS vehicle types are designed for specific off-road use, but non agricultural/forestry tasks, so some broadening of the definition of a tractor may be needed.

### **Utility vehicles/Passenger Cars (M/N- category)**

Respondents generally felt that the intended (low) SbS usage on public roads would mean that categorisation in similar ways to on-road passenger cars and/or vans would not be appropriate. Some of the suggested advantages of this option, however, include:

- That N categorisation could properly reflect the load-carrying usage of SbS vehicles;
- That M/N categorisation might facilitate some more appropriate safety requirements, e.g. for pedestrian protection and crashworthiness;
- That the M1 and N1 categories already have special provisions for off-road vehicles (e.g. N1G), that might form a suitable basis for SbS vehicle categorisation.

Most of the disadvantages suggested focused on the option to categorise SbS vehicles as M-category (passenger cars):

- That the requirements would be too onerous/costly and disproportionate to their suggested levels of on-road use and top speeds, e.g. accident avoidance technologies, crash protection systems. It was accepted, however, that if SbS vehicles are to be used as passenger cars on road, then appropriate safety rules should be respected.

### **Other (e.g. non-road mobile machinery, U-category)**

Most respondents felt that this option would be inappropriate because it might limit the ability to use the vehicles on road, which they felt was important functionality for many operators (e.g. to get from one part of their site to another). Some stakeholders, though, viewed this as an advantage, i.e. that U-categorisation would be the best way to prevent extensive on-road use, without interfering with the primary (off-road) usage requirements. Another disadvantage suggested, however, was that SbS vehicles would inevitably get used on road but under a U-categorisation might not meet adequate safety or environmental requirements. There is also the issue of category misuse by not paying the appropriate road tax, insurance premium, unjustified benefitting from low import tax and low fuel price by non professional users.

#### **4.1.6 Q6 – Current requirements**

***What are the current requirements to get approval for SbS vehicles in the EU market and elsewhere and does this present a barrier to international trade? What are the current costs per approval/Member State?***

Stakeholders suggested that some SbS vehicles are approved as T1 or T3 tractors, others as L-category. Most, though, responded that many SbS vehicles are currently not type approvable via these routes and instead are approved as non-road mobile machinery. Such vehicles have to meet a variety of other requirements, including

general EU requirements, e.g. for EMC, machinery Directive, low voltage Directive and a complex array of standards specific to individual member states (e.g. UK Construction & Use and Road Vehicle Lighting Requirements, Vehículo Especial in Spain and the Zugmaschine category in Germany).

Some respondents suggested that vehicles manufactured for non-EU markets generally needed modifications to be marketed in the EU, which could be considered a barrier to trade (unless modifications are needed anyway to reflect differing market needs/consumer preferences/traffic conditions etc). Manufacturers suggested that the costs of such modifications and certification might be in the range €400,000-500,000 per vehicle type.

#### **4.1.7 Q7 – safety & environmental measures**

***What safety and environmental protection measures are currently required for SbS vehicles? Do these requirements vary in different Member States and other countries outside of the EU?***

Respondents to this question generally referred to the existing EU approval routes (T, L and Machinery Directive), and to the US safety (ANSI/ROHVA 1 – 2011) and environmental (US EPA regulations), as discussed more fully in the literature review chapter of this report.

In particular, several respondents highlighted the variations in emissions standards between NRMM, L and T categorisations.

#### **4.1.8 Q8 – Published evidence**

***Is any published evidence available with respect to the safety or environmental performance of such vehicles (on-road and/or off-road)?***

Respondents referred to the US studies focussed on the rollover stability and performance of recreational off-highway vehicles, described more fully in the literature review chapter of this report.

Reference was also made to information on emissions provided by manufacturers as part of a separate project looking at L-categorisation and durability issues.

Some respondents reported a generally good safety record for SbS vehicles, particularly in comparison to ATVs.

## **4.2 Stakeholder workshop**

Stakeholders were invited to a workshop to discuss and contribute to the project, held in Brussels on 24<sup>th</sup> October 2011. Stakeholders discussed various pertinent issues:

### **4.2.1 Terminology**

Some stakeholders expressed the view that “Side-by-Side vehicle” was not a universally-understood or used term, and was not necessarily readily-translatable into non-English languages. As well as contributing to the difficulties in getting definitive market/accident/usage data (in that different countries and organisations use different classification terms), this might also cause problems for the drafting of any EU legislation.

#### **4.2.2 Maximum speed**

It was explained that the existing T-category requirements specified a maximum speed of 40 km/h, chosen as being suitable for off-road operations but not so high as to pose unacceptable risks during on-road activity. Industry representatives were asked to clarify their questionnaire response that the 40 km/h limit unduly restricted the functionality of utility SbS vehicles, and did so by explaining that some off-road tasks, e.g. travelling down long, fire-break tracks in forests or across large flat fields to herd/reach sheep, could be completed safely and more effectively at speeds approaching 60 km/h. These speeds were also “more fun” when the vehicles were being used for sport/recreational purposes.

Other stakeholders expressed un-ease that off-road driving at these speeds (60 km/h) was safe, especially its effect of increasing likelihood of passenger ejection. Industry representatives explained that this makes seat belt use essential (and helmet use encouraged for sport/recreational activities) and that much of the focus of recent standardisation activities in the USA (the ANSI/ROHVA standard) had focussed on preventing occupant ejection and occupant protection systems.

Stakeholders accepted the view that in general, the higher the maximum speed, the more likely that vehicles would be used on-road. It was also accepted that off-road speeds and usage aspects were largely a matter for individual Member States, as were national legislation on speed limits, drivers' behaviour and licensing issues.

#### **4.2.3 Emissions requirements**

One stakeholder explained their view that the chassis-dyno based requirements for L-category vehicles were more appropriate for SbS vehicles than the existing T-cat requirements for engine-based standards, because they are more stringent (and thus better protect the environment) and more representative of real-world conditions. Industry representatives clarified that the chassis-dyno standards in the US (for vehicles with max speeds >40 km/h) were broadly similar to today's Euro 2 standards, and thus not too dissimilar to the L-cat requirements. They expressed concern, however, that future tightening of emissions standards for L-cat vehicles might pose compliance problems for SbS vehicle manufacturers.

#### **4.2.4 ROPS**

A discussion on rollover protective structures highlighted that while manufacturers fitted ROPS as standard on most SbS vehicles, they were not tested in accordance with the existing T-category procedures. This was to do with procedural difficulties, especially when wide bench seats are used, and an old US (OHSA) standard was used instead of the T-cat procedures. A stakeholder recalled that they had been involved in ROPS testing of SbS vehicles some years ago, and had no issue with the T-cat procedure, though a bench-seat vehicle had not been tested. It was believed that a Silsoe Research Institute report (written by Andy Scarlett) was published covering these tests (described more fully in the literature review chapter of this report). There was thus general consensus that ROPS provision was important for SbS vehicles (noting there is currently no requirement for ROPS testing for T3 vehicles) but that some further work may be needed to develop universally applicable test procedures. It was also accepted that an appropriate balance needed to be struck between occupant retention in the event of a rollover and ease of access/egress in day-to-day use, which is a key user requirement.

#### **4.2.5 Anti-tampering**

Some stakeholders had raised concerns about type-approved maximum speeds being over-ridden by users by adjusting or removing whatever system/device was used to limit the top speed. It was stated that these issues were found to be more problematic if a significant increase in top speed could be obtained. Industry representatives stated that manufacturers generally welcome anti-tampering provisions and that the proposed L-cat requirements should be adequate in this regard for SbS vehicles. Redundancy in anti-tampering systems was to be encouraged (i.e. a user has to adjust/remove more than one part of the system to get the speed increase).

The point was also made that speed limitation by air-control was preferred to spark-retardation systems because of its better emissions performance. Fuel-cut was also mentioned, and individual approaches can be combined.

#### **4.2.6 Mass**

It was made clear that the 550kg limit in the L-category requirements is a strict limit that allows clear separation between L-category vehicles and M/N vehicle categories. It was accepted that any power restricting limit might be a more significant constraint for (pure sport/recreational) SbS vehicles.

The 600kg boundary between T1 and T3 tractors causes difficulties for some larger SbS vehicles, e.g. those with a double row of seats or 6 wheels, but most, it was suggested, are just below the 600kg threshold. A 1,000kg threshold for T-cat SbS vehicles (combined with suitable maximum speed restrictions) was also suggested.

### **4.3 Other stakeholder consultation activities**

TRL also accepted an invitation to attend a meeting of the Utility Vehicle Task Group of the European Garden Machinery Federation, held in Brussels on 4<sup>th</sup> November 2011. This meeting, attended by a mostly different set of stakeholders to those who attended the 24<sup>th</sup> October workshop, provided useful additional information and feedback on some of the main preliminary findings. In particular, information was provided relating to two specific SbS vehicle types that had not been fully considered up to that point; specialist task vehicles and golf carts. Of these, specialist vehicles such as sand spreaders and lifting platforms are of greatest significance to this project, in that they are utility SbS vehicles that have occasional need to be used on road, but that currently cannot be type approved because they are too heavy for L-cat and do not meet the T-cat requirements regarding agricultural/forestry use.

Face to face meetings were also held with a manufacturer, at their UK offices, and the UK Department for Transport. Both meetings helped clarify and develop their responses to the stakeholder questionnaire, e.g. how the existing regulatory framework was organised and which safety/environmental requirements/risks should be considered.

## 5 Conclusions from the survey

### 5.1 The relevance of type approval

The first objective of this study was to answer the fundamental question of whether or not utility Side-by-Side vehicles should be regulated via type approval provisions and then whether the current legislative framework for these vehicles can be improved with new provisions (either under type-approval or under other appropriate requirements if not type-approved). The objective information obtained from scientific literature and subjective opinions of stakeholders gathered for this study clearly indicates that **new type approval arrangements are the preferred option**. The main reasons for this can be summarised as:

- They are sold in sufficiently large numbers across the EU (at least 20,000 units per annum);
- They are designed for and used primarily off-road, but being able to make journeys on public roads would, stakeholders suggest, provide useful additional functionality and productivity. While Type Approval has no direct role in vehicle usage, stakeholders further suggest that including Side-by-Side vehicles within the type approval system would be likely to make it easier for users of such vehicles to be able to use them on public roads;
- Type approval would provide greater clarity, confidence, cost efficiencies and certainty for consumers and industry alike (than the current arrangements).

The evidence gathered for this study also indicates, however, that a number of important factors need to be considered and addressed to realise the full potential benefits of new type approval arrangements:

- The provisions should be drafted in such a way that the off-road utility benefits of the vehicles can still be realised, but so as not to encourage on-road use;
- If Side-by-Side vehicles are designed in such a way as to encourage extensive on-road use, then they should meet safety standards commensurate with that use;
- Environmental requirements should be based on representative duty cycles, reflecting the different on- and off-road uses and compatible with those for similar vehicles or engines with similar duty cycles;
- The provisions should also clearly distinguish, as far as practicable and if feasible, between utility and non-utility vehicles (i.e. those likely to be primarily used for leisure/sport/recreational purposes);
- Provisions should also be robust enough to prevent manufacturers gaining unreasonable advantage by choosing to categorise their vehicles such that they have to meet less stringent requirements than via some alternative, but more appropriate route.

### 5.2 Categorisation and classification criteria

Having established that some form of whole vehicle type approval for utility Side-by-Side vehicles is likely to be appropriate, the second objective of this study was to identify how to categorise them and how to distinguish them from non-utility vehicles or other

vehicle types already addressed through existing or developing frameworks. While a range of options are possible, each with various advantages and disadvantages, on balance, the evidence gathered indicates that **the most appropriate option is approval via amendments to the T-category of Directive 2003/37/EC** (currently applied to agricultural/forestry vehicles).

The study indicates that the two most important distinguishing criteria to use are:

1. to provide for robust demarcation between those vehicles designed for a wide range of primarily functional, professional, utility purposes, and those designed primarily for leisure/sport/recreation, albeit that those vehicles may have features that could be used for utility purposes (e.g. the classification criteria from category G, a tow hitch or small load bed);
2. To ensure as far as practicable through design and performance standards that vehicles approved under the T-category are not likely to be used extensively on road, but in case they are, they should meet similar requirements to closely-related on-road types, e.g. by referring to the substantive requirements from category L.

It is also important to distinguish utility Side-by-Side vehicles from other types of vehicle not suited to T-categorisation. The study indicates that the existing G-symbol criteria (applied to M1 and N1 vehicles to identify off-road vehicle types) are also broadly suitable for use within the T-category framework to identify off-road, Side-by-Side vehicles. The existing minimum ground clearance requirements, however, may need to be reduced slightly, as Side-by-Side vehicles tend to be narrower than cars and vans and thus it is desirable to have a slightly lower centre of gravity to retain lateral stability.

There are many shared technical characteristics between utility and non-utility off-road, Side-by-Side vehicles, or characteristics that could at least be quite easily applied to existing non-utility vehicles, e.g. similar masses, ROPS fitment, all wheel drive and diff-lock capability, seating configuration and ground clearance. These tend to reflect the shared, off-road, capabilities, but are not well suited to distinguishing between utility and non-utility design.

**As well as the basic G-symbol criteria, the minimum set of additional technical characteristics that the study indicates are best suited to separating utility, off-road Side-by-Side vehicles from non-utility (pure sport) vehicles are:**

- **Load carrying capability** (defined by load bed size), and;
- **Maximum speed** (with harmonised maximum vehicle speed plate fitted).

Vehicles designed for professional uses are highly likely to have relatively large load areas, able to carry a variety of tools, equipment, materials, etc. The load area may also be tippable, but making a (smaller) non-utility load bed tippable is probably quite straightforward, so tippability, per se, is not considered an appropriate distinguishing characteristic.

The evidence gathered for this study also indicates that the likelihood of extensive on-road use is more closely correlated to the vehicle's maximum speed than any other relevant technical characteristic. The evidence also suggests that high speeds (defined here as somewhere between 40 and 60 km/h) are not commonly needed during off-road, utility uses, but may sometimes be appropriate in a limited number of specific circumstances. Sport/recreational vehicles, however, tend to have quite powerful

engines and higher top speeds (some as high as 110-115 km/h), presumably to maximise the potential for “having fun” off-road. Several manufacturers of such vehicles warn users that their vehicles are not designed or intended for use on paved surfaces. It therefore seems sensible to use maximum speed as a distinguishing characteristic as one of the base classification criteria, provided that provisions are in place (not necessarily in the type approval requirements) to ensure, as far as possible, that in-use speeds do not exceed the official figures.

Stakeholders also suggested that the terminology used to describe utility Side-by-Side vehicles might need to be carefully constructed so as to facilitate clarity in a wide range of languages. They also provided a strong argument in favour of broadening the current scope of the T-category, to cover utility-purpose vehicles that were not “designed to perform agricultural or forestry work” as currently required to meet the Directive’s definition of a tractor. There are a wide range of other professional, utility work tasks that are difficult to classify as agricultural or forestry, e.g. golf course maintenance, zoo management, search and rescue, and the upkeep of municipal parks. It is important to note, however, that broadening the scope of the T-category is likely to be procedurally very difficult, and some of these uses may introduce risks wholly different to those for agricultural tractors, such as interaction with pedestrians.

There is also a strong argument in favour of distinguishing between utility Side-by-Side vehicles and utility ATVs, because of their very different usage and safety characteristics. As ATV provisions are outside of the scope of this project, it is appropriate to ensure that any proposals emanating from this study should not affect existing or proposed arrangements for ATVs.

These factors indicate that **the most appropriate option is to create a sub-category within the T framework specifically for Side-by-Side vehicles** (though using some alternative terminology), distinguishing between Side-by-Side vehicles, ATVs, other quadricycles and tractors (e.g. by seating configuration) and **encompassing non-agricultural and non-forestry utility uses**.

### 5.3 Safety and environmental requirements

The third and final main objective of this study was to propose the safety and environmental requirements that Side-by-Side vehicles should meet. The study indicates that **the main safety risks for utility vehicles stem from their propensity to rollover, especially in challenging off-road environments. Adequate levels of ROPS protection, together with seat belts, should thus be major areas of focus**. As top speed increases (along with likelihood of on-road use), then other safety issues will naturally become increasingly important, e.g. braking system capability, lateral stability and impact protection systems. These issues become even more important as seating capacity increases, i.e. the potential for human harm is much greater for a 4 or 6 seat vehicle than for a two seat vehicle.

**The main environmental impacts for the majority of Side-by-Side vehicles (powered by internal combustion engines) are pollutant emissions such as HC and CO**. These should thus be the main areas of focus.

Stakeholders have indicated that existing T-category environmental requirements, however, are based on diesel engines only, with lower power limit 19kW. Therefore, Side-by-Side vehicles, having spark ignition (SI) engines of power typically between 15 kW and 30 kW, cannot be fully covered by the pollutant emissions requirements in the

Non-Road Mobile Machinery Directive (97/68/EC), which are followed for the T-category environmental performance. To cater for all current and likely future side by sides (petrol, diesel, electric, hybrid, etc), wider provisions will be needed. There is also a strong argument in favour of more stringent requirements being applied to higher speed vehicles, to reflect their greater potential adverse environmental impacts.



## 6 Recommendations

Based on the evidence gathered for this study, and guided by the main conclusions described in the preceding chapter, our proposals can be summarised as follows:

1. That a new sub-category within the existing T framework be created specifically for utility Side-by-Side vehicles;
2. That these vehicles be termed "Off-Road Utility Vehicle" (ORUV) or some other suitable equivalent, and are defined as: "any motorised, wheeled agricultural, forestry or estate maintenance vehicle having at least two axles and a maximum design speed between 6 and 60 km/h, the main function of which lies in its off-road, tractive power and which has been especially designed to pull, push and carry materials and/or equipment, or to actuate certain interchangeable equipment designed to perform agricultural, forestry or estate maintenance work, or to tow agricultural, forestry or estate maintenance trailers; it may be adapted to carry a load in the context of agricultural, forestry or estate maintenance work and/or may be equipped with passenger seats and equipped with a minimum load bed area".
3. That ORU vehicles should all be equipped with:
  - a. A steering wheel for steering control;
  - b. Non-straddle seating;
  - c. At least one front axle and at least one rear axle designed to be driven simultaneously including vehicles where the drive to one axle can be disengaged;
  - d. At least one differential locking mechanism or at least one mechanism on the driven axle(s) having a similar effect and be able to climb a 25 % gradient calculated for a solo vehicle.
  - e. In addition, they must satisfy at least five of the following six requirements:
    - i. the approach angle must be at least 25 degrees,
    - ii. the departure angle must be at least 20 degrees,
    - iii. the ramp angle must be at least 20 degrees,
    - iv. the ground clearance under the front axle must be at least 150 mm,
    - v. the ground clearance under the rear axle must be at least 150 mm,
    - vi. the ground clearance between the axles must be at least 180 mm
4. That a maximum mass in running order limit should be set at 800kg, and a maximum vehicle speed be set at 60 km/h.
5. That ORU vehicles have a maximum of three passenger seats (including the driver's), with
  - a. A single, open or enclosed, virtually even and horizontal loading bed that meets one of the following criteria:
    - i. length of loading bed x width of loading bed  $\geq$  0.25 x Length of vehicle x Width of vehicle or;

- ii. an equivalent loading bed area as defined above is used in order to install machines and/or equipment and
  - b. a loading bed area which is clearly separated by a rigid partition from the area reserved for the vehicle occupants and
  - c. the loading bed area shall be able to carry a minimum volume represented by a 600 mm cube.
6. That the safety requirements for ORU vehicles of no more than 40 km/h top speed be identical to the existing provisions for T3 tractors, and a differential fitted on the driven axle(s), and additionally:
  - a. That all vehicles with mass in running order over 400 kg should be equipped with a ROPS (assuming that suitable OECD codes exist or are developed for 400 kg vehicles, with appropriate provisions for bench seats);
  - b. That a requirement be made for the fitment of lap (or 3 point) seat belts to all seating positions where a ROPS is fitted;
  - c. That vehicles must pass a static lateral stability test requirement.
7. That ORU vehicles with top speeds of more than 40 km/h (but no more than 60 km/h) meet the same requirements as for the lower speed varieties, and additionally:
  - a. That 3-point seat belts be fitted to all seating positions;
  - b. That the braking system must meet equivalent performance as motor vehicles and their trailers (i.e. M1G or N1G vehicles).
8. That the environmental requirements for ORU vehicles be based on those for L-category vehicles. The reason is that SI Engines of Side-by-Side vehicles are not fully covered by the pollutant emissions requirements set in the Non-Road Mobile Machinery Directive 97/68/EC and followed for the agricultural / forestry vehicles.

## Appendix A Examples of some Side-by-Side vehicles and their main characteristics

The Table overleaf is based on data provided by ATVEA and relates to a selection of common Side-by-Side vehicles currently on the market (produced by ATVEA member companies). It is not, however, an exhaustive list of all vehicles available. In particular, it does not cover some "estate maintenance" type Side-by-Side vehicles that may not currently meet the "agricultural or forestry" use requirements of Directive 2003/37/EC. The term "estate maintenance" here includes the upkeep of municipal, zoological or national parks, and the maintenance of golf courses and other mixed terrain, outdoor sport/leisure facilities. Some examples of these vehicle types are shown below.



Sprayer



Top Dresser



Aerial Lift Platform

Brand	Model	Vehicle dimensions						Cargo area dimensions				Ratio		Speed limitations	Currently eligible as?
		Length	Width	Surface area	Weight	Ground Clearance	Wheelbase	Length	Width	Surface area	Load	Surface Cargo / Vehicle	Weight Cargo / Vehicle	Intended design speed	Note 1
				A1	W1 (Note 2)					A2	W2				
mm	mm	m <sup>2</sup>	Kg	mm	mm	mm	mm	m <sup>2</sup>	kg			km/h			
John Deere	Gator T5	2720	1524	4.15	406	153	1770	1003	1245	1.25	227	0.30	0.56	32	T3
Kawasaki	Mule 610	2764	1335	3.69	429	170	1779	1044	900	0.94	181	0.25	0.42	40	T3
Kawasaki	Mule 610 4x4	2764	1335	3.69	458	170	1779	1044	900	0.94	181	0.25	0.40	40	T3
Polaris	Ranger RZR 570 - Rec	2730	1270	3.47	482	254	1960	510	1020	0.52	136	0.15	0.28	80	
Polaris	Ranger RZR 800 - Rec	2620	1270	3.33	492	254	1960	560	1070	0.60	136	0.18	0.28	80	
Polaris	Ranger RZR S 800 - Rec	2642	1537	4.06	494	320	1960	560	1070	0.60	136	0.15	0.28	80	
Polaris	Ranger 500 EFI	2740	1440	3.95	497	254	1830	810	1070	0.87	227	0.22	0.46	60	
Polaris	Ranger 400	2740	1440	3.95	498	254	1830	810	1070	0.87	227	0.22	0.46	60	
John Deere	Gator TX 4x2	2928	1524	4.46	510	145	1958	1143	1320	1.51	272	0.34	0.53	32	T3
Yamaha	Rhino 700 FI	2913	1626	4.74	540	307	1910	804	1122	0.90	180	0.19	0.33	60	
John Deere	Gator TH 6x4	2929	1524	4.46	541	170	2007	1143	1320	1.51	454	0.34	0.84	32	T3
John Deere	XUV 550	2921	1435	4.19	552	267	1950	820	1209	0.99	181	0.24	0.33	80	
ArticCat	Prowler XT 550	3016	1562	4.71	558	254	1910	804	1238	1.00	272	0.21	0.49	60	
KYMC0	UXV 500	2870	1460	4.19	560	310	1910	1210	860	1.04	200	0.25	0.36	60	
ArticCat	Prowler GTX 700	3016	1562	4.71	567	254	1910	804	1238	1.00	272	0.21	0.48	60	
Polaris	Ranger RZR XP 900 - Rec	2750	1630	4.48	568	330	2070	584	965	0.56	136	0.13	0.24	80	
KYMC0	UXV 500i	2870	1460	4.19	574	310	1910	1210	860	1.04	200	0.25	0.35	60	
John Deere	Gator HPX 4x4	2870	1506	4.32	589	152	1910	1116	1244	1.39	454	0.32	0.77	40	T3
Polaris	Ranger XP 800	2900	1520	4.41	594	305	1930	930	1370	1.27	454	0.29	0.76	60	
ArticCat	Prowler XTZ 1000	3016	1562	4.71	596	254	1910	804	1238	1.00	272	0.21	0.46	60	
Polaris	Ranger 800 HD	2900	1520	4.41	602	305	1930	930	1370	1.27	454	0.29	0.75	60	
Polaris	Ranger RZR 4 800 - Rec (2 Row)	3300	1540	5.08	605	292	2620	560	1070	0.60	136	0.12	0.22	80	
Polaris	Ranger Crew 500 (2 Row)	3556	1440	5.12	612	254	2640	810	1070	0.87	227	0.17	0.37	60	
ArticCat	Prowler HDX 700	3277	1524	4.99	620	254	2160	1079.5	1422	1.54	455	0.31	0.73	60	
John Deere	XUV 625i 4x4	3021	1571	4.75	627	267	2007	1143	1320	1.51	454	0.32	0.72	80	
John Deere	Gator TH 4x4 Diesel	2929	1524	4.46	634	170	2007	1143	1320	1.51	544	0.34	0.86	32	T1
BRP (CAN-AM)	Commander 800R	3015	1500	4.52	634	279	1924	na	na	0.97	272	0.22	0.43	80	
BRP (CAN-AM)	Commander 1000	3015	1500	4.52	634	279	1924	na	na	0.97	272	0.22	0.43	80	
Kawasaki	Mule 4010 4x4	3005	1575	4.73	638	175	1870	1175	1310	1.54	363	0.33	0.57	40	T1
BRP (CAN-AM)	Commander 1000 X	3067	1500	4.60	649	279	1924	na	na	0.97	272	0.21	0.42	80	
Honda	Big Red	2913	1626	4.74	651	262	1923	838	1346	1.13	450	0.24	0.69	60	
John Deere	XUV 550 S4 (2 Row)	3708	1435	5.32	660	236	2692	820	1209	0.99	181	0.19	0.27	80	
BRP (CAN-AM)	Commander 800R XT	3067	1500	4.60	661	279	1924	na	na	0.97	272	0.21	0.41	60	
BRP (CAN-AM)	Commander 1000 XT	3067	1500	4.60	661	279	1924	na	na	0.97	272	0.21	0.41	60	
Polaris	Ranger RZR XP 4 900 - Rec (2 Row)	3414	1626	5.55	662	318	2728	584	965	0.56	136	0.10	0.21	80	
John Deere	Gator HPX 4x4 Diesel	2870	1506	4.32	668	152	1910	1116	1244	1.39	454	0.32	0.68	40	T1
John Deere	Gator TE 4x2	2929	1524	4.46	669	196	1941	1143	1320	1.51	227	0.34	0.34	24	T1
Polaris	Ranger Diesel	2900	1520	4.41	673	305	1930	930	1370	1.27	454	0.29	0.67	60	
BRP (CAN-AM)	Commander 1000 LTD	3067	1500	4.60	686	279	1924	na	na	0.97	272	0.21	0.40	60	
Polaris	Ranger Crew 800 (2 Row)	3680	1520	5.59	711	290	2740	930	1370	1.27	454	0.23	0.64	60	
Kawasaki	Mule 4010 Diesel 4x4	3005	1575	4.73	725	175	1870	1175	1310	1.54	499	0.33	0.69	40	T1
Polaris	Ranger 6x6 800 (6 Wheel)	3480	1520	5.29	726	305	2670	1080	1370	1.48	567	0.28	0.78	60	
John Deere	XUV 825i 4x4	3021	1571	4.75	744	267	2007	1143	1320	1.51	454	0.32	0.61	80	
John Deere	XUV 855D 4x4	3021	1571	4.75	748	267	2007	1143	1320	1.51	454	0.32	0.61	80	
Polaris	Ranger Diesel Crew (2 Row)	3680	1520	5.59	785	290	2743	930	1370	1.27	454	0.23	0.58	60	
Kawasaki	Mule 4010 Trans 4x4 Diesel	3305	1486	4.91	788	180	2165	1280	1212	1.55	499	0.32	0.63	40	T1
Polaris	Ranger EV (Elec w/ Batteries)	2740	1440	3.95	794	254	1830	810	1070	0.87	227	0.22	0.29	60	

Source: ATVEA

Note 1: This column simply relates the weight and top speed to the existing T-category requirements, and does not indicate whether the vehicle is actually approved in that category.

Note 2: Generally Mass In Running Order, though ArticCat data are dry weight only.

## Appendix B Vehicle categories in Directive<sup>6</sup> 2007/46/EC

In this Appendix, wherever Annexes are mentioned these refer to the Directive 2007/46/EC, unless otherwise explicitly stated.

### *Category M: Passenger vehicles*

Motor vehicles designed and constructed primarily for the carriage of persons and their luggage.

- Category M<sub>1</sub>: Vehicles of category M, comprising not more than eight seating positions in addition to the driver's seating position;
- Category M<sub>2</sub>: Vehicles of category M, comprising more than eight seating positions in addition to the driver's seating position and having a maximum mass not exceeding 5 tonnes;
- Category M<sub>3</sub>: Vehicles of category M, comprising more than eight seating positions in addition to the driver's seating position and having a maximum mass exceeding 5 tonnes.

### *Category N: Goods vehicles*

Motor vehicles designed and constructed primarily for the carriage of goods.

- Category N<sub>1</sub>: Vehicles of category N having a maximum mass not exceeding 3.5 tonnes;
- Category N<sub>2</sub>: Vehicles of category N having a maximum mass exceeding 3.5 tonnes but not exceeding 12 tonnes;
- Category N<sub>3</sub>: Vehicles of category N having a maximum mass exceeding 12 tonnes.

### *Category O: Trailers*

Trailers designed and constructed for the carriage of goods or of persons as well as for the accommodation of persons.

- Category O<sub>1</sub>: Vehicles of category O having a maximum mass not exceeding 0.75 tonnes
- Category O<sub>2</sub>: Vehicles of category O having a maximum mass exceeding 0.75 tonnes but not exceeding 3.5 tonnes.
- Category O<sub>3</sub>: Vehicles of category O having a maximum mass exceeding 3.5 tonnes but not exceeding 10 tonnes.
- Category O<sub>4</sub>: Vehicles of category O having a maximum mass exceeding 10 tonnes.

### **Vehicle subcategories**

Off-road vehicles 'Off-road vehicle (ORV)' means a vehicle that belongs either to category M or N, having specific technical features which permit its use off the normal roads.

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<sup>6</sup> OJ L 263/1, 9.10.2007, p ..

For those categories of vehicles, the letter 'G' shall be added as suffix to the letter and numeral identifying the vehicle category. The criteria for the subcategorisation of vehicles as 'ORV' shall be specified in Section 4 of Part A of this Annex.

M1 or N1 vehicles shall be subcategorised as off-road vehicles if they satisfy at the same time the following conditions:

- (a) at least one front and at least one rear axle designed to be driven simultaneously irrespective of whether one powered axle can be disengaged;
- (b) at least one differential locking mechanism or a mechanism having similar effect is fitted;
- (c) they are able to climb at least a 25 % gradient as solo vehicle;
- (d) they satisfy five out of the following six requirements:
  - (i) the approach angle shall be at least 25 degrees;
  - (ii) the departure angle shall be at least 20 degrees;
  - (iii) the ramp angle shall be at least 20 degrees;
  - (iv) the ground clearance under the front axle shall be at least 180 mm;
  - (v) the ground clearance under the rear axle shall be at least 180 mm;
  - (vi) the ground clearance between the axles shall be at least 200 mm.

#### DEFINITION OF TYPE OF BODYWORK (only for complete/completed vehicles)

The type of bodywork in Annex I, Annex III, Part 1, item 9,1 and in Annex IX, item 37 shall be indicated by the following codification:

#### **1. Passenger cars (M1)**

AA Saloon: ISO Standard 3833-1977, term No 3.1.1.1, but including also vehicles with more than four side windows.

AB Hatchback: Saloon (AA) with a hatch at the rear end of the vehicle.

AC Station wagon: ISO Standard 3833-1977, term No 3.1.1.4 (estate car)

AD Coupé: ISO Standard 3833-1977, term No 3.1.1.5

AE Convertible: ISO Standard 3833-1977, term No 3.1.1.6

AF Multi-purpose vehicle: Motor vehicle other than those mentioned in AA to AE intended for carrying passengers and their luggage or goods, in a single compartment. However, if such a vehicle meets both of the following conditions:

(i) the number of seating positions, excluding the driver, is not more than six; a 'seating position' shall be regarded as existing if the vehicle is provided with 'accessible' seat anchorages; 'accessible' shall mean those anchorages, which can be used. In order to prevent anchorages being 'accessible', the manufacturer shall physically obstruct their use, for example by welding over cover plates or by fitting similar permanent fixtures which cannot be removed by use of normally available tools; and

(ii)  $P - (M + N \times 68) > N \times 68$

where:

P = technically permissible maximum laden mass in kg

M = mass in running order in kg

N = number of seating positions excluding the driver.

This vehicle is not considered to be a vehicle of category M1.

## **2. Motor vehicles of category M2 or M3**

Vehicles of Class I (see Directive 2001/85/EC)

CA Single deck

CB Double deck

CC Articulated single deck

CD Articulated double deck

CE Low-floor single deck

CF Low-floor double deck

CG Articulated low-floor single deck

CH Articulated low-floor double deck

Vehicles of Class II (see Directive 2001/85/EC)

CI Single deck

CJ Double deck

CK Articulated single deck

CL Articulated double deck

CM Low-floor single deck

CN Low-floor double deck

CO Articulated low-floor single deck

CP Articulated low-floor double deck

Vehicles of Class III (see Directive 2001/85/EC)

CQ Single deck

CR Double deck

CS Articulated single deck

CT Articulated double deck

Vehicles of Class A (see Directive 2001/85/EC)

CU Single deck

CV Low-floor single deck

Vehicles of Class B (see Directive 2001/85/EC)

CW Single deck

### 3. Motor vehicles of category N

BA Lorry: See Directive 97/27/EC of the European Parliament and of the Council of 22 July 1997 relating to the masses and dimensions of certain categories of motor vehicles and their trailers (1) Annex I item 2.1.1

BB Van: Lorry with the cab integrated into the body

BC Semi-trailer towing vehicle: See Directive 97/27/EC Annex I item 2.1.1

BD Trailer towing vehicle (road tractor): See Directive 97/27/EC Annex I item 2.1.1

— However, if a vehicle defined as BB with a technically permissible maximum mass not exceeding 3 500 kg:

— has more than 6 seating positions excluding the driver

or

— meets both of the following conditions:

(i) the number of seating positions, excluding the driver, is not more than 6 and

(ii)  $P - (M + N \times 68) \leq N \times 68$

this vehicle is not considered to be a vehicle of category N.

— However, if a vehicle defined as BA, BB with a technically permissible maximum mass exceeding 3 500 kg, BC or BD meets at least one of the following conditions:

(i) the number of seating positions, excluding the driver, is more than 8 or

(ii)  $P - (M + N \times 68) \leq N \times 68$

this vehicle is not considered to be a vehicle of category N.

See Part C, item of Annex II, for the definitions of 'seating positions', P, M and N.

### 4. Vehicles of category O

DA Semi-trailer See Directive 97/27/EC Annex I item 2.2.2

DB Drawbar trailer See Directive 97/27/EC Annex I item 2.2.3

DC Centre-axle trailer See Directive 97/27/EC Annex I item 2.2.4

### 5. Special purpose vehicles

SA Motor caravans (See Annex II A item 5.1)

SB Armoured vehicles (See Annex II A item 5.2)

SC Ambulances (See Annex II A item 5.3)

SD Hearses (See Annex II A item 5.4)

SE Trailer caravans (See Annex II A item 5.6)

SF Mobile cranes (See Annex II A item 5.7)

SG Other special purpose vehicles (See Annex II A item 5.8)

SH Wheel-chair accessible vehicle (See Annex II A item 5.5)



## Appendix C Vehicle categories in Directive<sup>7</sup> 2002/24/EC

This section summarises some of the main requirements of Directive 2002/24/EC. Formal EU processes to replace this Directive with new requirements are ongoing - see

[http://www.europarl.europa.eu/oeil/popups/ficheprocedure.do?reference=2010/0271\(COD\)&l=en](http://www.europarl.europa.eu/oeil/popups/ficheprocedure.do?reference=2010/0271(COD)&l=en)

### *Mopeds*

Two-wheel vehicles (*category L1e*) or three-wheel vehicles (*category L2e*) with a maximum design speed of not more than 45 km/h and characterised by:

- i) in the case of the two-wheel type, an engine whose:
  - cylinder capacity does not exceed 50cm<sup>3</sup> in the case of an internal combustion type, or
  - Maximum continuous rated power is no more than 4 kW in the case of an electric motor;
- ii) in the case of the three-wheel type, an engine whose:
  - cylinder capacity does not exceed 50cm<sup>3</sup> if of the spark (positive) ignition type, or
  - Maximum net power output does not exceed 4 kW in the case of other internal combustion engines, or
  - Maximum continuous rated power does not exceed 4 kW in the case of an electric motor.

### *Motorcycles*

Two-wheel vehicles without a sidecar (*category L3e*) or with a sidecar (*category L4e*), fitted with an engine having a cylinder capacity of more than 50 cm<sup>3</sup> if of the internal combustion engine type and/or having a maximum design speed of more than 45 km/h.

### *Motor tricycles*

Vehicles with three symmetrically arranged wheels (*category L5e*) fitted with an engine having a cylinder capacity of more than 50 cm<sup>3</sup> if of the internal combustion engine type and/or having a maximum design speed of more than 45 km/h.

### *Quadricycles*

Quadricycles i.e. motor vehicles with four wheels having the following characteristics:

- a) light quadricycles whose unladen mass is not more than 350 kg (*category L6e*), not including the mass of the batteries in case of electric vehicles, whose maximum design speed is not more than 45 km/h, and
  - i) whose engine cylinder capacity does not exceed 50 cm<sup>3</sup> for spark (positive) ignition engines, or

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<sup>7</sup> OJ L 49, 22.2.2003, p. 23.

- ii) whose maximum net power output does not exceed 4 kW in the case of other internal combustion engines, or
- iii) whose maximum continuous rated power does not exceed 4 kW in the case of an electric motor.

These vehicles shall fulfil the technical requirements applicable to three-wheel mopeds of category L2e unless specified differently in any of the separate Directives;

- b) quadricycles, other than those referred to in (a), whose unladen mass is not more than 400 kg (*category L7e*) (550 kg for vehicles intended to carry goods), not including the mass of the batteries in the case of electric vehicles, and whose maximum net engine power does not exceed 15 kW. These vehicles shall be considered to be motor tricycles and shall fulfil the technical requirements applicable to motor tricycles of category L5e unless specified differently in any of the separate Directives.

## Appendix D Vehicle categories in Directive 2003/37/EC

This section summarises some of the main requirements of Directive 2003/37/EC. Formal EU processes to replace this Directive with new requirements are ongoing – see

[http://www.europarl.europa.eu/oeil/popups/ficheprocedure.do?reference=2010/0212\(COD\)&l=en](http://www.europarl.europa.eu/oeil/popups/ficheprocedure.do?reference=2010/0212(COD)&l=en)

### *Category T: Wheeled tractors*

Category T1: Wheeled tractors with a maximum design speed of not more than 40 km/h, with the closest axle to the driver having a minimum track width of not less than 1,150 mm, with an unladen mass, in running order, of more than 600 kg, and with a ground clearance of not more than 1,000 mm.

Category T2: Wheeled tractors with a maximum design speed of not more than 40 km/h, with a minimum track width of less than 1,150 mm, with an unladen mass, in running order, of more than 600 kg, and with a ground clearance of not more than 600 mm. However, where the height of the centre of gravity of the tractor (measured in relation to the ground) divided by the average minimum track for each axle exceeds 0.90, the maximum design speed is restricted to 30 km/h.

Category T3: Wheeled tractors with a maximum design speed of not more than 40 km/h, and with an unladen mass, in running order, of more than 600 kg.

Category T4: Special purpose wheeled tractors with a maximum design speed of not more than 40 km/h.

Category T5: Wheeled tractors with a maximum design speed of more than 40 km/h.

### *Category C: Track-laying tractors*

Track-laying tractors that are propelled and steered by endless tracks and whose categories C1 to C5 are defined by analogy with categories T1 to T5.

### *Category R: Trailers*

Category R1: Trailers, the sum of the technically permissible masses per axle of which does not exceed 1,500 kg.

Category R2: Trailers, the sum of the technically permissible masses per axle of which exceeds 1,500 kg but does not exceed 3,500 kg.

Category R3: Trailers, the sum of the technically permissible masses per axle of which exceeds 3,500 kg but does not exceed 21,000 kg.

Category R4: Trailers, the sum of the technically permissible masses per axle of which exceeds 21,000 kg.

Each trailer category also includes an 'a' or 'b' index, according to its design speed:

'a' for trailers with a maximum design speed below or equal to 40 km/h,

'b' for trailers with a maximum design speed above 40 km/h.

Example: Rb3 is a category of trailers for which the sum of the technically permissible masses per axle exceeds 3,500 kg but does not exceed 21,000 kg, and which are designed to be towed by a tractor in category T5.

#### *Category S: Interchangeable towed machinery*

Category S1: Interchangeable towed machinery intended for agricultural or forestry use, the sum of the technically permissible masses per axle of which does not exceed 3,500 kg.

Category S2: Interchangeable towed machinery intended for agricultural or forestry use, the sum of the technically permissible masses per axle of which exceeds 3,500 kg.

Each category of interchangeable towed machinery also includes an 'a' or 'b' index, according to its design speed:

'a' for interchangeable towed machinery with a maximum design speed below or equal to 40 km/h,

'b' for interchangeable towed machinery with a maximum design speed above 40 km/h.

Example: Sb2 is a category of interchangeable towed machinery for which the sum of the technically permissible masses per axle exceeds 3,500 kg, and which are designed to be towed by a tractor in category T5.

## Appendix E Stakeholder Questionnaire

### Questionnaire: Categorisation of side by side (SBS) vehicles

*Note: Please provide as much detail as possible. Any information that you provide will be treated anonymously and we will not attribute any views to specific organisations or individuals without permission.*

#### Contact Details

Name:

Organisation:

Telephone:

Email:

**QA1. How many SbS vehicles are produced and/or entered into service each year in EU-27<sup>1</sup>?**

**QA2. Please provide details about what these vehicles are primarily used for**

- *professional use (include nature of work and, if available, please mention the number of vehicles in this use category )*

- *leisure (if available, please mention the number of vehicles in this use category)*

**QA3. Do you deem it necessary to harmonise the technical requirements of such SbS vehicles through type-approval legislation and what are the advantages and disadvantages of including SbS vehicles in a type approval system compared to excluding them from type-approval legislation?**

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<sup>1</sup> If data for EU-27 is not available then please provide any data you may have for one or more Member States and indicate this in your response.

**QA4. The classification criteria in particular are deemed to be very important in order to differentiate SbS vehicles from other or similar types of vehicles. What characteristics and classification criteria should be used to identify SbS vehicles?**

*e.g. weight, dimensions, maximum speed, seating configuration, other (please refer to the basic examples mentioned above).*

**QA5. What are the advantages and disadvantages of including SbS vehicles under each of the following vehicle categories?**

Agricultural vehicles

Utility vehicles

Passenger Cars

Other (e.g. non-road mobile machinery, light vehicles...)

**QA6. What are the current requirements to get approval for SbS vehicles in the EU market and elsewhere and does this present a barrier to international trade? What are the current costs per approval/Member State?**

**QA7. What safety and environmental protection measures are currently required for SbS vehicles? Do these requirements vary in different Member States and other countries outside of the EU?**

**QA8. Is any published evidence available with respect to the safety or environmental performance of such vehicles (on-road and/or off-road)?**

Stakeholders consulted (those contributing highlighted in **bold**):

<b>Distribution list for questionnaire</b>		
<b>Agricultural Engineers Association (AEA)</b>	CNH (UK) Ltd	<b>Polaris</b>
<b>AECC</b>	DEKRA	Same Deutz-Fahr UK Ltd
AGCO Ltd	<b>EGMF</b>	T&E
<b>Arctic Cat</b>	ETUI	Tractors U.K.
<b>ATVEA</b>	JCB Agriculture Ltd	<b>UK Department for Transport</b>
<b>BMVIT</b>	<b>John Deere Ltd</b>	<b>UK Health &amp; Safety Executive</b>
Bobcat	Kawasaki (UK)	<b>VDMA</b>
<b>BRP</b>	KBA	<b>Yamaha Motor UK</b>
CEA	Kioti	<b>ZZTSPL Slovakia</b>
CECE	Kubota (UK) Ltd	
<b>CEETTAR</b>	Kymco	
<b>CEMA</b>	McCormick (AgriArgo UK Ltd)	
<b>Cemagref</b>	<b>Ministry of Social Affairs &amp; Health - Finland</b>	
Claas (UK) Ltd	National Farmers Union (NFU)	
CLEPA	OECD	