Evaluation of the Longer Semi-Trailer Trial: Annual Report 2013

A report for the Department for Transport

June 2014

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Executive summary

Background

The Department for Transport (DfT) wants to evaluate a trial of the operation of longer semi trailers (LSTs) on roads in Great Britain (GB). These trailers are permitted to be up to 2.05m longer than the standard 13.6m units commonly seen on the roads in this country. The trial is designed to test the impact of LST operations on efficiency, emissions and safety. A reduction in emissions may be expected from the increased trailer capacity which should allow the same quantity of goods to be transported in fewer journeys. The evaluation of the trial will ascertain whether this potential reduction in emissions is realised.

The trial is proposed to last for 10 years from the launch in 2012. The trial will permit up to 1,800 trailers in two length categories (up to 14.6m and up to 15.65m) to operate under Vehicle Special Orders (VSOs) granted by the Vehicle Certification Agency (VCA). The first semi-trailers were granted VSOs early in 2012 and data collection began on 1 May 2012. In December 2011, DfT appointed Risk Solutions as the independent evaluation consultant for the trial. This report is the second annual report of the evaluation study findings to date.

Trial data collection and reporting

The first LSTs started to operate in March 2012, but they did not appear in service in significant numbers until April/May. Formal data collection began from 1 May 2012, with operators recording details of every individual journey leg covered by LSTs, some basic trailer design details and also information on any incidents that took place. The process also gathers basic counterfactual[1] information about the non-LST operations of the participants for a period prior to the trial. Data is submitted in periods covering four months of operations and a summary is sent to DfT for each data period.

The first annual report of the trial was published in May 2013[2], covering data from the start of the trial to December 2012. It describes the data gathering process and provides a summary of the results up to December 2012. At that stage the dataset was too small to support detailed analysis.

This second report updates the summary of data to the end of December 2013, the extent of participation during 2013 and the status of the data gathered to this point. The report also includes an initial analysis of two areas:

1. Reported injury and non-injury incidents involving LSTs
2. Reported utilisation of the trailer load area.

In line with the HM Treasury Magenta Book (Guidance for Evaluation)[3] we have developed a programme logic mode (PLM) for evaluation of the trial and have structured this report around the key elements of the PLM.

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1 HM Treasury. The Magenta Book, Guidance for Evaluation, April 2011:
"The key characteristic of a good impact evaluation is that it recognises that most outcomes are affected by a range of factors, not just the policy. To test the extent to which the policy was responsible for the change, it is necessary to estimate – usually on the basis of (often quite technical) statistical analysis of quantitative data – what would have happened in the absence of the policy. This is known as the counterfactual."

2 https://www.gov.uk/government/publications/evaluation-of-the-high-volume-semi-trailer-trial-annual-report-2012

3 'The Magenta Book: Guidance for Evaluation' HM Treasury April 2011 (available from .GOV) See also 'Logic Mapping: hints and tips for better transport evaluations' Tavistock Institute for DfT October 2010

Scale of the trial

At the end of 2013 there were just under 600 LSTs on the road – one third of the total allocation of about 1,800. DfT revised the allocation process in September 2013 and all of the 1,800 quota was allocated to operators by the end of January 2014.

The trailers in 2013 were being operated by 76 companies, with the vast majority being 15.65m box or curtain-sided designs with a single steering axle. At the time of writing, 130 operators either held a VSO or had provided evidence to DfT that they have an order in place with a manufacturer.

The companies involved range from very small operations (<10 drivers) to the largest haulage and retail operators in the country (>1,000 drivers). The largest single group is the general hauliers, with good representation of supplier/producers, pallet shippers, retailers and the courier/mail/parcels businesses.

The trial database contains records of over 335 thousand journey legs operated by LSTs over a total distance of almost 41 million km with an average leg being 120 km. The total recorded weight lifted is over 3 million tonnes.

Empty running appears to be around 18%, which is considerably lower than for the GB Articulated HGV fleet as a whole.

Trailer lengths

Of the trailers known to be on the road, only about 20% are the shorter length category, up to 14.6m. The revised allocation process adopted by DfT in September 2013 acknowledged the greater interest in the longer 15.65m category and effectively removed the restriction on an allocation being fixed to one length category or the other.

Incident analysis

Analysis of reported road collisions involving LSTs resulting in injury shows that the incidence of such collisions is lower than that for the GB Articulated fleet in general.

Summary comparison of injury collision and casualty rates for LSTs (2012-13) vs. GB general articulated fleet (2010-12)

Injury incidents Public access locations	**LST Rate** per billion veh km	**GB Artic HGV Rate** per billion veh km	**Ratio (LST/GB-HGV)**
Collisions	48.8	187.4	**26%**
Casualties	48.8	262.5	**19%**

Based on injury incidents involving LSTs and STATS19 / DfT Traffic Census 3 yr average 2010-12

At this stage it is not possible to determine the precise reasons for this reported difference. It is worth noting however that the operators are using the LSTs under a specific operational regime and that LST drivers have typically been subject to special (and recent) training. These factors may have a bearing on the road collision experience of the LSTs to date, in comparison to the general GB articulated HGV fleet.

A review of the nature and circumstances of non-injury incidents involving LSTs indicates that half of the events being reported on the trial resulted in damage to property (public or private), and one third of them occurred in locations with public access. Furthermore, the rate of non-injury incidents, taking into account the number of LSTs in operation and the distance travelled, appears to be decreasing as the trial progresses.

Conclusions - injury incidents

The evidence to date indicates that operating the LSTs on the trial so far has not led to an increase in casualty rates on public roads, when compared to the general operation of GB registered articulated HGVs. Whilst this is encouraging, it is too early to infer longer term conclusions about the safety of LSTs, as there are many factors associated with their operational practice that need to be taken into account.

Conclusions - damage only incidents

No direct comparison with the rate of such incidents involving the general GB articulated HGV fleet has yet been made, but it may be possible, with the cooperation of a sample of operators, to do so in the future. However, the data does show that the rate of occurrence of damage only events has been falling as the trial has progressed.

Utilisation analysis

The impact assessment for introduction of the LSTs[4] indicated that there would be an environmental benefit arising from the fact that fewer journeys would need to be made to carry the same volume of goods. The impact assessment assumed that operators would maximize their utilisation of the LSTs. A preliminary analysis has sought to estimate utilisation of the LSTs, and hence possible environmental impact, based on the reported operational experience of the LST operators.

The analysis assumes that savings are only made on journeys where the trailers were reported as fully loaded (in the band 91-100% full) and hence are more efficient than standard length trailers. The calculations treated all journeys in this band as, on average, 95.5% loaded, as the median of the range. An estimate of additional tailpipe emissions provided in the original feasibility and impact assessment has then been used to calculate the negative environmental impact of the LSTs, converted into the common unit of vehicle kilometres for comparison with the calculated savings in vehicle kilometres.

Conclusions – utilisation

We estimate that between 600 thousand and 900 thousand HGV vehicle km have been removed from the road as a result of LST operations since September 2012[5].

Looking forward

The report looks forward to the next phase of the trial:

- There will be a mid-year project review in Autumn 2014 and a further Annual Report on the trial and emerging findings, in the Spring of 2015.
- The potential value of special topic analyses of LST operations will be explored for consideration later in the trial.
- We do not anticipate any major changes in the data framework for operators. However, we will need to upgrade the data management processes during 2014/15 to handle the projected substantial increase in the quantities of data generated.

4 'Impact Assessment of Longer Semi-Trailers' DFT00062 15/12/2010.

5 The analysis of utilisation excluded the first period of trial data for reasons given in the report.

Table of Contents

TABLES

FIGURES

1 INTRODUCTION AND EVALUATION FRAMEWORK

1.1 The Department for Transport (DfT) wants to evaluate a trial of the operation of high-volume semi-trailers (HVSTs) on roads in Great Britain (GB). These trailers are permitted to be up to 2.05m longer than the standard 13.6m units commonly seen on the roads in this country and hence are also referred to as 'Longer Semi-Trailers' (LSTs).

1.2 A trial has been created to gather evidence about the operational performance of LSTs in terms of safety, environmental impact and economics. The trial is proposed to last for 10 years from the launch in 2012. The first semi-trailers were granted Vehicle Special Orders (VSOs) early in 2012 and data collection began on 1 May 2012.

1.3 The outputs from the trial will feed into a decision about whether or not to permit an increase in the length of semi-trailers authorised for operation on roads in GB. More broadly, the trial will contribute to DfT's work to:

- identify de-regulatory measures to reduce burdens on business; and
- identify measures to reduce emissions from HGVs.

1.4 In December 2011, the Freight, Operator Licensing and Roadworthiness Division (FOLR) of the DfT commissioned Risk Solutions to:

- Design a process to collect data to support the evaluation of operational performance of LSTs.
- Set up the initial systems for data collection.
- Initiate the process and support participants during the first year of the trial (2012).
- Report on progress achieved during the year.

1.5 Terminology specifically related to the trial and the data gathering is used throughout this report and is defined either in the text or the appendices. Terms that are in common use in the industry are used without further explanation.

1.6 Risk Solutions has recently been commissioned to continue in the role of independent evaluation consultant for the trial for the next two years, with an option for a further two year extension. Results from the early LST operations were reported in the first Trial Annual Report[6].

1.7 This second annual report includes:

- an update to the summary of key trial data
- initial analysis of the injury and non-injury data from reported incidents involving LSTs
- initial analysis of the reported utilisation data, focusing on % deck space covered
- key recommendations for the trial data and evaluation going forward.

1.8 **This report also introduces the evaluation framework structure that we propose to use as the trial goes forward. In the current report, evaluation of outcomes is at a very basic level, reflecting the early stage of the trial, but introducing the framework now allows us to start breaking out the elements of the trial evaluation in a structured way that we will use in future reports.**

1.9 There will be a mid-year project review in Autumn 2014 and a further Annual Report on the trial and emerging analysis, in the Spring of 2015.

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6 Evaluation of the high volume semi-trailer trial: annual report 2012. DFT May 2013 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/204084/hvst-trial-annual-report-2012.pdf

Evaluation framework

1.10 The primary objective of the entire trial is to provide evidence to DfT to support long term policy decisions on **"…..the most socially beneficial length of Heavy Goods Vehicle semi-trailers"**[7]. The specification of the trial to allow the trailers of the two length categories (up to 14.6m and up to 15.65m), and otherwise matching all existing regulatory standards, flowed out of the impact assessment and the analyses done to support it.

1.11 The evaluation process needs to operate at two levels:

- Primary evaluation of outcomes – analysis that can inform the response to core questions:
  - Do longer trailers carry at full capacity?
  - Do longer trailers result in fewer vehicle trips or vehicle kilometres?
  - Do longer trailers result in more or different types of accidents? Is there potential for using extra safety devices on longer trailers?
  - What kinds of operations are longer trailers used for? For example, what routes, trips, commodities and roads are they used on?
  - Does the pattern of usage differ significantly from the assumptions made in the original Departmental Impact Assessment?
  - Can the existing infrastructure (including roads, delivery depots and parking) cope with longer trailers? Does existing infrastructure limit their potential use?
  - Do real world operations identify any additional operational issues, risks, costs or benefits not identified in the Department's original research?
- Secondary evaluation – analysis to assess the extent to which the trial process and the resulting data have produced a robust data source and the applicability of any results

1.12 The HM Treasury Magenta Book ('Guidance for Evaluation')[8] recommends use of a programme logic model (PLM), as shown in Figure 1, for all policy evaluation.

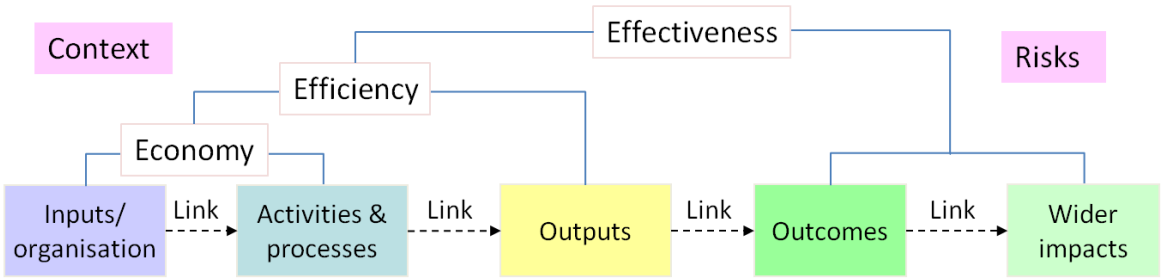


Figure 1: Generic evaluaton Programme Logic Model (PLM)

7 'Impact Assessment of Longer Semi-Trailers' DFT00062 15/12/2010

8 'The Magenta Book: Guidance for Evaluation' HM Treasury April 2011 (available from .GOV) See also 'Logic Mapping: hints and tips for better transport evaluations' Tavistock Institute for DfT October 2010

1.13 The PLM provides a structure for evidence gathering, collation and analysis, mapping how the inputs, key activities and outputs are used to deliver the desired outcomes. An expanded explanation of PLMs as outlined in the HMT guidance is given in Appendix B.

1.14 Ideally, a full evaluation framework would have been drawn up prior to the start of the trial. However, the circumstances at the time precluded this, although many of the necessary elements were present in the work done to define the trial data collection processes. We are therefore able to start to 'back fit' the existing trial aims and structure on a PLM. The current version is shown in Figure 2

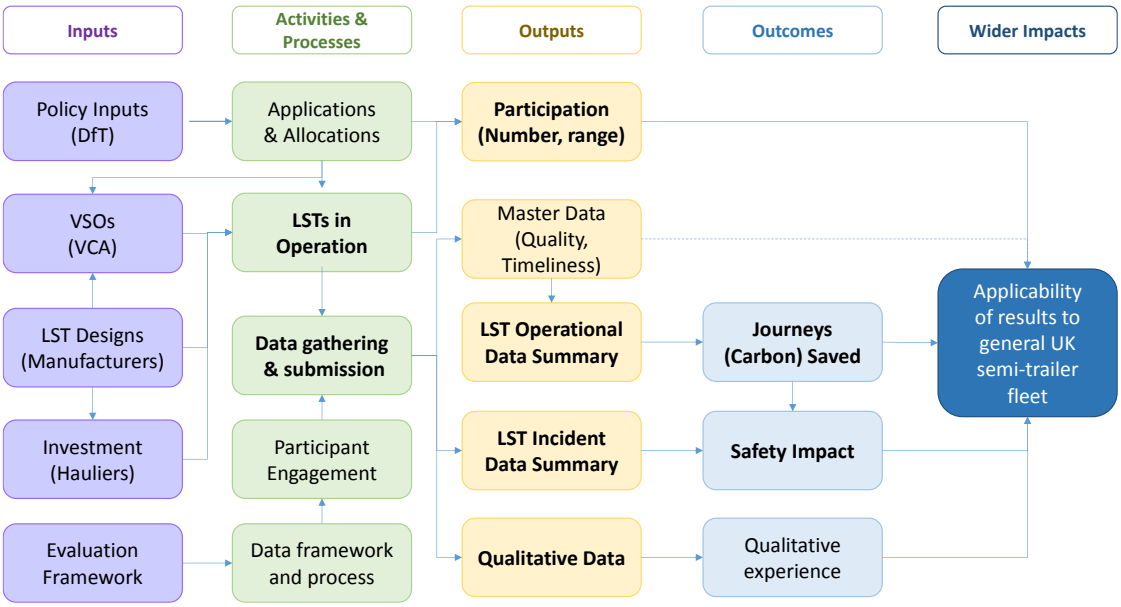


Figure 2: LST Trial Evaluation Programme Logic Model (v1)

1.15 Some elements of the model and the progress being made on them can be expressed as a metric (e.g. How many operators have been signed up? How many LSTs are operating compared to the planned total?). Others may only be expressed qualitatively (e.g. Has the trial attracted a range of operator types and sizes as was hoped?) as no numeric or quantified target was set at the start of the trial.

1.16 Where metrics were explicit in the original formation of the trial (e.g. 1,800 LSTs on the road), they will be clearly identified in this report and progress against them evaluated as the trial continues.

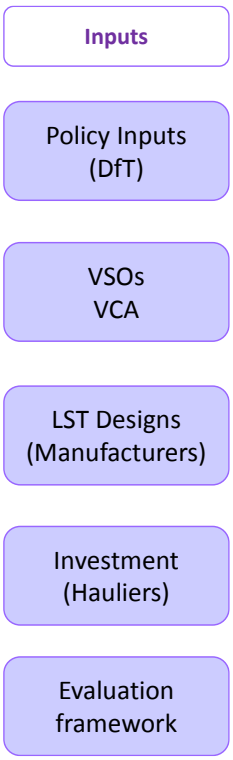
1.17 Where no numeric metric can be established, then progress will be reported qualitatively.

1.18 The PLM will be developed further as the trial continues. This report has been structured to align with the PLM evaluation stages as follows:

- Chapter 1 Inputs
- Chapter 2 Activities and Processes
- Chapter 3 Outputs
- Chapter 4 Outcomes
- Chapter 5 Wider Impacts

Progress on trial inputs

Policy inputs



Trial requirements and LST allocations

1.19 The core framework for the trial was established by DfT at the end of 2011 and, with one major exception, has remained largely unchanged. Full details are on the DfT website[9].

1.20 In 2013 the LST allocation process was reviewed to reflect the fact that take up was slower than anticipated originally and there was evidence for strong operator preference for the longer design (up to 15.65m) over the short one (up to 14.6m).

1.21 A revised allocation process was launched in September 2013 with these features:

- Existing allocations not taken up by 31 December 2013 would lapse as originally planned, with any surplus allocations being made available to the new allocation pool.
- Allocations were re-opened to new applicants providing they were willing to agree to the condition of feeding back their operational experience using the periodic data submission forms (DSFs).
- Applications from existing participants were also considered, consistent with the original allocation rules, i.e. the number of LSTs in an operator could be no more than 180 or 20% of their total trailer fleet, whichever is smaller.
- All new allocations are valid for six months, by which time the operator must provide proof that the trailers have been ordered or a VSO has been issued, or else the allocation lapses and is returned to the 'pool'.
- The original split of LST allocations (50:50 between the two length categories) was removed.

1.22 The aim of the revised allocation process was to ensure that the original aim of 1,800 LSTs (about 2% of the total GB semi-trailer fleet) running in the trial could be realised in 2014, and to meet demand from those in the industry who were ready to use the longer trailers.

Data requirement

1.23 The other core policy input by DfT was definition of the original data requirement, which was first drafted in December 2011. Risk Solutions and DfT rationalised that original data requirement for the first version of the data submissions to be completed by operators. DfT's rationale for each data item is given in Appendix A1.

1.24 The initial data gathering process used an online survey system to collect summary data. For reasons given in last year's annual report, it became clear that operators were not only willing to submit raw data in an Excel template but, in many cases, would prefer to do so[10] rather than working with the online survey. Therefore, the main Excel templates were revised and expanded to cover the areas originally addressed by the survey. The Excel templates –

9 https://www.gov.uk/government/policies/providing-effective-regulation-of-freight-transport/supporting-pages/trialling-longer-hgv-semi-trailers

10 'HVST Trial Annual Report 2012' May 2013 DfT/Risk Solutions – para 2.7-2.15

described in Appendix A – are available on the DfT website along with the guidance provided to managers and operators[11].

Vehicle Special Orders (VSOs)

1.25 The Vehicle Certification Agency (VCA) issues the Vehicle Special Orders (VSOs) under which the LSTs are permitted to run on GB roads. For new designs this involves testing by VCA Milbrook which leads to a Model Report which records the design parameters of the LST design being approved and its performance in the various tests. For further builds of a design under an existing model report, each new trailer is sent for a simple conformance test.

1.26 In a few cases, a National Small Series number has been issued to a manufacturer covering a number of repeat builds of a proven design without further VCA testing of individual units, unless there are modifications to any of the chassis systems.

1.27 Beyond this, VCA's role also involves advice to DfT, operators and Risk Solutions on matters relating to LST operations under VSO where required.

LST design development and manufacturing

1.28 The LST designs are emerging from a combination of proposals by manufacturers and bespoke designs prompted by user specifications developed by the operators. The numbers of any one design being produced are determined by the demand from the market.

1.29 At the time of writing, 12 manufacturers had LST designs on the road or with a VSO. They are largely being produced by UK builders, with 31 from suppliers in mainland Europe.

1.30 The majority of designs are variants on the standard single deck box/curtain sider. Additionally, there are more complex designs produced to satisfy operator requirements, including step frames, dual deck (fixed and moving), those with two steering axles and a few flatbed and skeletal models.

Investment

1.31 DfT's financial commitment under the trial covers their own time, the time required by VCA for the testing of LST designs prior to issue of a VSO and the contract with Risk Solutions for independent evaluation support.

1.32 The decision that the trailers would be funded wholly by the market, without any subsidy from public money, was one of the drivers for setting the trial up as a ten year programme.

1.33 Whilst the take up of allocations was initially slower than DfT anticipated, the take up during 2013 and oversubscription of the revised allocation process suggest that there is, at least for many operators, a sufficient business case to justify investing in the trailers. Some manufacturers have also produced trailers for lease.

Evaluation Framework

1.34 The evaluation data framework and process was originally drafted by DfT and is being further developed jointly, by DfT and Risk Solutions.

1.35 The data gathering processes now in place provide for:

- basic reporting of trial statistics to DfT after each four month data collection period
- this annual report
- special topic analyses during any year to provide more in depth study of the data.

1.36 The evaluation work is funded by DfT.

[11] The latest trial data process templates, user guide and management summary are available on the DfT website at https://www.gov.uk/government/publications/longer-semi-trailers-trial-data-guidance-and-documentation

Summary evaluation of trial inputs

1.37 **The roles of each organisation are now well established and appear to be fit for purpose, with special cases that have arisen during 2013 being handled by the relevant combination of DfT, VCA and Risk Solutions.**

1.38 **The trial arrangements, with the revised allocation process, are judged to be also broadly fit for purpose, noting specifically the willingness of operators to join the trial and invest in the trailers.**

1.39 **The arrangements for data collection, analysis and evaluation are now:**

- **sufficiently flexible to provide for the inherent uncertainties in costs relating to the rate of new trial entrants and the support per participant, as well as to provide for both the 'base' work and any special topic analysis, and**
- **sufficiently transparent to ensure DfT can manage the costs within an overall budget envelope to the end of the current contract.**

2 TRIAL ACTIVITY AND PROCESSES

Core trial activities

Activities & Processes

Applications & Allocations

LSTs in Operation

Data gathering & submission

Participant Engagement

Data framework and process

2.1 The consultation on the allocation process and the launch of the revised process in September 2013 were significant activities for DfT, designed to ensure the trial reached its goal of 1,800 LSTs on the road. The number and nature of LSTs in operation is not, of itself, an output of the trial, but realising this objective is considered important in order that a credible evidence base from the trial can be established.

2.2 For operators, safe and efficient operation of the LSTs is a primary goal in order to generate a commercial return on their investment. The commercial return is not an output of the trial, but without it there would be no trial, because there would be no participants.

2.3 For Risk Solutions then, the primary focus during 2013 has remained the refining of the process for data collection and the checking of submissions, maintaining engagement with existing participants and inducting new applicants into the process.

2.4 All of these activities need to be sustained to ensure that the required trial outputs and evidence are generated. Progress in each area is reported in this chapter.

Applications and allocations

2.5 In July 2013 the DfT undertook a consultation: “The longer semi-trailer trial: consultation on a proposal to change the allocations process”. The objective was to accelerate the rate of take-up of longer semi-trailers and help meet demand from operators who did not have enough, or any allocation, of longer semi-trailers. This consultation and summary of responses can be seen on the DfT website[12].

2.6 This resulted in the launch of a revised allocation process in September 2013, where operators were given an allocation on a first come, first served basis, until the quota was reached early in 2014.

2.7 Under the new allocation scheme, operators have six months in which to either obtain a VSO or to provide evidence to DfT confirming that an order has been made with a manufacturer, otherwise the allocation lapses.

2.8 At the time of writing, there were about1,000 trailers registered on VSOs and 130 operators either holding a VSO or having provided evidence of an order being placed with a manufacturer.

LSTs in operation

Number of LSTs in operation

2.9 Progress towards the total complement of LSTs being in operation can be seen by tracking the number of VSOs granted (from DfT data) and the number of LSTs known to be on the road by the date on which they appear in the journey logs submitted by the operators.

[12] https://www.gov.uk/government/consultations/proposal-to-change-the-allocations-process-in-the-longer-semi-trailer-trial

2.10 Figure 3 shows the growth in trailers on VSOs, with 518 counted at the end of December 2013 and almost another 100 being added by the time of the update from DfT (13 Feb 2014) giving a total of 613.

2.11 Once the VSO is granted there can be a delay before the trailers are built and commissioned into service, especially for a run of a new design. The lag may be smaller where an operator is adding further units of an existing design to their fleet. The first on the road date of each trailer is extracted from the data submitted by operators to give the cumulative profile of LSTs shown in Figure 4. Of these, just over 100 are in the 'up to 14.6m' group. The figure shows that at the end of 2014, almost two years since the launch of the trial, just under 600 out of the planned total of 1,800 LSTs were in service on the road.

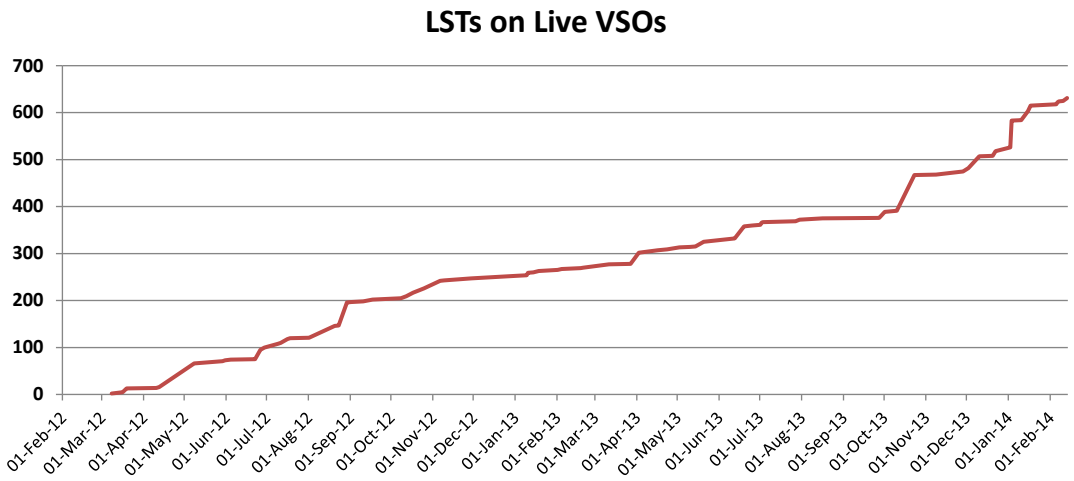


Figure 3: Number of LSTs on live VSOs by date

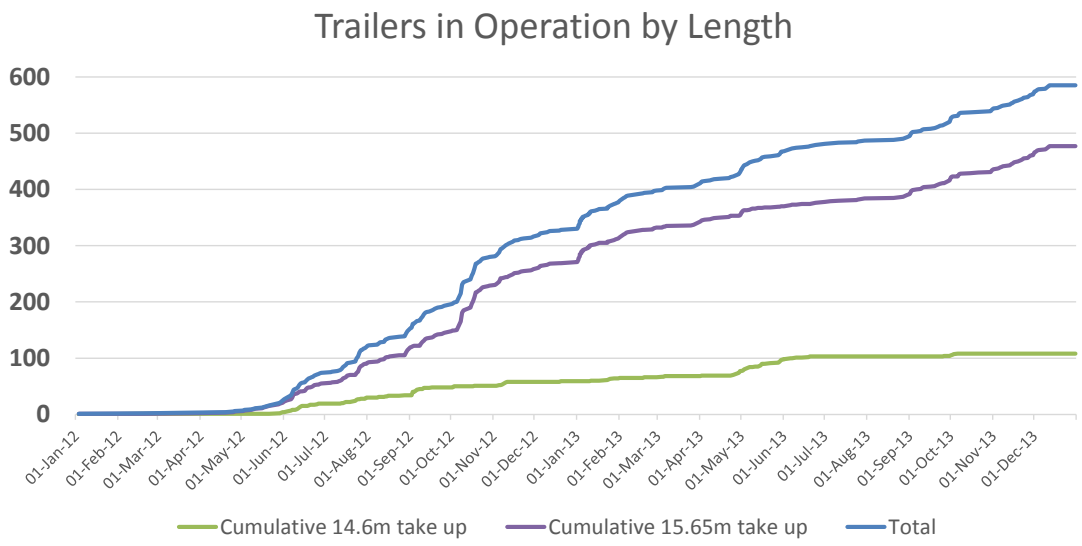


Figure 4: LSTs 'On the Road' by date, based on Journey Logs

LST design mix

2.12 The detailed design of the underlying semi-trailer (exact dimensions, detailed axle data etc.) is contained in the vehicle model report held by VCA as part of the process of granting a VSO to the operator. The detailed design data is not currently in a form that can be linked digitally to the trial operational data, but the possibility of doing so is being investigated by DfT.

2.13 Even if the model report data were provided, it would not necessarily give details of the design above the deck, in terms of the body design, whether the units are chilled or any special safety systems were added.

2.14 The trial data gathering therefore requires operators to submit some basic design information in a worksheet inside every DSF. Most of the data remains unchanged from period to period, but the sheet allows them to indicate time when the trailer was off the road and flag up any changes in status or sale of the units.

2.15 An outline of the data collected is provided in Appendix A5.

Body design and features

2.16 Figure 5 shows the basic body design of LSTs on the road in 2013, with almost all of them being either solid box construction (tail loading) or curtain-siders. A proportion of the latter have some form of retention systems built in to allow the curtain-sider to be loaded with roller cages or goods in similar modes of appearance requiring such additional restraint.

2.17 As the fleet has grown during 2013, the split between box and curtain-siders has shifted. At the end of 2012, just over 60% of LSTs were box construction, whereas at the end of 2013 this has reduced to about 50%.

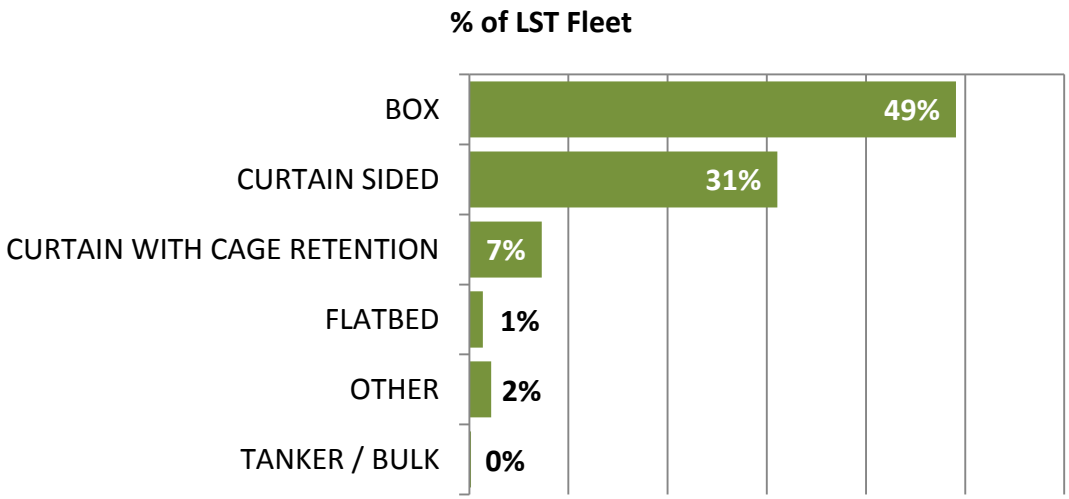


Figure 5: Body design of all LSTs on the road[13]

2.18 Figure 6 shows that 35% of all operational LSTs are chilled units[14]. This figure also shows that 17% of LSTs have walking floor or similar system to aid loading / unloading. The 2% recorded as self-loading or top loading are figures that need further investigation as we believe they may be entries noted against flat-bed units. However, the numbers involved are very small.

[13] Total on road at the waiver date for 2013-P3 – i.e. 1 December 2013 – for operators new to the trial, and by 31 December 2013 for operators already part of the trail by this date. This also applies to subsequent figures.

[14] Knowing which trailers are chilled is an example of where the construction is important for later analysis. In this case, estimates of volume utilisation must recognise that chilled trailers have around 30% of the volume (above the cargo) free to permit circulation of chilled air.

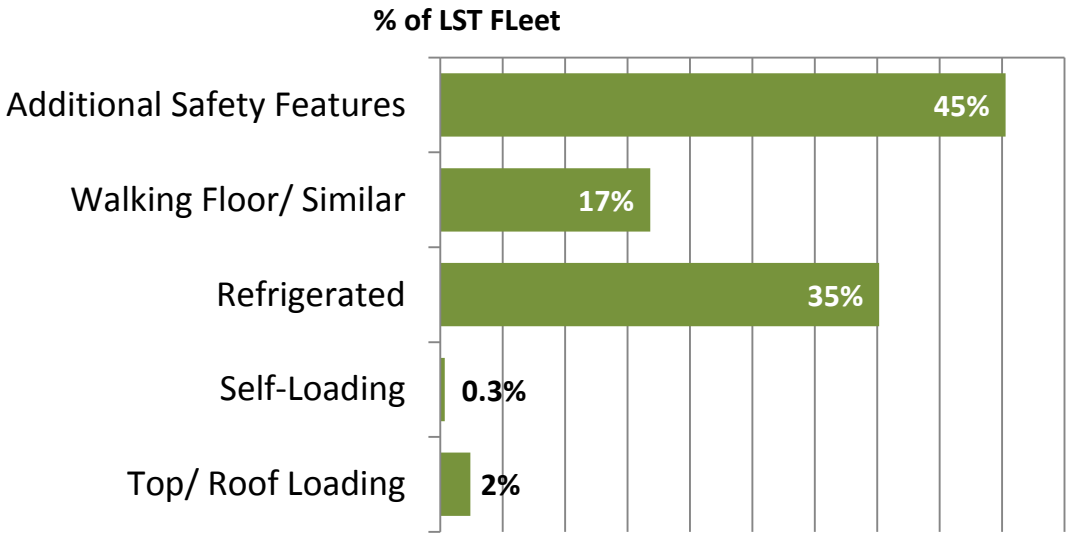


Figure 6: Other features of all LSTs on the road

2.19 Figure 7 shows records of additional safety features noted by the operators in their trailer reference information. This chart is not shown as a percentage of the LST fleet, but simply as the number of trailers where some additional features have been noted. This is because what one operator may regard as 'additional', another may regard as 'standard kit'. Trailers may also be fitted with more than one additional feature. A decision was made not to seek to create a comprehensive list of every conceivable safety feature and require operators to tick them all, but simply to provide the opportunity for operators to note such features and examine what emerged.

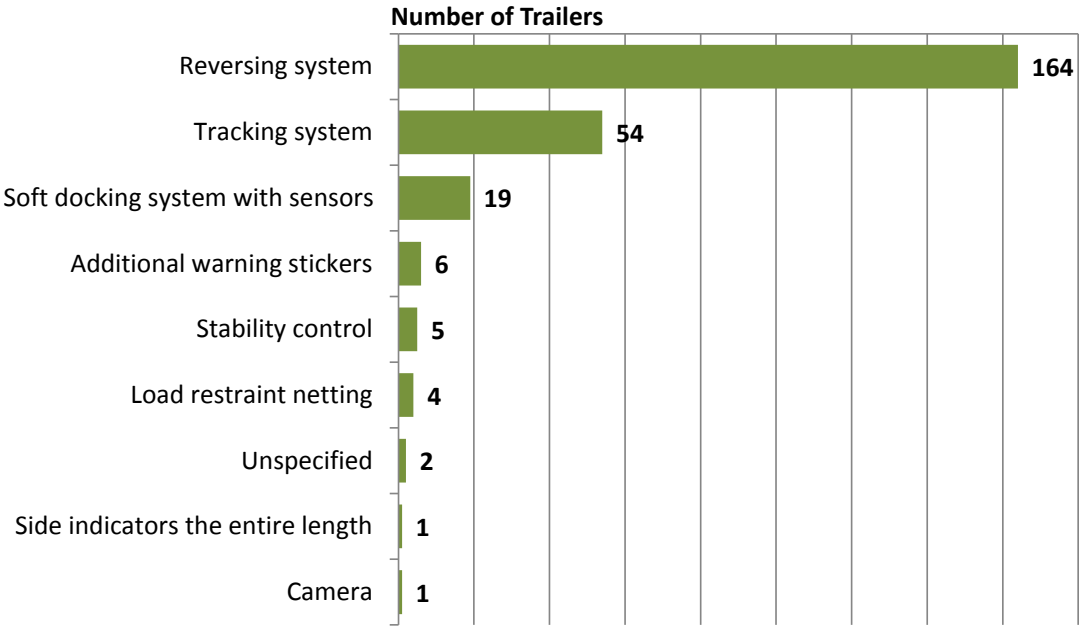


Figure 7: Additional safety features (where data provided)

2.20 Reversing aids have clearly been the most common additional feature noted and text notes indicate that these include proximity warning systems cameras. The 'soft docking' systems have a related purpose, providing protection for dock asset and trailer when the LST is being reversed onto a loading bay. This reflects operators' recognition of the risks to fixed assets and people during reversing movements.

2.21 We believe that the reported number of LSTs with tracking systems added (54) is much lower than is actually the case as we are aware of whole fleets of 30 or more LSTs, which are tracked. Telematics are now so common that for many larger operators this is no longer considered an additional feature, but one they have on almost all tractors and many trailers. We also know of a number of operators who did not fit tracking at the time of ordering their LSTs – and hence did not note it in their Company Information return – but who are now back-fitting tractor and or trailer telematics on the longer trailers or their whole fleet.

Deck arrangements

2.22 Figure 8 reports the deck arrangements of the trailers. The presence of dual or part-dual decks is relevant to the analysis of volume and deck-space utilisation.

2.23 Almost 75% of the LSTs reported here are single deck, which is perhaps as expected given the additional cost and weight penalty of the various forms of dual deck, along with the need to have loading/unloading arrangements which are able to manage such designs.

2.24 The data behind this chart shows that 50% or more of the Moving Dual-Full deck units are being used by the Mail/Parcels/Courier businesses, with the other dual deck designs spread amongst general hauliers, retailers and pallet/groupage operators. A more refined analysis of the design choices by operator type will be appropriate once the full complement of participants is reached. When sufficient data is available to support analysis disaggregated by trailer design, we will explore whether these more specialised designs achieve higher utilisation factors than the more generic single deck units.

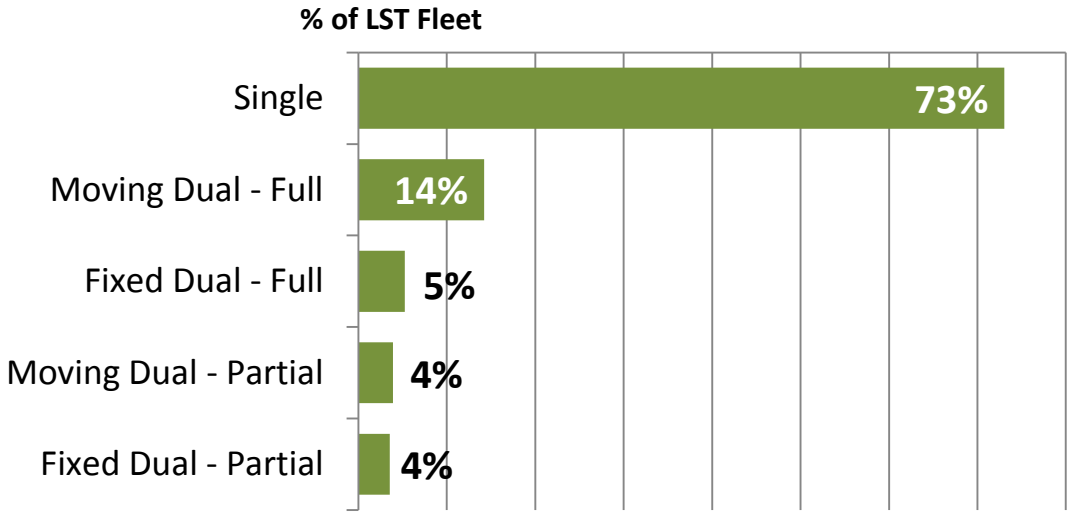


Figure 8: Deck arrangements of all LSTs on the road

2.25 Figure 9 shows the different axle arrangements present in the fleet. It has been demonstrated by most manufacturers that designs using a single steering axle at the rear of the trailer can be built to comply with the requirements of the trial in terms of turning circle, etc. and it is clear that for almost all operations a single steer axle has been deemed sufficient to meet the operational requirements of users. We note that up to this point, no operator has found Active Steer technology necessary to meet operational requirements.

2.26 As the fleet grows, it will be interesting to see whether the benefits of self-steer vs. command steer and one vs. two steering axles emerge either in the data or in the choices made by different business types. We can then also plan to insert qualitative survey questions to assess the reasons some operators select a particular design.

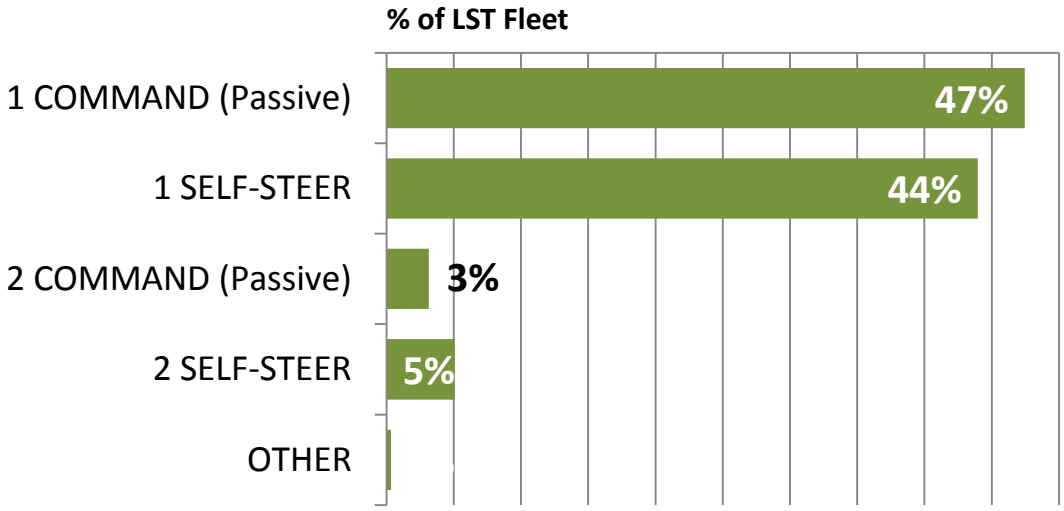


Figure 9: Axle steering arrangements of all LSTs on the road

Data collection framework

2.27 Operators submit three types of data:

Company information

2.28 This is submitted once only, when the operator enters the trial (when first VSO is granted).

2.29 This includes some basic information about the size and nature of business of the operator and a set of summary figures about their non-LST semi-trailer fleet.

Qualitative information

2.30 This is submitted initially when the operator enters the trial and then optionally at later times.

2.31 This is a set of open questions about the experience of the company, its staff and clients in operating the new trailers. The questions may vary as the trial develops.

LST operational data

2.32 This is submitted every data period and covers all LST operations in that period.

2.33 This is the primary trial data and includes:

- An Aggregated journey log of all LST journeys on the public road network in the period. The log includes details of locations and times, the nature of the journey, load and mode of appearance (MOA) types, load weight and two measures of utilisation.
- A set of trailer reference information relating trailer IDs to their vehicle identification number (VIN), basic design details and numbers of days 'off the road' in the period.
- An incident log covering all LST incidents on the public highway and certain types of incident on private property (e.g. in depots, at client sites).

2.34 All files submitted are checked for basic errors and inconsistencies by Risk Solutions and then

- comments and requests for revisions are sent back to the operator, **OR**
- an 'Accepted' email is sent, signifying the completion of the process.

2.35 All three sets of data are collected using Excel templates provided by Risk Solutions. The operator's manager/primary contact is responsible for:

- ensuring that the latest versions of the templates (from the DfT website) are in use as they may be updated periodically.
- ensuring that the process has been completed, evidenced by receipt of an 'Accepted' email for each file of data submitted.

Support

2.36 Risk Solutions staff provide email/telephone support to operators of all sizes in setting up their data collection processes at whatever level, whether it is giving advice on completing the Excel template manually for a single trailer, or liaising directly with the operator's IT or telematics specialists on large scale data download formats.

2.37 Risk Solutions perform a number of basic checks on all data files as they are received from the operator.

Data collection process

2.38 Data is collected three times per year.

2.39 The agreed submission cycle adopted for the period 2012-2014 is shown in Table 1.

Table 1: Data submission schedule

Pd Ref	2012 P1[15]	2012 P2	2013 P1	2013 P2	2013 P3	2014 P1	2014 P2	2014 P3
Data Collection Period	**May-Aug 2012**	**Sep-Dec 2012**	**Jan-Apr 2013**	**May-Aug 2013**	**Sep-Dec 2013**	**Jan-Apr 2014**	**May-Aug 2014**	**Sep-Dec 2014**
Data Submission Month	Sept 2012	Jan 2013	May 2013	Sept 2013	Jan 2014	May 2014	Sept 2014	Jan 2015

2.40 The current plan is that submissions in 2015 will follow a similar pattern. However, DfT and Risk Solutions are also considering the feasibility of reducing the frequency to two submissions per year.

Timely Submission

2.41 Whilst most operators have submitted data in a timely manner, in the early reporting periods, a significant number of submissions were coming in very close to the end of month deadline or in the two weeks thereafter. Once comments were sent back and the data finalised, the process of completing the dataset from all operators was spread out over 6 weeks or more. This was very inefficient and delayed the provision of period data to DfT.

2.42 During 2013, a revised process within submission months was adopted, whereby operators were asked to send in their draft data by the end of the second week of the month and to finalise their data in response to any comments from Risk Solutions by the end of a further two weeks.

2.43 This '2+2' process was intended to be more effective than the earlier approach of a single end-of-month deadline (see later discussion on timeliness of submissions). The new process was emphasised to all operators for 2013-P3 data – the submission due in January 2014.

[15] Periods were previously referred to using the format P1-1, P1-2 for year 1, periods 1 and 2.

2.44 The two charts in Figure 10 show the spread of companies by the number of days from the end of the data period to final acceptance of their main data file (the DSF) for a period. The upper chart shows the outturn for the data submitted in September 2013, which was only a small improvement over the preceding periods. The lower chart shows the data from the January 2014 submission process (2013-P3 data) after the work to publicise the '2+2' process and shows a clear improvement compared to that for the previous period.

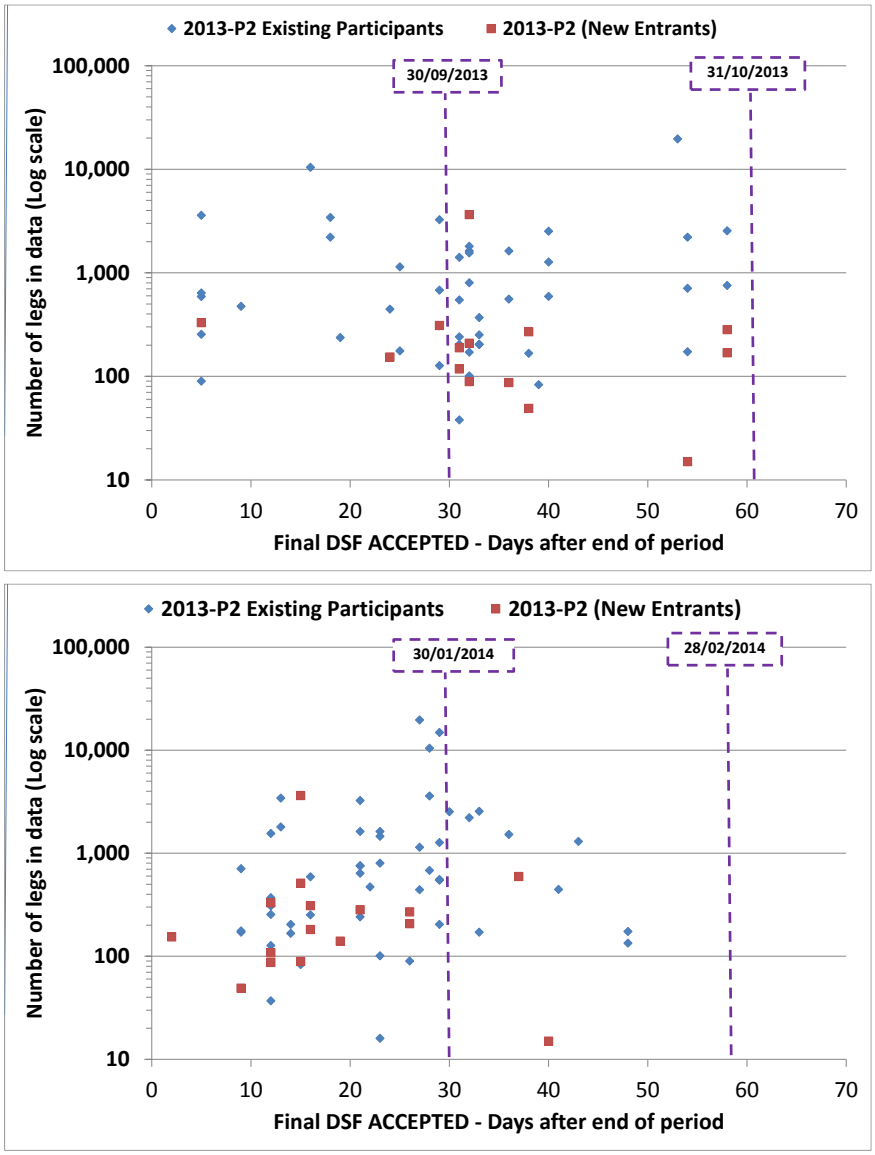


Figure 10: Improvement in data submission timeliness between Sept 2013 and January 2014 processes

2.45 The vertical axis shows the number of journey legs in their data file as a measure of the size of their LST fleet and the work involved in collating their data. The colour of the data points indicates whether the operator was a 'New Entrant' in this data period or not. It is notable that neither the size of the dataset, nor being a new entrant appears to have a strong correlation with whether the submission is timely. This aligns with our experience of supporting the operators, which suggests that the ability to execute the data process smoothly relates to factors including the general state of information handing in the company and the skills and culture present, rather than simply the size of the organisation or the amount of time they have been involved in the trial.

Missing/late submissions

2.46 We have made it clear to operators that whilst Risk Solutions will seek to assist operators with their data processes in whatever way we can, there is a fundamental expectation that as they gain experience in the operation of the trailers and the data gathering, the level of support needed will reduce. The corollary to this must be that where an operator submits data late, or of poor quality or fails to submit, in more than data period, it needs to be clear what action follows. This is necessary both to ensure that a recovery plan is put in place but also to demonstrate fairness to other operators, given that all have signed the same undertaking which includes the requirement to submit good quality data in a timely manner.

2.47 During 2013, DfT and Risk Solutions agreed jointly to put a more formal process in place and the steps in that process have been disseminated to participants both in the user information, emails and in discussion at the FTA forum in November 2013.

2.48 Where an operator is only late by a few days or provides a reason in advance that there may be a delay there is no action taken and DfT are not informed.

2.49 Beyond this, Risk Solutions now draw up a 'Missing/Late' list showing those submissions which are still not finalised at the point the data period summary is sent to DfT, usually around 2-3 weeks after the period end. The list is sent with the report. Operators on the list are contacted and asked to respond regarding when they plan to recover the situation. The missing/ late list is updated periodically as the picture changes (i.e. as operators respond).

2.50 Risk Solutions classify each operator shown on the list into one of five categories, each of which has an associated action outcome, although the specific steps for each case are discussed with DfT rather than it being fully automatic. The categories and action outcomes are shown in Figure 11.

Category	Category Description and Action
1	Missing / late data for 2 or more consecutive periods without communication of reasons. **Risk Solutions cease contact, DfT begin escalation to formal action to seek a resolution. Ultimate action would be to remove the operator's VSO.**
2	Data missing, late or not finalised for 2 or more periods. Operator still in communication with Risk Solutions but without results. **Risk Solutions continue contact, DFT call / written contact.**
3	Data missing / late / not finalised but where data is known to exist and communication with operator suggests a reasonable chance of a resolution in a short period of time.
4	Data missing / late for this or earlier periods, but genunine reasons known to exist, communication in progress and action in progress
5	Data for period not technically complete but awaiting a minor clarification.

Figure 11: Missing/late data escalation categories and actions

2.51 At the end of 2013, only one operator reached Category 1 and, following very positive discussions with DfT, the problem has been resolved, the full year of data has been submitted and it is included in this report.

2.52 At the time of writing there are four operators who have reached category 1 or 2. They have all subsequently executed a recovery plan and all data has been submitted or is known to be in preparation. There is one case where an operator remains at Category 1. In this case, DfT are pursuing the matter.

2.53 In most cases actions by senior managers have been able to reassign priorities for the operational staff or have changed the processes involved. In other cases, appearing on the list has empowered operational staff charged with data collection to make the case for a change in priorities or process to ensure the task is completed.

2.54 The response of all operators, even those finding themselves on the list, has been positive. So far, the approach appears to strike the right balance between emphasising the importance of the undertaking to provide the data as a condition of participating in the trial, and the common interest of ensuring that a sustainable data process is established in the relevant company.

Primary data submission file (DSF)

DSF: Journey leg data

2.55 The structure of the journey log data has remained unchanged since September 2012 and no fundamental changes are currently planned.

2.56 Minor updates have been made to the Excel DSF template to improve the self-checking features, making it easier for operators to locate errors in their data before submitting.

2.57 We have spoken to a few providers of semi-trailer telematics. In some cases we have seen operators putting in significant effort to generate their data manually, when they have telematics systems, but they had not investigated using them for the trial data. As noted last year, where telematics or other existing data has been accessed, we have observed that:

- 70% or more of the DSF fields can be populated automatically from existing data
- The work required to create a bespoke report to download this data is not onerous
- The data from such sources is of high quality (i.e. few if any missing fields or errors)
- The telematics providers see this as a positive service to existing or potential clients
- The result is less effort required by the operators, especially the larger ones, with secondary benefits to the trial in terms of maintaining engagement.

2.58 During 2013, we continued engagement with companies that provide logistics data and telematics systems to the industry. We are acting on contacts generated both via participating operators and also directly with providers of these systems.[16] In addition to this, the data collection from new entrants to the trial was adjusted to include a question about the systems they already use for routing, logistics management and, where present, vehicle tracking. A number of the major providers have welcomed our approach, realising that they are in a position to support a number of their clients who are participating in the trial.

2.59 We have also seen a number of existing trial participants moving to back-fit telematics to their LSTs, either as a special option to aid their trial data collection, or simply as part of a wider programme of fitment across their fleet.

2.60 In analysing the data this year we have noted some more subtle facets of the way some fields are being used that may mean we need to make small adjustments to the guidance to remove inconsistencies as shown in Table 2. In most cases these are simply moves to adopt practices already in use by the majority of participants. In some cases we may also need to propose adjustments to the historic data, but we expect this to be for a limited number of cases.

Table 2: DSF field clarificatons being considered for 2014

Case:	Consistency Clarification
Training / Trailer testing	'Client' column to be marked 'Training or 'Testing' Leg Type = 'Other'
Goods Type 1) Empties / Waste Packaging	MOA set to same value rather than Pallets, Cages etc.
No Cargo	'Leg Type' to be selected only from the three 'Empty' leg types or 'Other') (e.g. rather than 4) DC to DC))

[16] Risk Solutions attended the Commercial Vehicle Show in Birmingham, April 2013, making providers of these products aware of the trial, the data requirements and how they might be able to support their clients in generating the required data. We have spoken to some other providers by phone when invited to do so by operators who are seeking to get their supplier to design downloads/reports to serve the trial data requirement.

DSF: Trailer reference data

2.61 Apart from added self-checking features, the trailer reference data sheet is unchanged from September 2012 and is, in general, completed well by most participants.

2.62 A small revision is anticipated in 2014 to accommodate the emergence of consortia of operators who occasionally operate backhaul legs using other operator's trailers to reduce empty running. Where both the operators are participants in the trial, this practice has been approved by DfT subject to a policy statement they have developed and arrangements are being put in place to ensure the complete data record is collected. The only change to the template is to be the addition of an 'Ownership' field.

DSF: Incident data[17]

2.63 All participants are required to report incidents involving LSTs in two ways:

- All significant events have to be reported to DfT as quickly as possible so that DfT is aware of them. In the cases we have seen, incidents are being reported within 24 hours – often much faster.
- A more complete record of LST incidents is required in the incident log – one of the worksheets in the DSF submitted to Risk Solutions at the end of each data reporting period.

2.64 During 2012, three important adjustments to the incident reporting took place.

2.65 The first was a clarification the meaning of 'significant' by DfT – i.e. what had to be reported to DfT at the time of the incident. The trial guide notes were updated with a statement that immediate reporting was required ***"… for any incident involving injury or serious damage, or which could be picked up by the media for any reason."***

2.66 The second was a clarification of what had to be recorded in the incident log. The guidance is:

- all incidents on the public highway involving either injury or damage to property
- all incidents on private land (e.g. depots) where there was injury or a risk of injury.

2.67 Some operators are choosing to use the incident log to record all incidents involving LSTs, even those of only minor damage in depots, simply as a tool for their internal analysis.

2.68 The final change was to the basis of categorising injury levels from the simple 'RIDDOR reportable' scale to the more refined scale used in the STATS19 police accident reporting system. This move was to enable comparison with STATS19 data for all HGV accidents.

2.69 In 2013, one further adjustment was made to the incident log. The guidance has always required that a judgement is made for each incident noting whether the occurrence or the outcome was 'LST related' – by which we mean would the event have occurred or developed in the same way, had the trailer been a regular 13.6m unit.

In the early part of the trial this judgement was made by Risk Solutions and were recorded using a simple scale shown in Table 3.

[17] The text of this subsection was included in the Annual Report 2012 but has been retained here as it is an area which both DfT and Risk Solutions wish to ensure is clearly understood by all parties.

Table 3: 'LST Related' incident judgement scale

LST Related?	Judgement Guidance
YES	The fact that the trailer was an LST was the major contributor to either the fact the event occurred or the severity of the outcome.
YES - PARTLY	The fact that the trailer was an LST was only one of the contributors to the event occurring or the severity of the outcome.
MAYBE	It is possible that the fact the trailer was an LST was a factor, but not certain.
NO	The fact the trailer was an LST was not a factor in the event.
UNCLEAR	The information about the event, or the circumstances mean no judgement can be made. (For example, damage to the trailer discovered on depot 'walk round' – no information of how and when it was sustained)

2.70 The judgements were based on the incident report and narrative provided by the operator, which was supposed to include their judgement of whether it was LST related, but the data this yielded was highly variable. Where there was an injury and the narrative was ambiguous, the discussion with the operator would resolve the judgement.

2.71 Since mid-2013, this process has been reversed, with the operator being asked to include their judgement as a specific data field, selecting from the list of options above. Risk Solutions then review the incidents and the narrative. Where there is an apparent mismatch between the log entry and the operator's selection from the list, again a verbal or email discussion resolves the final judgement.

Company Information Files (CIFs)

2.72 The Company Information File (CIF) format was last changed in January 2013, when the process was moved from on online survey platform to a simpler, Excel template. The questions are summarised in Appendix A2.

2.73 A process to collect this data from those who have failed to submit the file or finalise a draft version has continued throughout 2013. Progress is reported later in the report (see paragraph 3.3).

2.74 The extension of the allocation and uptake process over three years (2012-2014) poses some challenges in the collection and future use of elements of the CIF data. The original trial programme anticipated all the allocations being taken up during 2012 and the CIF data requested some background data for the three previous years (2009-2011). For operators entering the trial in 2013, it made more sense to collect data for 2010-2012, and for those entering in 2014 it will be 2011-2013. Any later analysis that utilises these annualised figures will need to take into account the disparity in the years being cited. If it emerges as a major issue, it may be that the trial will need to take a later 'snapshot' of any required elements of the data at a common year across all participants.

Qualitative Survey Files (QSFs)

2.75 The Qualitative Survey File (QSF) format is unchanged since January 2013 when it was also moved from an online survey to an Excel template.

2.76 Operator comments continue to inform our interpretation of the quantitative data and give useful insights into the special circumstances of different operations.

2.77 We anticipate that once the whole LST trial fleet is on the road, we will update the QSF to ask a revised set of questions based on the key areas of interest in the emerging analysis.

Data sources and confidentiality

Data sources

2.78 The primary source of data for this report is the data submission files (DSF) received from operators.

2.79 This has been augmented by:

- Company information files (CIFs) submitted by operators
- Qualitative survey files (QSFs) submitted by operators
- LST allocation and VIN data provided by DfT
- Published data on road safety and transport including:
  - STATS19 – Person injury from road traffic incidents gathered by the police
  - CSRGT – Continuous survey of road goods transport (DfT)
  - Road traffic census data (DfT).

2.80 Where comparisons are made between the LST operations and any general population or counterfactual data, only statistically significant results will be discussed.

2.81 At this stage of the trial, the quantity of data is just sufficient to support some high level comparisons of collision and casualty rates compared to the standard semi-trailer fleet, as will be discussed in Chapter 4, but not yet sufficient to do so on segments of the data (e.g. by leg type or operator group).

2.82 We are still in discussion with DfT and VCA to see whether they can provide a digital dataset of the underlying VCA model report data, which contains more detailed design information. The VCA reports also hold the data on the tail outswing measured for each design tested. Risk Solutions have drafted a small template for this data, extracting a small set of data items from the model report format. The draft is with DfT and VCA for review.

Data confidentiality

2.83 All data submitted by trial participants contain commercially sensitive data and are held securely on Risk Solutions servers or the encrypted personal computers of the project team. The data files are only accessible by members of the team who have a project related reason to do so. The raw data is never made available to DfT or any third parties by Risk Solutions.

2.84 As part of our responsibilities as the independent evaluator, any figures or results from the data collection and analysis that are included in period summary reports and annual reports are anonymised. Analysis results are vetted to ensure that there is no commercially sensitive or confidential data identifiable. Where data is segmented, any analysis will be reviewed to ensure that the identity of an individual company cannot be deduced from the nature of the data segment.

Participant engagement

2.85 Risk Solutions continues to support trial participants in setting up efficient data processes and advising on possible improvements, based on good practices seen across the trial.

2.86 From January 2013, a contact monitoring system has been in place to log all phone and email contact with the participants, which is accessible only to the core project team members involved in the engagement. This acts in parallel with a common email inbox for the trial communications which the core evaluation team can all see.

2.87 These systems fulfil a number of functions:

- Listing the operators who it is anticipated will be submitting data in any new period (based on the list of approved VSOs provided by DfT)
- Allowing any of the core project team to see the 'thread' of discussion and support given to an operator so that our response does not depend on individual staff availability
- Tracking of operator contact in any period and the status of DSF, CIF and QSF files (Draft, Accepted, Updated)
- Reporting progress to DfT during each period – as numbers of submissions & status
- Tracking support time provided per operator (as well as on common tasks supporting all operators)
- Comparing progress metrics between periods (e.g. Figure 10) and against forecast profiles drawn up my Risk Solutions and DfT.

2.88 These tracking systems have proved fit for purpose to date with about 70 participating companies. We anticipate that they may need upgrading to manage the full complement of participants over the long term.

2.89 In general, engagement with the operators continues to be positive with both managers and direct data contacts demonstrating good intent and a conscientious approach to the data gathering. Where problems have arisen and more senior staff have become involved, this has also been done efficiently and without loss of relationships in almost all cases.

2.90 There are a small number of cases where stronger DfT intervention is being undertaken and the early evidence from those cases is also that matters can be resolved quickly and normal engagement resumed.

Summary evaluation of trial activities and processes (to Dec 2013)

2.91 **The number of participants has grown during 2013, but the expansion to the full projected total will only now occur at or near the end of 2014.**

2.92 **DfT's requirement that the trial involve operators of all sizes appears to be being met, with a good range of operator types.**

2.93 **Engagement with participants continues to be largely positive. We have seen an improvement in the timeliness and quality of data submissions in the last period of 2013. For the cases where problems have arisen with data submissions, a transparent process has now been established for highlighting the issue to operator managers and, where necessary, escalating cases via DfT.**

3 TRIAL OUTPUTS: LST FACTS AND FIGURES 2013

3.1 This chapter provides an overview of the key statistics of the trial under three headings:

- The number and range of participating companies
- The extent and nature of LST operations
- The number and nature of incidents involving LSTs.

Outputs

Participation (Number, range)

Master Data (Quality, Timeliness)

LST Operational Data Summary

LST Incident Data Summary

Qualitative Data

Participants – number and range

3.2 The data on who is participating in the trial and the nature/size of their operations is drawn from the company information file (CIF) completed by each trial participant. Although only submitted once, the CIF does require data from a number of parts of a business and hence can take some time to collate, especially in larger companies (where the information is dispersed) or in very small ones (where historic records may be on paper).

3.3 Of the 76 potential participants up to the end of December 2013, we are still waiting for eight participants to finalise their company information file (CIF) following comment on their draft. We are awaiting first versions of the CIF from seven more.

Operator size and primary business

3.4 One of DfT's stated intentions was that the trial should be accessible to operators of all sizes – not just large operators. Figure 12 presents the declared business size of the operators for whom we have completed company information, expressed by the number of drivers.

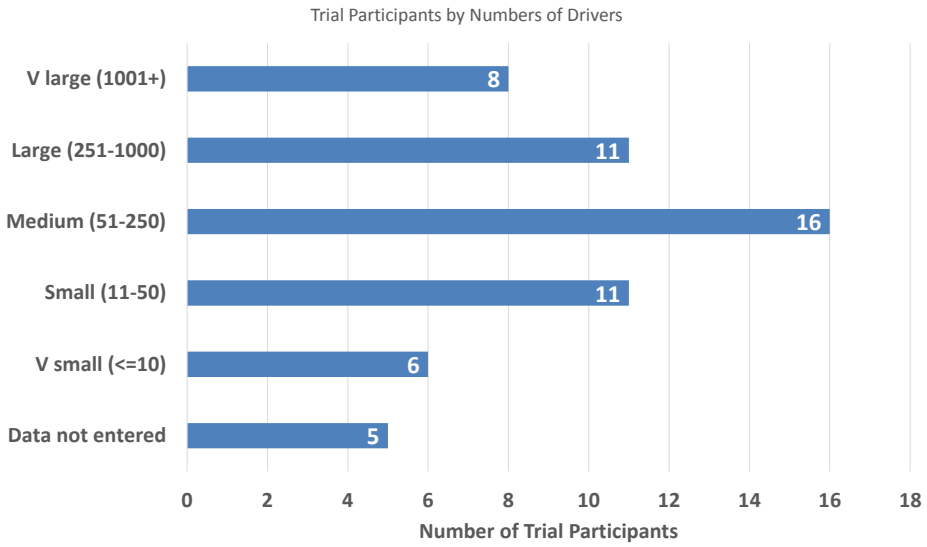


Figure 12: Size of business by number of drivers

3.5 What is notable since last year is that the growth in participant numbers during 2013 has been in the middle three size categories on the chart, rather than amongst the very large or very small[18]. The greatest change is in the increase in the 51-250 driver category.

[18] A part of the change in the profile arises from five existing (2012) participants for whom we now have completed company information. However, the observation made in the text still holds.

3.6 The spread of operators by their main business, presented in Figure 13, is in line with expectations. The greatest numbers of early entrants are general hauliers where there is a spread of large and small operators. There are then the directly operated fleets of the retailers and all types of mail operators, which represent some of the largest individual LST fleets. What is not shown here, but is clear from the raw data, is that a portion of the LST operation being undertaken by the general hauliers is actually fulfilling long term contracts for major retailers. This will become more apparent in analysis of the type of goods where the amount of FMCG and the legs 'To/From Retailer' are shown.

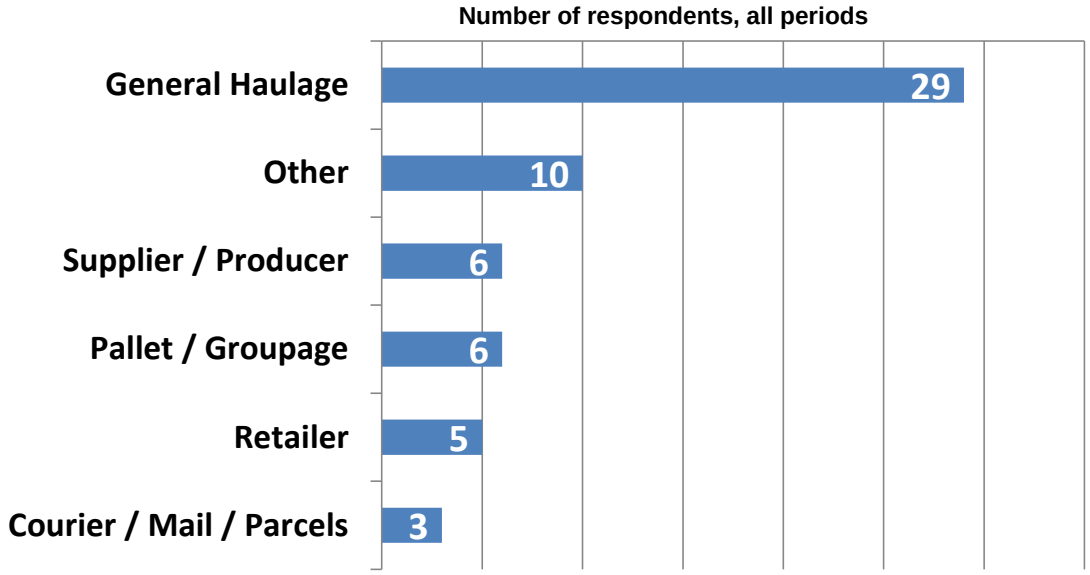


Figure 13: Respondents' primary business types

3.7 The 'Other' category includes two sets of operations:

- Defined categories – for which there were only one or two cases so they are merged to avoid identification of individual operators.
- Specialist operators, in particular heavy haulage, usually operating flatbed trailers.

3.8 It will be interesting to see how this spread of business types continues to develop as the new entrants from the revised allocation process start to enter the trial. Categories such as the Livestock or Tanker/Bulk operators are not expected to necessarily become a major part of the fleet. The possible entrance of container specialists may depend on whether an interaction with rail freight operations develops as well as whether or not any issues emerge associated with infrastructure at container handling locations. We are aware of one operator who has, in 2014, announced the arrival of their first 50ft ISO container designed to fit on a 15.65m base[19].

Special LST operational measures

3.9 One of the earliest questions to be considered by all participants is the extent to which they would constrain the use of LSTs within their operation, at least during their early use. Figure 14 shows operator responses to a series of possible special arrangements which were postulated might be put in place, with operators selecting as many as applied.

[19] Shown at the 'Multimodal Show' and reported in Commercial Motor / Motor Transport 1/5/14 the unit did not come onto the road until 2014 and so is not included in the data for this report.

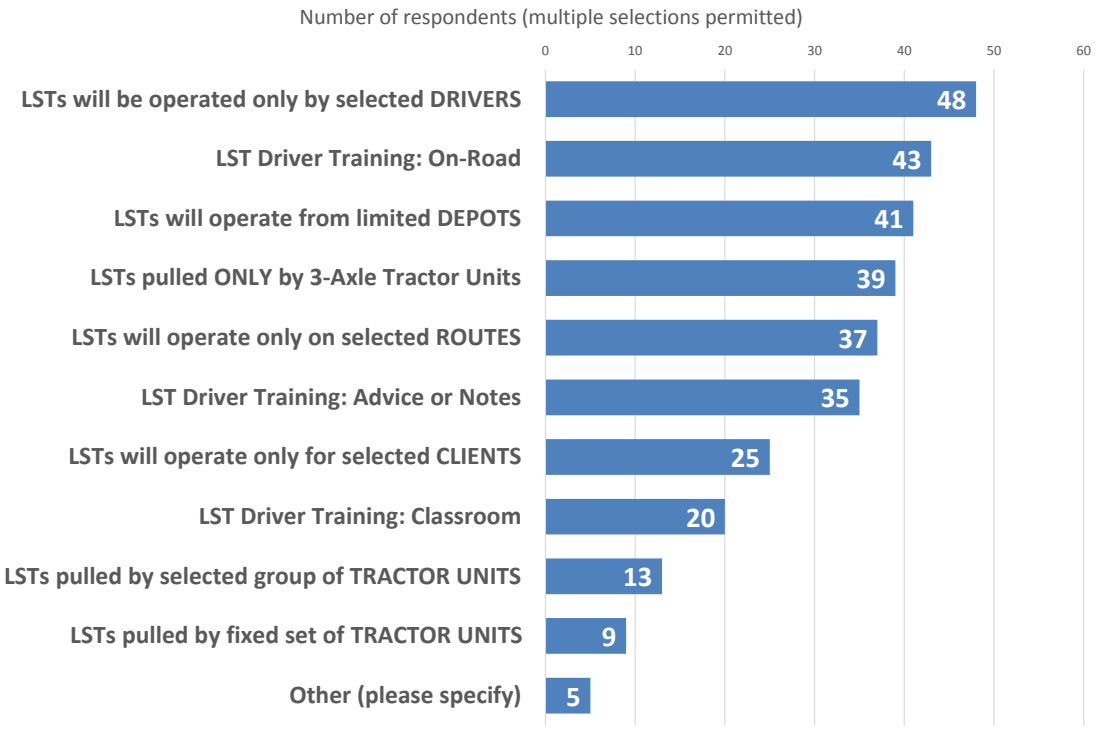


Figure 14: Limits placed by respondents on longer trailer operations[20]

3.10 As was noted last year, conversation with operator contacts confirms that these constraints were being applied for both practical considerations (e.g. could the trailer access the route/site easily) as well as operational factors, including direct contact between fleet or depot managers and the drivers to pick up on any issues as quickly as possible.

3.11 We will revisit this later in the trial and explore the extent to which these constraints have been relaxed by operators as they gain experience with the LSTs.

LST operational data summary

3.12 The outputs below give an overview of the operations of LSTs from the start of the trial to the end of 2013 based on the journey leg data entered into the survey by operators.

3.13 Journeys are expressed as legs in the data, meaning a single point-to-point trip without loading or unloading stops en-route. Any multi-drop journeys with fewer than five loading/unloading points are recorded as individual legs for each part of the trip. Where there were five or more drops, the journey is recorded as a single record in the data, with the number of drops noted.[21]

Day of the week

3.14 Figure 15 shows the profile of LST journeys by day of the week. It shows the trailers being used in a similar pattern to much of the regular 13.6m fleet, with a rise in the number of legs in the run up to the weekend reflecting the dominance of the retail trade and its supply chain on the operations of both general hauliers and directly operated retail fleets.

[20] The equivalent chart in the LST Annual Report 2012, published last year, was found to have some double counting in some categories. The error in the query that generates the charts was fixed during 2013.

[21] This approach is the same as that used in the DfT Continuing Survey of Road Goods Transport.

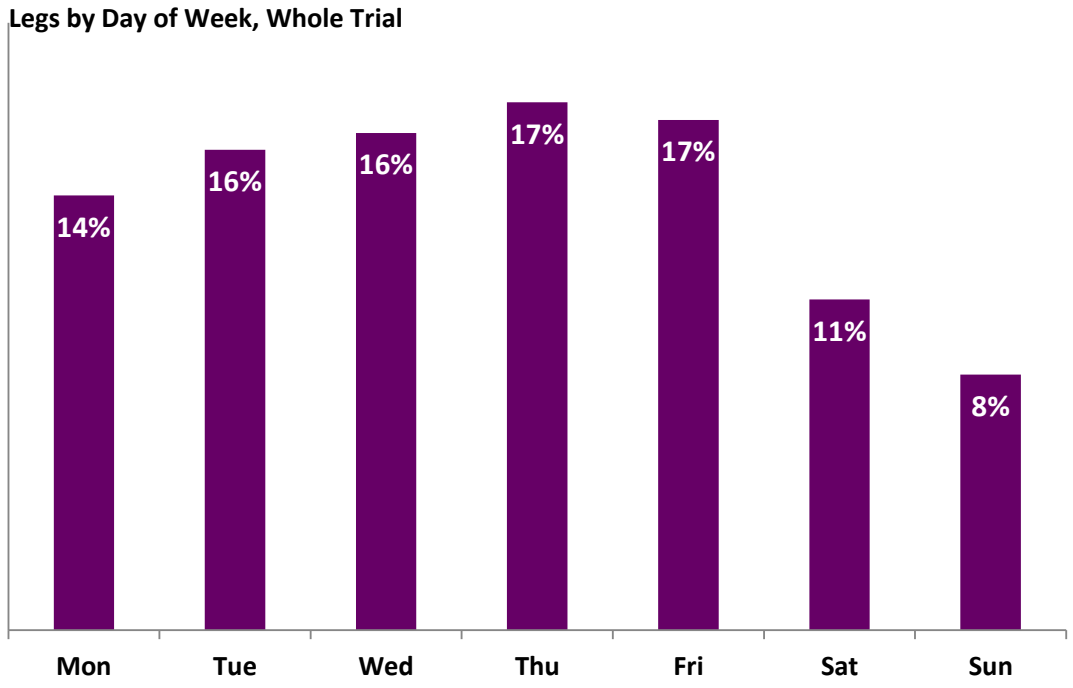


Figure 15: Distribution of longer semi-trailer journeys by day of week, all respondents

Leg type

3.15 The dominance of loads related to the retail trade and its supply chain is shown clearly in Figure 16 where 29% of the recorded legs were to or from a retail site, although this understates the position, since where the return leg is empty, it is, in most cases, recorded as 8) Empty Back to Depot.

3.16 The 30% of legs between distribution centres would also, in part, be retail supply chain work, with the remainder being pallet/ groupage loads and operations by the mail/parcels sector.

3.17 This pattern certainly shows the primary uses of the LSTs to be in the areas anticipated in the DfT Impact Assessment[22].

[22] Op Cit. Page 31 and Page 40 Table 5 of the impact assessment lists the categories of journeys which were assumed to see transfer of loads from regular 13.6m trailers to LSTs were the longer trailers to be generally available. A direct comparison of the percentage swaps since the table relates to assumed transfers of loads across the entire market.

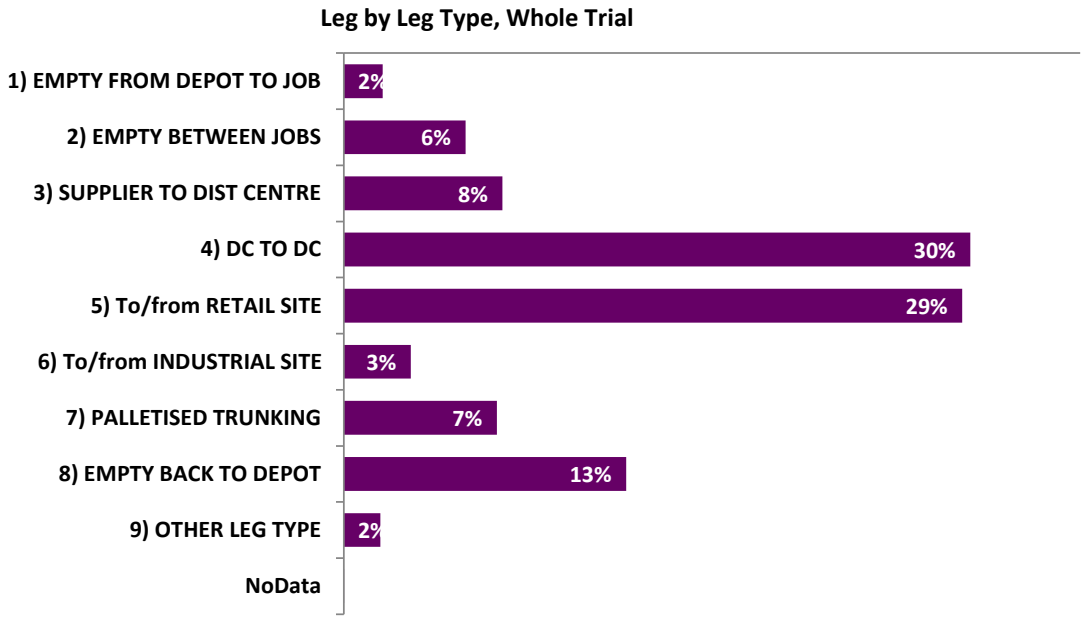


Figure 16: Journey leg types for all recorded LST journey legs, all respondents

3.18 Figure 16 also gives an indication of empty running. Adding up the three relevant leg types (1, 2 and 8) gives an estimate of around 23% of legs being operated without cargo, the majority being return legs to the depot following delivery of goods. However, as noted earlier, there is also some empty running being recorded under other leg types, describing the nature of the journey.

Goods type and Mode of Appearance (MOA)

3.19 Figure 17 presents a summary of the type of cargo being carried, as a percentage of all legs where the goods type was recorded and the 0) No Cargo total here is believed to be a better indication of the number of legs run without a load, which is 29% by count of legs.

3.20 When measured by distance travelled the figure is only 18%, as shown in Figure 18.

3.21 **This is considerably lower than the average figure for all articulated HGV traffic recorded in the latest available DfT statistics, which is 29% by distance travelled**.[23]

3.22 Retail trade operations are included in the fast moving consumer goods (FMCG) loads, whether of a single product or a mixed load. These constitute 26% of all legs and 33% of distance travelled.

3.23 Mail/parcels work represents 11% of all vehicle km, up from 8% in 2012 alone. This was anticipated as these operators entered the trial later than some of the retailers and hence these loads were moved in only the second half of 2012.

[23] Source – Latest CSRGT Data October 2011 Table RFS0118.

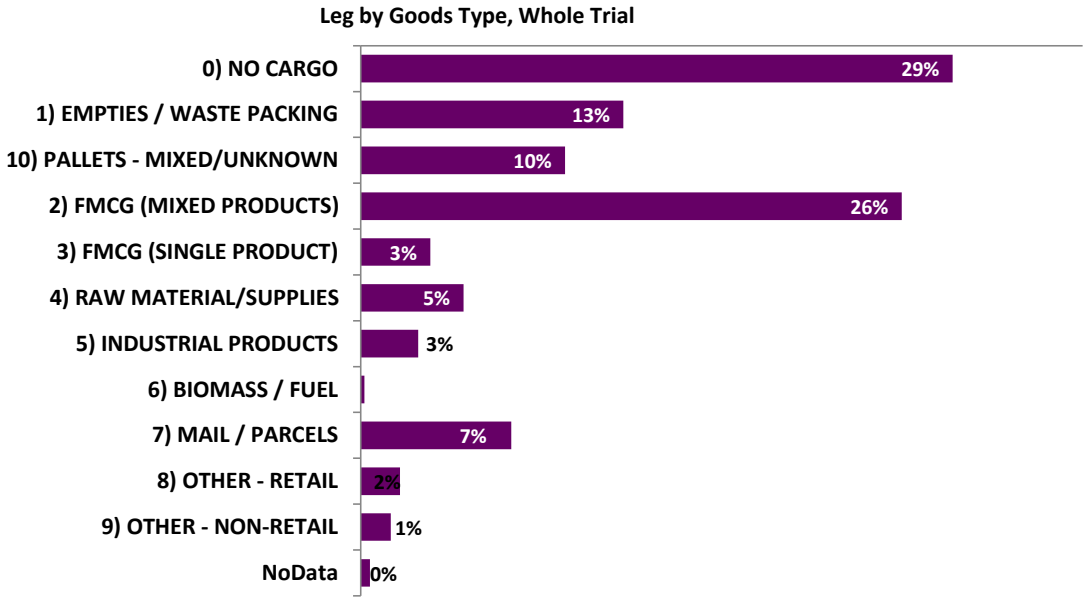


Figure 17: Goods types for all recorded LST journey legs, all respondents

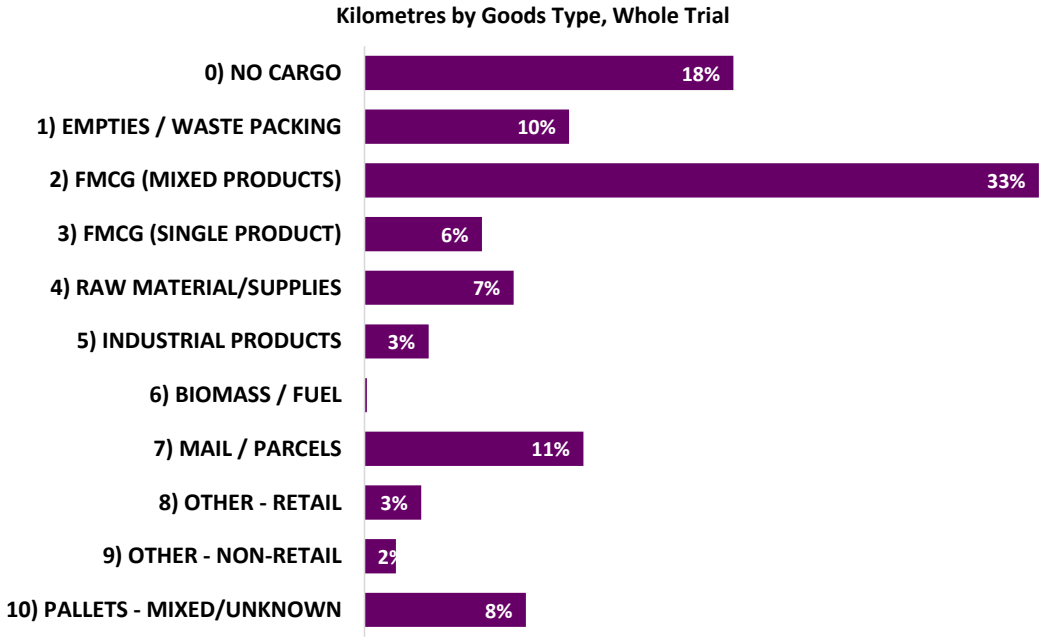


Figure 18: Goods types for all recorded LST vehicle kilometres, all respondents

3.24 Figure 19 shows the data split by mode of appearance (MOA)[24]. Again there is a small discrepancy in the empty running estimate and this will be resolved by the data cleaning process noted above.

[24] Mode of Appearance is the commonly used term in the industry for the way in which the cargo is loaded or 'appears'. The categories being used in the trial are a subset of a much larger set of possibilities seen in the

3.25 The mix of MOA is much as we would anticipate at this stage, with cages and pallets being the primary mode, given the dominance of FMCG and mail/parcels cargo.

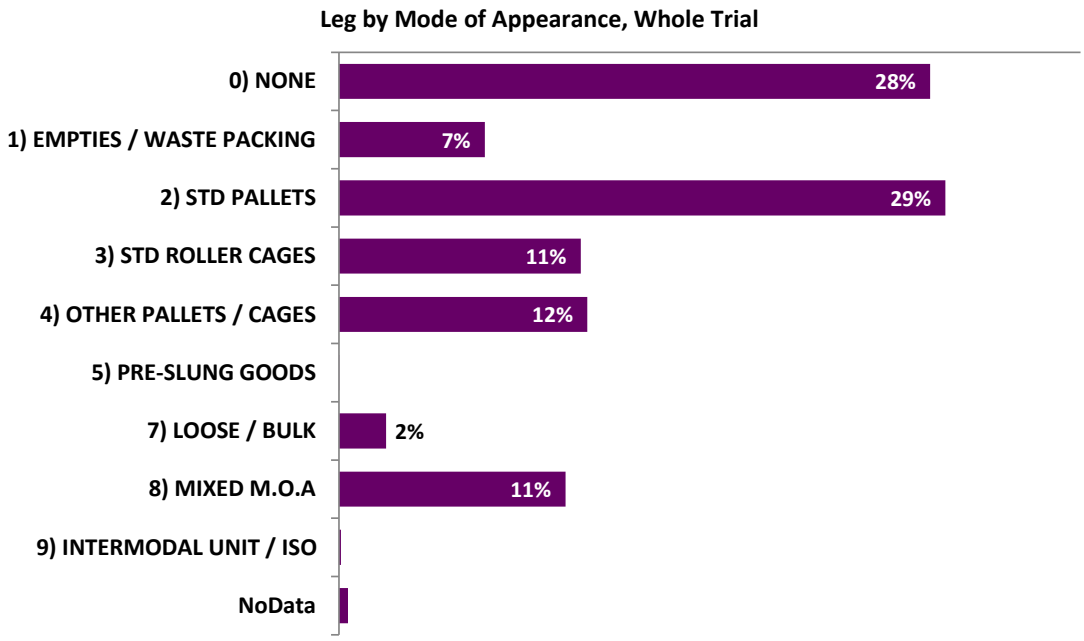


Figure 19: Goods mode of appearance for all recorded LST journey legs, all respondents

Utilisation

3.26 Utilisation data is gathered by both deck % and volume % to give both perspectives on how well the total load potential of the trailer is being used.

3.27 A field also records whether the load was 'weight limited' so that cases where the deck or volume is not being used only because no additional weight can be added. However, only 2.5% of legs are noted as being weight limited, as may be anticipated with the LSTs being primarily of interest to those hauling lower density – higher volume goods. Indeed if a significant proportion of a company's LST legs were to be weight limited and showed low deck% figures, it might call into question whether the use of LSTs for that operation was justified.

3.28 Figure 20 shows the utilisation by deck space covered and Figure 21 the utilisation by volume.

3.29 Chapter 4 includes an initial analysis of the deck % utilisation data and what it might mean in terms of reductions in vehicle km compared to the same work being done on 13.6m trailers.

3.30 Any analysis by volume % will require a larger dataset so that it can be split out by different types of operation and trailer type. For example, an assessment by volume needs to take into account the trailer design:

- For refrigerated trailers, a free space of perhaps 20-30% of the volume may be required to permit circulation of the air and hence for such trailer designs, a figure of 70% may be regarded as 'full' by volume in analysis.
- For flatbed trailers, volume fill is not measureable in a meaningful way and so volume analysis will need to exclude these units.

3.31 An analysis by volume will be performed once sufficient data has been gathered to support it.

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industry, selected to be the ones most likely to be used where goods density is less likely to weight limit the loads.

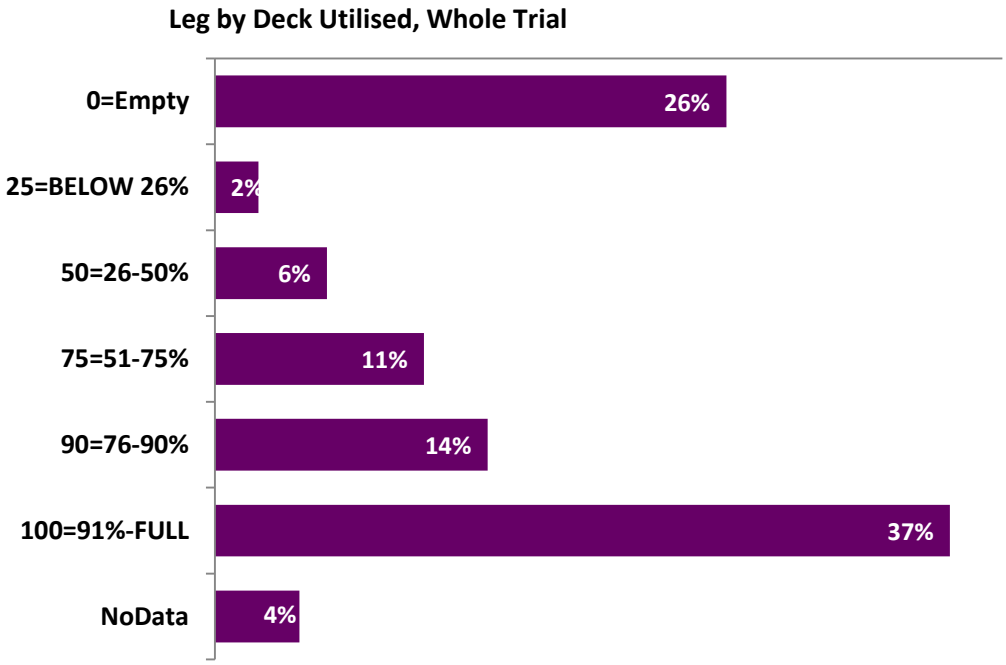


Figure 20: Utilisation by deck space % covered

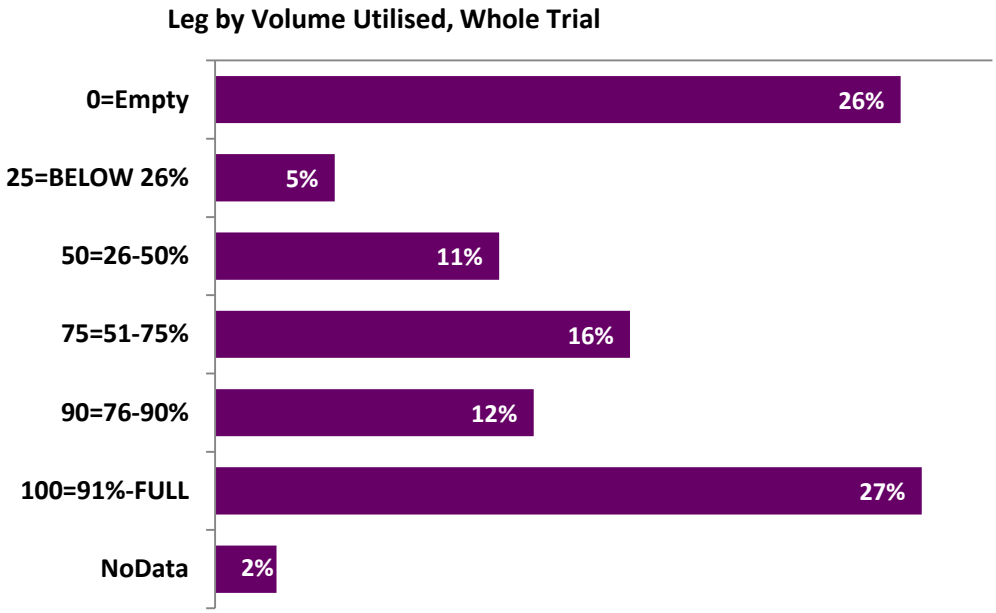


Figure 21: Utilisation by volume % filled

3.32 This report provides an overview of the main outputs. For a full list of the data fields being collected and hence an indication of the analysis which may be possible once the dataset increases to support it, see Appendix A.

LST incident data summary

3.33 Figure 22 provides a summary of the incidents involving LSTs, as reported through the trial data system.

3.34 An analysis of the incident data to date has been undertaken and is reported in Chapter 4 and hence the other charts of results have been placed in that chapter for easy reference, rather than here with the other outputs.

3.35 The primary focus of analysis at this stage is to provide assurance that there are no early indications of the operation of the LST in the trial causing a measurable increase in risk.

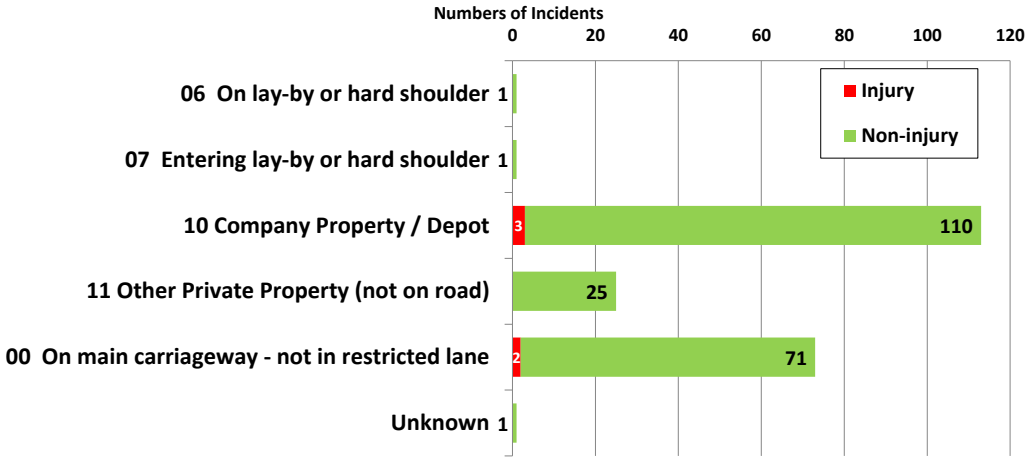


Figure 22: Incidents involving LSTs (Summary to end 2013)

3.36 The analysis of incidents is a primary reason for the trial. We can expect to have to collect data for an extended period of time before we are able to analyse trends or contributory factors to risk.

Qualitative data summary

3.37 The data collection includes qualitative comments made by the participants regarding use of the trailers in real operations. So far, the comments are fairly consistent and are summarised here. Some of these observations are unchanged from the 2012 annual report, reflecting the consistency of the comments made by recent entrants to the trial with those who joined earlier.

Operational observations

3.38 Most participants have reported no serious problems in incorporating the trailers into their work. There have been some issues to resolve around negotiating client sites and a few with onsite parking. On the whole, operators have made careful assessments of the viability of routes and site access issues and operated only where they are happy that the access is suitable. One operator noted some issues around loading but did not say that it prevented them from operating the LSTs.

3.39 Operators have almost all reported making special on-the-road or, at the very least, awareness training for drivers who will be operating LSTs, and a number have reported that they have taken a decision not to permit agency drivers to do so. Discussions at the FTA trial forum in November 2013 note this as being assumed to be generally true for all operators.

3.40 The feedback from drivers has been very positive, with a number noting only that they needed to get used to the way the trailer moves – i.e. that the change in experience is not so much related to the length as to the presence of the steering rear axle. We have checked this with a number of operators verbally during support phone calls and they all confirm this is the case.

3.41 A few planners have noted the increased complexity of managing load planning where they have to work with a mix of regular 13.6m trailers and the longer units for one client. This is an issue that the DfT impact assessment noted as being likely to arise, especially during the introduction of the new trailers.

3.42 The independent hauliers report good feedback from the clients for whom they have been running the trailers, as well as from loaders, with the only caution noted being the care needed to adhere to the loading guidelines to avoid overloading the rear axle. (LSTs in the trial are required to have axle load indicators fitted, with some exceptions).

3.43 Several of the operators with larger LST fleets began by operating them from just one or two depots to gain experience, before then spreading them out across more locations. Their qualitative observation was that passing on the experience gained from the original location to the new ones was vital, but also not easy. The new locations still experienced a learning curve in terms of all operational aspects (loading, driving, depot management etc.) albeit not as steep as that of the original depots. They also noted this issue in relation to training new depot staff in the completion of the trial data recording.

Commercial observations

3.44 As anticipated in the original feasibility study, there is a varied experience of the commercial benefits of having the longer trailers.

3.45 A small number of operators – mainly smaller, independent hauliers – have reported periods where the LST has been idle due to a lack of suitable work. In some cases this was reflective of a general downturn (some noting December 2013 -January 2014 being very poor), but in other cases they cited being unable to find a suitable contract which could realise the benefits of using the longer trailer. We have had cases where an LST was purchased with a view to use on one contract, but the work has, for whatever reason, not materialised. The haulier has then had to consider the need to find opportunities that can use the LST in their sales and marketing. Some have found replacement work easily – others have found it more difficult, resulting in downtime for their LST(s).

3.46 In contrast, the experience of the revised allocation process shows that some operators are seeing the benefits from existing LSTs and have applied for further allocations – in some cases citing that they would have “as many as we can get”.

3.47 One or two operators have commented that their original decision to apply for the 14.6m trailer allocations was not because it was the best ‘fit’ for their operations, but because prior to the trial actually starting, the manufacturers had expressed uncertainty over whether the 15.65m design would always require two steering axles to meet the design criteria. Once the actual designs started to emerge this was of course found not to be the case. The issue has been removed for later applications under the revised allocation system where an allocation can be for either length category.

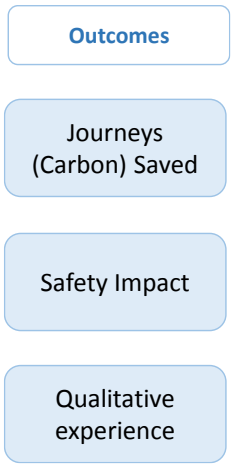
3.48 To summarise, in response to the qualitative question:
“How would you summarise the feedback you have received?”
the responses in QSFs submitted are all either “All positive” or “More positive than negative”.

Summary evaluation of trial outputs (to Dec 2013)

3.49 **The data submissions are now being processed efficiently to produce summary outputs to form the basis of outcome analysis.**

3.50 **Qualitative feedback from operators on operating LSTs is largely positive.**

4 TRIAL OUTCOMES - PRELIMINARY ANALYSIS



4.1 In discussion with DfT we agreed that in this annual report we should undertake preliminary analysis of the outcomes on the two key issues of:

1. Incidents
2. Utilisation.

4.2 These are both areas which we will expect to return to in future reports, with increasing depth of analysis as the trial dataset expands to permit finer segmentation and cross-referencing.

4.3 This may, in the future, include results from focused Special Topic Analysis (STA) conducted during the trial year, where selected by DfT. STAs could draw on experience from outside the project team or, for example, on results from special data studies involving selected volunteer companies from amongst the trial participants. There are no STAs currently planned in 2014.

4.4 The analysis here fulfils a number of roles:

1. The analysis of injury incidents is vital to establish if there are any indications that LST operations are introducing an increase in safety risk, particularly to other road users and vulnerable groups.
2. The analysis of utilisation is important as it will be the first time DfT has published data on the loading of the trailers during the trial so far.
3. Both analyses will act as a baseline from which we can monitor changes in the key metrics as the trial progresses. This is important since we want to be able to see whether the operation of the trailers in the early stages of running, when they are a new concept, changes as they become an accepted part of the fleet. This might include changes in the way they are used, improvements in the loading processes to increase utilisation, or increases in incidents if some of the current special practices become part of daily operations.

LST incidents - preliminary analysis

Introduction

4.5 This analysis considers:

- An analysis of the incidents to date on the trial involving LSTs, with a statistical comparison to the background rates of collisions involving articulated HGVs on GB roads
- An analysis of the nature of non-injury accidents involving LSTs so far on the trial.

4.6 The analysis here has been conducted by Risk Solutions as the independent evaluator of the trial. It has been reviewed by the relevant DfT statisticians and their comments have been incorporated where appropriate. Further detail of the analysis is shown in Appendix C.

Injury incidents

4.7 Incidents involving LSTs have to be reported in the incident log by each operator with their data submission file for each period of the trial.

4.8 All injury incidents must be reported, regardless of where they occur and whether the injured person is a member of the public or a member of staff.

4.9 Incidents are recorded against a sub-set of the DfT STATS19 data fields, modified to add options to cover non-injury events and incidents occurring off the public roads.

4.10 Operators record casualty severity according to STATS19 injury categories and injury types.

4.11 All incidents include a narrative by the operator of the trailer and a judgement of whether the event was 'LST Related', meaning whether the fact it was an LST rather than a standard trailer, was in any way relevant to the occurrence or outcome of the incident. In the early reporting periods, this judgement was added by Risk Solutions and based on a review of the incident log report. In later periods the judgement is made by the operator and reviewed by Risk Solutions.

Injuries in incidents involving LSTs

4.12 Table 4 shows the number of recorded incidents from the start of the trial to the end of 2013.

4.13 The table introduces a measure called FWI – Fatalities and Weighted Injuries.
FWI differs from the measure KSI (Killed and Seriously Injured) in two ways:

- FWI takes **Slight** injuries into account
- FWI is **weighted** measure in which different severities of injury are assigned a proportionate 'value' to the total
  FWI for a collision = Fatal + (n × Serious) + (m × Slight)
  (In KSI there is no weighting – a broken arm is counted the same as a fatality although there is a fairly common understanding that the majority of any KSI total will be injuries rather than fatalities.)

4.14 For the evaluation of the safety aspect of the LST trial, we believe using the FWI measure will, once we have more data, provide a more refined basis for analysis that makes use of the larger population of Slight injuries. See Appendix C for a more complete discussion of FWI.

Table 4: Incidents involving LSTs - Trial start to 31 Dec 2013

Injury Collisions from Trial Logs	Road Traffic Collisions	Total Casualties	Fatal	Serious	Slight	FWI
All Injuries	**5**	**5**	0	1	4	**0.14**
All Injuries in Public Road/Place	**2**	**2**	0	1	1	**0.11**
All Injuries judged LST related *	**2**	**2**	0	0	2	**0.02**

* Neither of the two LST related injuries recorded here occurred on a public road.

4.15 **There have been no fatal accidents involving LSTs during the trial to date.**

4.16 There has been only one serious injury to date, resulting in a third party HGV (Rigid) driver fracturing his arm. The incident was not judged to be 'LST Related' since it occurred as the LST driver was decelerating on a main road because of traffic ahead and the third party, behind the LST, failed to slow down, resulting in a rear-end shunt.

4.17 The second incident that occurred on the public highway resulted in a slight injury to the driver of a car. The LST was completing a manoeuvre at a mini-roundabout. As the LST exited the junction the third party driver entered from another access road and collided with the trailer. The impact point on the LST was recorded as 'offside' and there is no indication that the design being an LST was relevant to the incident.

4.18 The remaining three incidents all took place in depots / delivery areas not accessible to the public and resulting in slight injuries. One was judged not to be LST related as a pedestrian member of staff was struck by the tractor unit. In the second incident, a staff member misjudged the tail-swing of the trailer and was struck on the arm. In the third the driver suffered a slight injury when he misjudged the tail-swing and struck company property with the nearside of the trailer.

Background data: Incidents involving standard articulated HGVs

4.19 The primary data for all GB road injury statistics is the STATS19 database, maintained by the Department for Transport and populated by the Police for all incidents known to the police and an injury occurred.[25]

4.20 The vehicles involved are categorised by the reporting police officer. The guidance to officers completing a STATS19 report includes instructions that a vehicle pulled by a tractor unit where the bulk of the load is carried by the trailer is to be categorised as :

- Vehicle Type 21 HGV > 7.5 Tonnes mgw **AND**
- Towing and Articulation Code 1.
  Note that this coding intentionally excludes drawbar combinations

4.21 For the analysis in this report we have used this categorisation scheme as a filter on the STATS19 data so that we identify only road collisions where the collision involved at least one Tractor + Semi-Trailer unit. The figures are shown in Table 5 below.

4.22 We note that the original trial impact assessment undertook some detailed analysis examining the robustness of this assumption, where it concluded that there might be some under-reporting of the number of events involving semi-trailers, due to mis-coding by the reporting police officers.[26] However, the analysis did not offer sufficient evidence to justify modifying the published figures for analysis. The analysis was also based on data that is now almost ten years old and there has been significant work done on STATS19 reporting in the intervening period that should have improved the quality of reporting.

4.23 We note that the concerns expressed in the trial impact assessment mean that, if they were well founded, any background collision rate calculated on this basis for comparison with LSTs, would be under-estimated.

Table 5: Number of GB road traffic collisions involving articulated HGVs >7.5T and severity of the associated casualties (STATS19 2008-12)

	2008	2009	2010	2011	2012	3yr avg '10-12
Number of Collisions	**3,043**	**2,437**	**2,618**	**2,467**	**2,222**	**2,436**
Collision Severity (Worst)						
Fatal	136	110	117	111	103	
Serious	447	360	363	356	293	
Slight	2460	1967	2138	2000	1826	
Casualties in Collisions	**4,373**	**3,463**	**3,556**	**3,559**	**3,121**	**3,412**
Fatal	156	117	124	130	116	
Serious	524	431	420	440	355	
Slight	3693	2915	3012	2989	2650	
FWI (Fatalities & Weighted Injuries)[27]	**245**	**189**	**196**	**204**	**178**	**193**

[25] STATS19 Data available at https://www.gov.uk/government/collections/road-accidents-and-safety-statistics & STATS20, guidance notes from http://www.stats19.org.uk/html/stats_20_notes.html

[26] WSP Impact assessment sub-report "The likely effects of permitting longer semi-trailers in the UK: vehicle specification performance and safety" Final Report TRL PPR526/LP0808 October 2010. Appendix E

[27] FWI standard definition for any event FWI = Fatalities + (Serious x 0.1) + (Slight x 0.01)

Exposure – billion vehicle kilometres (bvkm)

4.24 The trial data returns indicate that the aggregate distance travelled by the LSTs in the trial, up to the end of December 2013, was about **0.041 billion km.**

4.25 An estimate of comparable data for the standard semi-trailer fleet can be derived from DfT's published traffic statistics[28] which has a classification specifically for Articulated HGVs. The data are shown in Table 6.

Table 6: GB annual distance covered by articulated HGVs

Billion vkm	2008	2009	2010	2011	2012	3yr Avg '10-12
3 or 4 Axles	1.6	1.4	1.5	1.1	1.1	
5 Axles	6.5	5.9	5.6	4.9	4.9	
>= 6 Axles	6	5.6	6.0	6.9	7.0	
All Artics	14.1	12.9	13.1	12.9	13.0	13.0

4.26 The collision and flow data are summarised in Figure 23. The analysis here will be based on a 3 year average for 2010-2012. However, it is interesting to note that from 2011 to 2012, there was a marked drop in collisions casualties against a background of rising traffic flow.

Figure 23: GB Articulated HGV collision and flow summary 2008-2012

Comparing LST incident rates to background HGV incident rates

4.27 We have performed two sets of tests comparing the rates of events per million vehicle km for LSTs so far on the trial with the background rates for the general articulated HGV fleet.

4.28 **Test 1: Conservative** including ALL the injury events, regardless of where they occurred. (See Appendix C2-1).

4.29 **Test 2: Realistic** including only the incidents on the public highway or public access areas. (See Appendix C2-2).

[28] Heavy goods vehicle traffic by axle configuration and road category in Great Britain 2007-2012 Table 3105 https://www.gov.uk/government/statistical-data-sets/tra31-heavy-goods-vehicle-traffic

4.30 This is not to suggest that incidents in depots and on other private property are not important, but to include them in a comparison with STATS19 data would be conservative, since STATS19 relates only to personal injury accidents on the public highway that have been reported by the police.

4.31 The injuries realised in depots and on other private property would more properly be analysed in comparison to RIDDOR data for the equivalent location types and/or as part of a trial operator sample of data (see 4.51) but this is not covered in the current analysis.

4.32 Each comparison between the LST rate and the background rate is tested for statistical significance and results are only presented where the test confirms that the comparison is significant at a 95% confidence level[29].

4.33 The analysis calculation details and results are shown in Appendix C, for three metrics:

- Road traffic collisions per billion vehicle km
- Casualties per billion vehicle km
- FWI (Fatalities and Weighted Injuries) per billion vehicle km.

4.34 The results show that for Test 2: based only on the public road LST incidents, that the end of 2013 there is sufficient data from the trial to produce a statistically significant comparison for collision and casualty rates, but not yet for FWI.

4.35 The summary in Table 7 shows that the rate at which the LSTs have been involved in collisions resulting in injury is significantly lower than for the general articulated HGV fleet.

Table 7: Summary comparison of LST public road collision and casualty rates (to end Dec 2013) vs. GB general articulated fleet

Injury incidents Public access locations	**LST Rate per billion vkm**	**GB Artic HGV Rate per billion vkm**	**Ratio (LST/GB-HGV)**
Collisions	48.8	187.4	**26%**
Casualties	48.8	262.5	**19%**

4.36 In the more conservative test case, which includes the events that occurred in depots etc., the LST collision rate is only 65% of the background rate but the result was shown not to be statistically robust. For casualties the LST rate was only 46% of the background rate, with the result proving to be just outside the acceptance criteria of our statistical test.

Discussion of injury incident results

4.37 The significantly lower injury risk associated with the operation of the trial LSTs was not predicted in the original 2010 impact assessment[30]. Possible explanations for this therefore should be explored.

[29] The two populations of incidents are assumed to be Poisson distributed and a Chi-squared test was applied to the difference in the mean rates for the two populations (events per million vehicle km). Test results <0.05 confirm that there is less than a 5% chance that the difference in the two mean rates is due to random chance.

[30] Op Cit in footnote 2.

4.38 The original impact study was designed to assess the possible increase in risk that might be associated with the longer designs. It was concluded that :

- In like-for-like operations, there could be a very small increase in the incident rate per million vehicle km, but this would be associated with stability risk of the taller LSTs (4.6-4.9m) arising from side wind issues, rather than from an increase in low speed manoeuvring collisions.
- It was noted that the predicted increase in the incidence of collisions was so small as to be immeasurable in any monitoring data.
- The increase in incidence of collisions for the longer trailers would be offset by the reduction in collisions that would be realised by a reduction in the number of journeys required to transport the same loads; if the assumed load factors were achieved in LSTs.

4.39 The key difference between the actual trial to date and the assumptions of the impact study is that the trailers are not being operated on a like-for-like basis compared to the general, but under very specific conditions. From the operator data submissions, we know that in comparison to the standard HGV trailer fleet, LSTs are operating in a very particular way.

- LSTs are operating a high proportion of their journeys between distributions centres (DC), so the majority of the distance is covered on motorways and major roads, which tend to have lower accident and casualty rates in general. However, to examine this would require analysis segmented by road type or class.
  - At a future stage the evaluation should look at the flow and incident data by road type or with urban operations separated out. However, whilst it is possible to break down the national flow data for articulated HGVs (either from the DfT traffic census data or the CSRGT figures[31]) we do not currently have data on the distances travelled by the LSTs on difference road types. This will require additional analysis of the trial data with either some route modelling or sampling.
  - In addition, to segment the analysis in this way would require a larger dataset, to provide statistically significant results for each road type. As the trial dataset grows, we anticipate such analysis will become possible.
  - This analysis will be important, since it could be that the current trial experience is biased to operations on routes and patterns which would be ‘low collision risk’ even when operated by 13.6m trailers.
- LSTs are operating under special operating conditions such as:
  - limited, often repetitive routes rather than a full range of destinations
  - pre-assessment of routes and sites for loading and unloading, especially when deciding which retail or supplier sites can receive the vehicles
  - selected drivers with special training
  - dedicated bays in DCs/warehouses with special arrangements to accommodate the additional length.
- LSTs are operating under special scrutiny – i.e. that all staff, including drivers and despatchers and their managers, will still be aware that the trailers are a new piece of equipment and also that the whole trial is under special monitoring for the evaluation.

31 DfT Data table TRA3105 provides a split of distances for all HGVs split out into Rigid and Articulated, by numbers of axles, with a breakdown by road CATEGORY Motorway, Urban/Rural, Trunk/Principal, although not the exact road type – i.e. Dual/Single A road split)

4.40 **Given the comments above, we draw the following conclusions from the injury incident evidence so far.**

1. **The evidence to date indicates that operating the LSTs on the trial so far has not led to an increase in casualty rates above that seen in the general operation of GB registered articulated HGVs.**

2. **The evidence to date, whilst encouraging, cannot be used to infer longer term conclusions about the safety of the trailers in general operation, since there are still many factors constraining their operation as noted above.**

4.41 As the trial continues we will continue to monitor the injury collision and casualty rates as more operators enter the trial and as the operation of the LST fleet becomes more mature.

4.42 In later evaluation reporting periods, as the size of the dataset increases, we would expect to be able to analyse the data in more refined ways so that the influence of other factors such as the operator types, leg types, distances, route types, trailer designs, tail-swing distances (from the VCA model repot data) etc. on collision rates can be assessed. However, each time the data is segmented into more and more refined subsets, a larger overall population of data is required to produce statistically robust results and hence the depth of analysis will only grow as the trial database grows.

Non-injury incidents

4.43 The DfT reporting requirements for incidents involving an LST, but not resulting in any injury are different, depending on where the incident took place.

- Any incident occurring on the public highway or on land where the public have access (e.g. motorway service areas, retail parks) must be logged, even if no injury resulted.

- Incidents occurring on private land where there is no public right of access (e.g. depots, loading areas, supplier sites) only have to be logged if there was an injury or, in the view of the operator, a serious precursor to injury (a near miss).

4.44 Some operators have chosen to use the trial data recording system to log ALL incidents involving their LSTs, since it provides them with a useful repository for the data and means no judgements need be made as to the inclusion of an event or not.

The incidents are assigned a judgement of the degree to which they were 'HVST Related' as described earlier in Table 3 (Page 18).

4.45 Table 8 shows a summary of **ALL** the 211 non-injury incidents recorded in the logs submitted by operators and accepted[32] in the trial periods up to the end of December 2013. The table is included here to show the size of the complete dataset.

4.46 Table 9 shows a reduced dataset of only 101 incidents where some resulting damage to property (private or public) or vehicles was noted in the incident log. For the analysis this year, we have judged that it is appropriate to look primarily at this 'damage only incident' dataset on the basis that it should contain the more significant events.

Incident locations: public vs. private

4.47 Of the events where damage to property is recorded (as opposed to damage only to the tractor or trailer), two thirds of them occurred on private property with no public access.

4.48 Of those occurring in public locations, almost all occurred when turning left or right.

[32] Para 2.52 (page 15) noted that there are a small number of operators with data outstanding or seen only in draft and not yet 'accepted'. Since the data which has not been accepted is not included in this analysis, there is a small amount of under-reporting in these figures**. We can confirm that we know of no further injury incidents in that pending data.**

Comparison to general articulated HGV operations

4.49 There is no simple method of comparing the rates at which damage-only accidents are occurring to the rate in the general articulated HGV fleet, since there is no database of damage only accidents comparable to STATS19.

4.50 Options for creating a robust comparison of damage only incident patterns and rates between the LSTs and a suitable sample population of 'standard' semi-trailers were discussed at a forum of trial participants in November 2013[33]. One suggestion was that it could be done using a sub-set of the trial participants – those with existing large scale incident monitoring and tracking data systems containing both LST events and the general fleet. Such a sample analysis could, in principle, also cover workplace injury accidents and hence provide one basis for analysing the LST incidents in depots / on private land.

4.51 No commitments have been made at present, but this idea will be explored with operators further during 2014.

Incident rates over time

4.52 **The key observation that can be made at this stage of the trial is that the rate of non-injury events is falling over time, as shown in Figure 24.**

Some operators have commented that they have also detected a reduction in all incidents once a group of drivers in a depot have 'settled in', with the pattern being repeated, albeit with fewer events, each time trailers are introduced at a new location. Whilst this seems plausible, it is not a pattern we have been able to identify in the data. However, it may be that the experience being cited includes many very minor events that are not required to be reported on the trial.

[33] Longer Semi-Trailer Operators Forum Organised by Freight Transport Association 6 Nov 2013 Volvo, Warwick

Table 8: Non-injury incidents involving LSTs (by vehicle location)

LST Related? (See Table 4 – page 18)	Yes	Yes - Partly	Maybe	Unclear	No	Grand Total
Private	**60**	**4**	**30**		**43**	**137**
10 Company Property / Depot	**47**	**3**	**23**		**37**	**110**
11 Other Private Property (not on road)	**13**	**1**	**7**		**6**	**27**
Public	**34**	**2**	**18**	**1**	**19**	**74**
00 On main carriageway - not in restricted lane	**33**	**2**	**17**	**1**	**18**	**71**
06 On lay-by or hard shoulder	**1**					**1**
07 Entering lay-by or hard shoulder					**1**	**1**
Unknown			**1**			**1**
Grand Total	**94**	**6**	**48**	**1**	**62**	**211**

Table 9: Non-injury incidents involving LSTs resulting in damage (by vehicle location and manouvre)

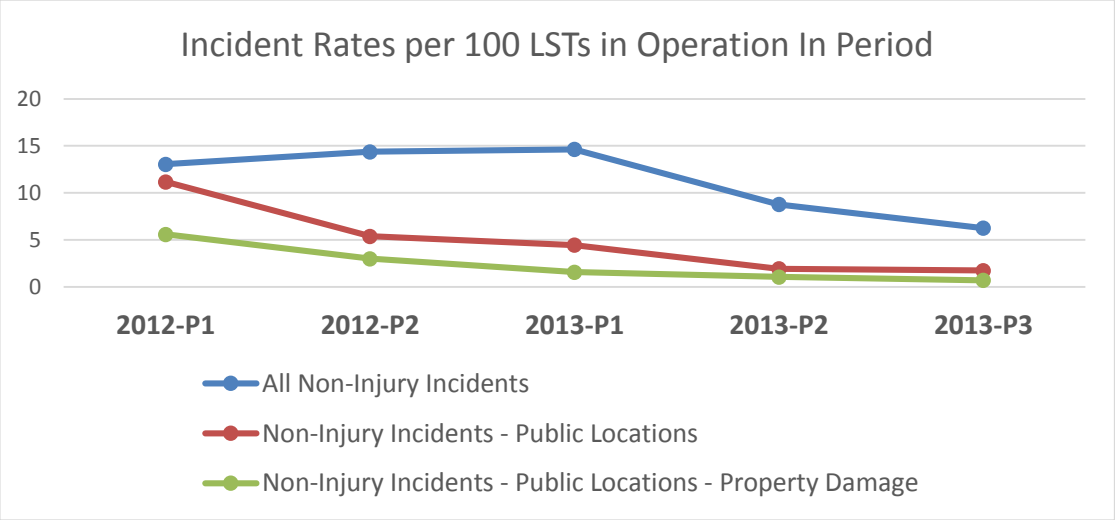
LST Related? (See Table 3)	Yes	Yes - Partly	Maybe	No	Grand Total
Private	**32**		**12**	**22**	**66**
10 Company Property / Depot					
01 Reversing			5	9	14
03 Waiting to go ahead but held up			1		1
05 Moving off	1		2	6	9
06 U turn	2			1	3
07 Turning left	11		2	2	15
08 Waiting to turn left	1				1
09 Turning right	8			3	11
10 Waiting to turn right	1				1
18 Going ahead other	1				1
11 Other Private Property (not on road)					
01 Reversing	1		1		2
02 Parked				1	1
05 Moving off	3				3
06 U turn	1				1
07 Turning left	1		1		2
09 Turning right	1				1
Public	**19**	**2**	**9**	**5**	**35**
00 On main carriageway - not in restricted lane					
01 Reversing				1	1
06 U turn	1		1		2
07 Turning left	12	1	3		16
09 Turning right	6	1	5	1	13
16 Going ahead left hand bend				1	1
18 Going ahead other				1	1
(blank)				1	1
Grand Total	**51**	**2**	**21**	**27**	**101**

Figure 24: Analysis of non-injury incidents by trial period

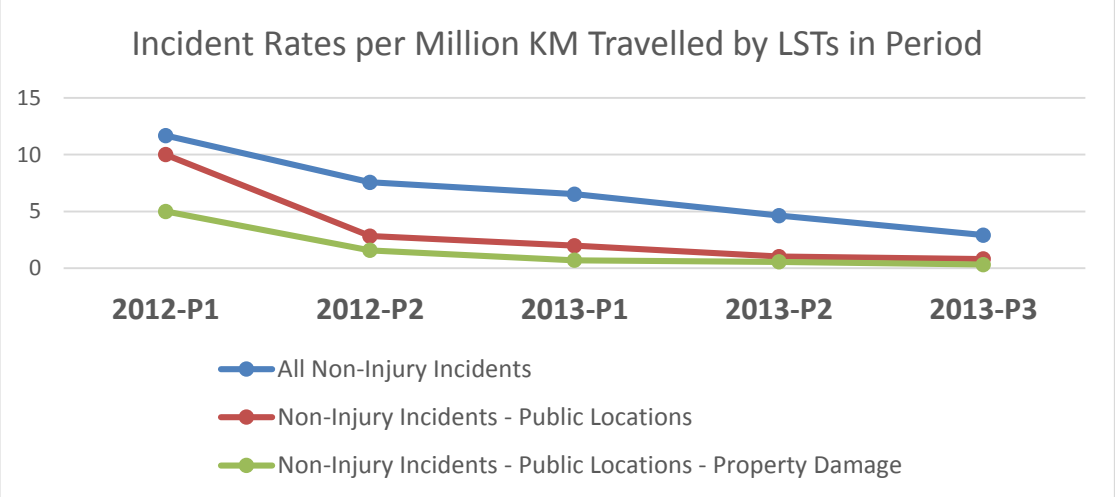
2a Summary Data

	2012 -P1	2012-P2	2013-P1	2013-P2	2013-P3
	May-Aug 2012	Sep-Dec 2012	Jan-Apr 2013	May-Aug 2013	Sep-Dec 2013
INCIDENT COUNTS					
All Non-Injury Incidents	21	48	56	50	36
Non-Injury Incidents - Public Locations	18	18	17	11	10
Non-Injury Incidents - Public Locations - Resulting in Property Damage	9	10	6	6	4
NORMALISING FACTORS					
LSTs Operating (by period end)	161	334	383	570	576
Million Vehicle Km (in period)	1.8	6.3	8.6	10.8	12.4

2b Incident rates normalised by number of semi-trailers in operation



2c Incident rates normalised by distance operated by LSTs



LST utilisation - preliminary analysis

4.53 The analysis presented here covers:

- Methodology used to estimate the LST operational utilisation and hence to derive the environmental impact of the longer semi-trailers in operation.
- Findings from the trial, based on the data responses of operators.
- Conclusions.

Utilisation and environmental Impacts

Methodology

4.54 One of the purposes of the LST trial is to understand the environmental impact of the longer semi-trailers (LSTs). While there are likely to be some whole-lifecycle impacts related to the slightly larger size (and hence greater material consumption) of the longer trailers, and their slightly increased weight due to additional steering axles, we are not in a position to estimate these from the current data captured in the trial itself.

4.55 The original impact assessment estimated that the largest component of environmental impact would come from savings in carbon dioxide and other harmful emissions resulting from reductions in journeys (and hence vehicle kilometres) due to longer trailers being operated full to capacity[34]. It also estimated a small tailpipe emissions increase (up to a maximum of 1.8%) due to a small increase in the aerodynamic drag from the vehicle's longer length and to a small increase in the un-laden weight of the vehicle. This was based on tractor units complying with Euro V regulations. While tractor units complying with Euro VI have recently entered the market, these represent a small part of the current tractor fleet and consequently have little impact to date on the overall energy consumption associated with pulling LSTs. As the trial progresses, the impact of an increasing number of EURO VI tractors on emissions may become more significant and is entirely separate from any impact arising from the increased capacity or additional fuel use arising from the trailer design.

4.56 The trial is not capturing fuel consumption directly, nor is it possible to make a comprehensive estimate of the emissions of environmental pollutants. However we can estimate the reduction in the number of journeys, and hence vehicle kilometres, as a result of the operation of fully laden longer semi-trailers, as a proxy for the reduction in direct environmental impact of their operation.

4.57 We could apply a simple factor to estimate the carbon dioxide or fuel consumption changes, however these are dependent on a range of factors that are not captured in the survey data, such as vehicle speed, loading, emissions compliance level (EURO IV, V, VI etc.) and so on. Such an estimate would be one step further removed from the data actually captured during the trial, so we have chosen not to provide it at this stage.

4.58 We have used the 1.8% estimate of tailpipe emissions increases identified in the original impact assessment to estimate the increased direct environmental impacts of the LSTs, using 1.8% of the total vehicle-kilometres operated by all LSTs as a proxy for this increased impact. We consider this estimate to be reasonable on present knowledge, although a separate study of the actual impacts of LSTs on tractor unit fuel consumption would need to be carried out to investigate this. [35]

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[34] Longer Semi-trailer Feasibility Study and Impact Assessment Final Summary Report, Department for Transport, December 2010

[35] The LST trial does not capture any data on actual fuel consumption as this would be very difficult to do (fuel use is associated with tractor units rather than trailers) and there are a large number of confounding factors such as loading and traffic conditions which would prevent comparisons from being meaningful. To investigate the actual impact of LSTs on fuel consumption in operation a specific controlled trial would need to be set up, comparing identical tractor units pulling longer and standard semi-trailers over a defined route in the same traffic

Loading levels

4.59 There are two main categories of semi-trailer operated in the trial, trailers up to 14.6m in length and trailers up to 15.65m in length. 79% of the trailers put into operation during the trial to date have been 15.65m length.

4.60 In analysing utilisation, it is important to take into account how 'mode or appearance' affects the actual additional load that is possible, rather than simply calculating on the basis of the available deck space.

4.61 The 14.6m trailers can carry one additional row of 2 standard pallets, or three standard FMCG cages, while the 15.65m trailers can carry an additional two rows of standard pallets or an extra nine standard FMCG cages over and above the standard 13.6m semi-trailer[36].

4.62 We have therefore assumed that a fully laden 14.6m semi-trailer would on average carry a maximum of 7% more goods, and a 15.65m semi-trailer a maximum of 15% more goods except where the MOA is standard cages, where the maximum additional load is 20%.

4.63 The more generous assumption for standard cages is considered to be reasonable since it is clear that the gain is significantly different for these two standardised modes of appearance. This arises because the maximum permitted LST length of 15.65m was not selected to optimise the loading of standard carrying units, but simply to fit inside the existing UK maximum vehicle length, defined by an 18.65m drawbar combination. The result is that on a 15.65m trailer with the deck loaded fully with standard pallets, there is a small section of deck which is not used. In contrast, standard cages happen to pack more exactly into the additional 2.05m permitted on the trial than do standard pallets and hence the actual gain in real operations, rather than just measured by deck space, is greater for cages than for pallets.

4.64 Goods loaded in other MOA may also pack such that the assumption for standard pallets is conservative. Bulk and other modes of appearance would have slightly different mechanisms for filling the additional available space anyway and there are also cases of mixed MOA. For all these cases we have currently applied the factors of 7% and 15% for 14.6 and 15.65m trailers respectively.

4.65 In the data collected during the trial there are several measurements of how laden each trailer-leg is. We collect data on:

- percent of the deck that is covered by goods (deck %),
- percent of the volume of the trailer that is filled (volume %),
- quantity (units) of the goods carried, dependent on mode of appearance, and
- weight of goods carried.

4.66 The number of legs that are reported where the load has been limited by weight is 2.5% of the total – indicating that the vast majority of goods being carried in the longer semi-trailers is predominantly higher volume, lower density. For the purposes of estimating vehicle kilometre (vkm) savings here, we have chosen to use the deck % measure of how full the trailers are. We plan to widen the analysis to look at volume fill issues in a future report.

4.67 Using this logic, we assume that on average each fully loaded longer trailer is effectively saving a proportion of an additional trip that a standard 13.6m trailer would have had to make to deliver the same quantity of goods.

4.68 The deck % data is captured either in bands or in actual figures (where available). For the purposes of this analysis we have assumed that the band 91-100% full is typically loaded to the median point, 95.5% full – the load carried by a longer semi-trailer loaded to this level could not have been accommodated in a smaller trailer. We recognise that within the band there could be range of fill levels and we know from conversations with some operators that

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conditions (i.e. no more than 1 mile apart), capturing fuel consumption via telematics. To date such a controlled trial has not been conducted, although it has been discussed with a small group of trial participants.

[36] A standard 13.6m semi-trailer carries 26 rows of standard pallets or 45 standard FMCG cages. The additional quantities noted here are a general case. In some designs, the additional load is further restricted by the door pillars at the back of the trailer and the final row of goods is limited to 2 cages instead of 3.

for their operations, the norm is for the trailers to be 100% full. More operators are now providing us with precise percentage fill measures in their trial data returns, rather than simply providing banded ranges, so in future we hope to refine the analysis by using actual fill levels rather than this median estimate.

4.69 Goods filling trailers around the 90% level could have been accommodated in a standard trailer, so no saving would be accrued at such a level.

4.70 For the purposes of this analysis we have assumed that a 14.6m trailer loaded to the 95.5% full level would carry 3.5% more cargo than a fully loaded standard length trailer, and a 15.65m trailer would carry 7.5% more for all MOA except standard cages, where we assume 10%.

Journeys saved by leg type – upper and lower bounds

4.71 We have captured data in the trial by a number of journey type categories:

1) EMPTY FROM DEPOT TO JOB
2) EMPTY BETWEEN JOBS
3) SUPPLIER TO DIST CENTRE
4) DC TO DC
5) To/from RETAIL SITE
6) To/from INDUSTRIAL SITE
7) PALLETISED TRUNKING
8) EMPTY BACK TO DEPOT
9) OTHER LEG TYPE

4.72 Leg type 4, Distribution Centre to Distribution Centre (DC to DC) are main trunking journeys. We assume that where possible journeys of this type always have the potential to be fully loaded.

4.73 Leg type 5, to/from retail site is a more subtle case. In most operations, the leg to the retail site could potentially be fully loaded, while the return journey is unlikely to be so unless a complementary backhaul load has been arranged. In the present analysis we are unable to link up each pair of legs. In the future a more detailed analysis may be possible, as the data on origin, destination and journey times could be used to link up the two legs. However each part of the journey (to and from) is replacing a trip or trips that would have been performed by a standard length trailer, so it can be argued that both legs should be counted when considering the overall change in vehicle kilometres due to the use of an LST.

4.74 For the purposes of this analysis we have considered an upper and lower bounding case based on how the large number of To/From Retail legs are treated:

- **Lower bound**: counting only each fully loaded journey to/from a retail site provides the lower bound to the total kilometres saved.
- **Upper bound**: double-counting these journeys - to also take credit for the empty return legs saved - provides an upper bound (with a maximum of 100% of journeys as a cap should the percentage of fully-loaded journeys be greater than 50%).

4.75 It is less clear whether other leg types would follow a similar pattern to the retail sites. At present, we have had the more detailed discussions with retail operators than other operators and hence we feel comfortable making an assumption for this leg type, but we have not made any assumptions about whether other leg types can be treated the same way in the current analysis. This means that we are likely to be underestimating the positive impact of the LSTs in removing journeys and vehicle-kilometres from the roads. Analysis of paired legs for all journey types would enable the analysis to be refined.

Mode of appearance

4.76 We have captured data in the trial by a number of mode of appearance (MOA) categories:

0) NONE

1) EMPTIES / WASTE PACKING

2) STD PALLETS

3) STD ROLLER CAGES

4) OTHER PALLETS / CAGES

5) PRE-SLUNG GOODS

7) LOOSE / BULK

8) MIXED M.O.A

9) INTERMODAL UNIT / ISO

4.77 We would anticipate that of these MOA categories, standard pallets, roller cages and bulk commodities would perhaps be most likely to be used to fill LSTs completely. We have at least one major retailer in the data where the quantity and hence utilisation data for their Mixed MOA operation appears to be proving difficult to complete automatically – their data indicates that their LSTs are often not operated full, but we are not convinced this is an accurate assessment as in discussions with them they claim to be filling the trailers more frequently. We therefore consider they are using an overly conservative formula for calculating their utilisation from their quantity data. We are currently discussing other options for their formula. Their data is a statistically significant proportion of the total, so we currently consider our current analysis of the overall environmental benefit to be a conservative one.

Period of data submission

4.78 Analysis indicates only 1% of the legs operated in Period 2012-P1, the first period of the trial, were full. This is significantly different from data for other periods – operators at this stage were in the process of learning how to a) make best use of the trailers and b) complete the data collection process accurately. We have therefore excluded this period's data from the utilisation analysis because we do not believe it is representative of the normal operation of the LSTs. This period's data represents 4% of the total.

Findings

Overall vehicle kilometres saved – Lower bound

4.79 Table 10 shows the overall analysis of total vehicle kilometres by trailer length based only on the loaded journeys saved on legs to/from retail sites. This calculation therefore represents the lower bound (as outlined in 4.75 above) of vehicle kilometres saved due to operation of full LSTs. To account for increased emissions associated with the operation of longer trailers identified in the original feasibility study and impact assessment, an increase of vehicle km of 1.8% has been applied across all trailer types.

Impact of leg type

4.80 Table 11 and Table 12 show the loaded vehicle kilometres by leg type, according to trailer length for full journey legs and for all journey legs. Table 13 shows the percentage of vehicle kilometres operated full for each leg type. Figure 25 shows this data graphically.

4.81 It should be noted that a very small number of 'empty' legs that have been declared as being loaded in the data returns. These appears as small amounts of loaded vehicle km for against leg types 1, 2 and 8, which are expected to be empty. These are due to errors in reporting of loads or errors in reporting of Leg Type, especially in early submission periods. They account for less than 1% of vehicle km and our latest data checking techniques should avoid this issue.

Table 10: Vehicle kilometres by trailer length

	Trailer Length (& MOA)			
	14.6m	**15.65m** MOA≠StdCages	**15.65m** MOA=StdCages	**Total**
Vkm for legs where LSTs are reported to be full (Full=91-100%)	2,595,932	12,142,035	2,350,085	**17,088,052**
All vkm operated by LSTs	5,100,110	26,121,817	3,688,723	**34,910,650**
Percentage of vkm operated by full LSTs	51%	46%	64%	**49%**
Assumed saving for vkm operated by full LSTs (additional load carried)	3.5%	7.5%	10.0%	
Vkm saved (lower bound)	**90,858**	**910,653**	**235,009**	**1,236,519**
Vkm 'increase' on all LST vkm as a proxy for emissions increase of 1.8%	91,802	470,193	66,397	**628,392**
Estimated net vkm saved	**-944**	**440,460**	**168,612**	**608,127**

Table 11: Loaded vehicle kilometres by trailer length and leg type, operated by fully loaded LSTs

	Trailer Length		
Leg Type	**14.6m**	**15.65m**	**Total**
1) EMPTY FROM DEPOT TO JOB	116	539	655
2) EMPTY BETWEEN JOBS	1,348	766	2,114
3) SUPPLIER TO DIST CENTRE	547,367	2,063,929	2,611,295
4) DC TO DC	851,318	7,301,744	8,153,063
5) To/from RETAIL SITE	158,338	3,449,812	3,608,150
6) To/from INDUSTRIAL SITE	521,434	220,342	741,776
7) PALLETISED TRUNKING	355,492	1,234,402	1,589,893
8) EMPTY BACK TO DEPOT	2,386	2,657	5,043
9) OTHER LEG TYPE	149,591	205,875	355,466

Table 12: Loaded vehicle kilometres by trailer length and leg type operated by all LSTs

	Trailer Length		
Leg Type	**14.6m**	**15.65m**	**Total**
1) EMPTY FROM DEPOT TO JOB	157	1,045	1,202
2) EMPTY BETWEEN JOBS	1,878	119,390	121,268
3) SUPPLIER TO DIST CENTRE	1,031,750	2,537,562	3,569,312
4) DC TO DC	1,200,226	10,433,146	11,633,372
5) To/from RETAIL SITE	490,759	7,774,224	8,264,983
6) To/from INDUSTRIAL SITE	718,853	453,967	1,172,819
7) PALLETISED TRUNKING	476,565	2,229,171	2,705,737
8) EMPTY BACK TO DEPOT	3,082	5,599	8,681
9) OTHER LEG TYPE	208,305	329,863	538,167

Table 13: Percentage of loaded vehicle kilometres operated full, by trailer length and leg type (excluding empty leg types)

	Trailer Length		
Leg Type	14.6m	15.65m	Total
3) SUPPLIER TO DIST CENTRE	53%	81%	73%
4) DC TO DC	71%	70%	70%
9) OTHER LEG TYPE	72%	62%	66%
6) To/from INDUSTRIAL SITE	73%	49%	63%
7) PALLETISED TRUNKING	75%	55%	59%
5) To/from RETAIL SITE	32%	44%	44%

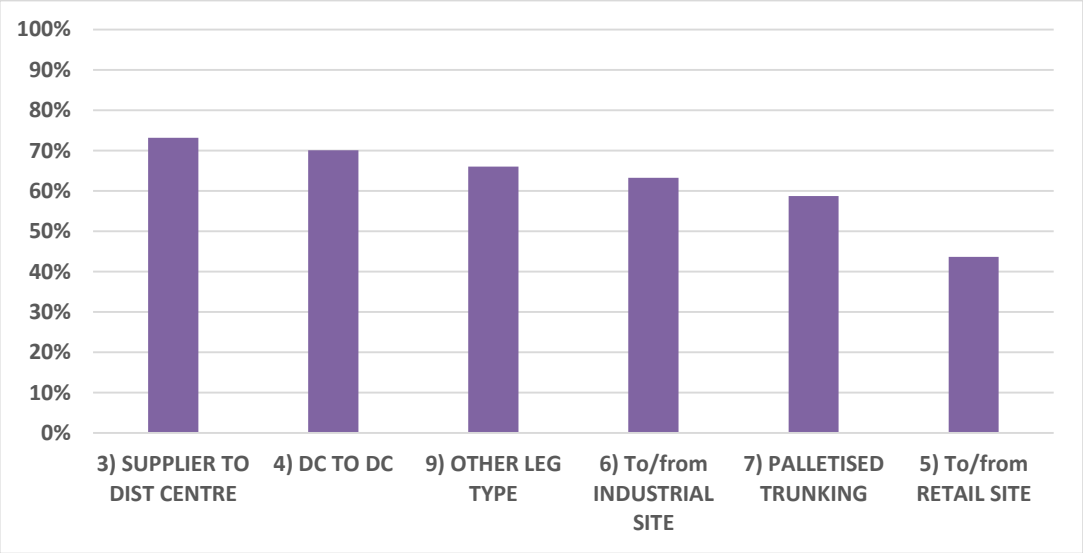

Figure 25: Percentage of loaded vehicle Km operated full, by leg type

4.82 As anticipated, the leg type to/from retail site has the lowest percentage of vehicle kilometres operated full – this is because for each full journey to a retail site it is likely that there will be an empty return journey as discussed above (Para 4.73).

4.83 The data on Leg Type 6) To/from Industrial site shows an apparently unusual outcome, with the distances covered by 14.6m trailers being greater than that by the 15.65m units. A review of the underlying data shows that this is not a general trend. It arises because 80% of the data under this leg type relates to a small group of operators with a single operator running 14.6m units over the entire trial accounting for 60% of all distance covered.

4.84 This is just one example of where more refined analysis of subgroups of the data (by Leg Type, MOA etc.) is not yet supported by the size of dataset gathered so far on the trial. By a similar argument, it could be observed that the 14.6m trailers appear to attain higher utilisation than the 15.65 units for a number of the leg types (from Figure 25). However, at this stage such results are more likely to be facets of the limited data sample than a general trend, as shown in the example above. We have not therefore, at this stage, taken the analysis down to look at lower level segments of the overall dataset.

4.85 Multidrop journeys are recorded as a series of separate journey legs unless there are more than 4 individual drops in which case these are recorded as a single ‘multidrop’ leg. Such multidrops account for 0.3% of all journey legs collected to date, reflecting the very small number of operators using LSTs for work involving intermediate part load drops/collections.

Overall vehicle kilometres saved – Upper bound

4.86 Recalculating the vehicle kilometre savings using the assumption that savings from loaded legs to/from retail sites can be doubled due to savings on empty return journeys (as discussed in paragraph 4.75), gives the results shown in Table 14.

Table 14: Estimated vehicle kilometre savings, assuming additional saving of retail site return legs (Upper bound)

	Trailer Length			
	14.6m	**15.65m** MOA≠Std Cages	**15.65m** MOA=Std Cages	**Total**
Vkm for legs where LSTs are reported to be full (Full=91-100%) with the vkm associated with legs to/from retail sites doubled	2,754,270	14,327,980	3,613,952	**20,696,202**
All vkm operated by LSTs	5,100,110	26,121,817	3,688,723	**34,910,650**
Assumed saving for vkm operated by full LSTs (additional load carried)	3.5%	7.5%	10.0%	
Vkm saved (upper bound)	**96,399**	**1,074,599**	**361,395**	**1,532,393**
Vkm 'increase' on all LST vkm as a proxy for emissions increase of 1.8%	91,802	470,193	66,397	**628,392**
Estimated net vkm saved	**4,597**	**604,406**	**294,998**	**904,001**

Conclusions

4.87 There are a number of factors to take into account when considering the likely environmental impact of operating longer semi-trailers. This analysis has used the data available from the LST Trial to calculate the impact of longer semi-trailers on overall vehicle kilometres, using assumptions about the vehicle kilometres removed from the road through the operation of fully loaded LSTs. The analysis has also included a simple assumption for the increased energy consumption (and hence emissions) associated with pulling LSTs, and converted this into a measure of increased vehicle kilometres as a common currency for the analysis.

4.88 We have assumed that trailers reported to be full using the banding range **Full=91-100%** are all operated at the median point of the band, at 95.5% full. However in reality this is likely to underestimate loading, particularly where standard pallets or cages are used. Operators are beginning to provide more accurate percentage fill levels so more detailed analysis using more accurate fill should be possible in the future.

4.89 We have also made an assumption about the operation of trailers serving major retailers through journeys to/from retail sites, providing us with an upper and lower bound on the total vehicle kilometres saved. This analysis could be refined and extended to other leg types (see below).

4.90 The analysis is considered to be conservative, due to at least one major retailer potentially underestimating the loading of their LSTs, due to the complexity of assessing loads on trailers carrying mixed units with automatic systems. We are currently discussing with them ways of estimating their fill levels more accurately.

4.91 According to the analysis we estimate that between 600,000 and 900,000 vehicle km (rounded) have been removed from the road during the operation of LSTs since September 2012.

Future Work

4.92 There are further refinements that could be made to the analysis, for example:

- Using more accurate fill rates to estimate the removal of vehicle kilometres from the road. This is likely to reduce the overall benefit calculated.
- Providing a detailed tying together of to and from legs for all leg types, to provide a more accurate assessment of the vehicle kilometres saved, by accurately identifying which return journey empty legs are associated with full legs. This is likely to increase the overall benefit calculated.

4.93 We are also planning to analyse and provide feedback on the mixed mode of appearance data to encourage operators who may be under-reporting their loading, to improve their estimates.

Summary evaluation of trial outcomes (to Dec 2013)

4.94 **The trial data has been shown to support preliminary analysis of two key issues.**

4.95 **There is no indication of any increase in risk arising from operation of LSTs on the trial.**

4.96 **Utilisation rates have been analysed to provide a basic statement of the 'journeys saved' due to operations of the LSTs on the trial to date.**

5 WIDER IMPACTS - LOOKING AHEAD

Wider application of outputs and outcomes

Wider Impacts

Applicability of results to general UK semi-trailer fleet

5.1 The trial is not yet mature enough for us to make robust conclusions about the applicability of any of the outputs to a more general case of LST being operated as a general part of the GB HGV fleet, outside the special conditions imposed by the trial:

- The dataset is not yet large enough to support the more subtle analysis required
- The population of LSTs covered by the analyses reported here represents only one third of the target total of 1,800.
  (At the time of writing that figure is ~1000)
- The operation of the LST is, for many operators, still a new experience and so the long term patterns of working are not necessarily those which we see today.
- The training of drivers is still very recent – we have not yet seen if, over time, the incident rate falls (perhaps as early lessons are learned) or rises (perhaps as early caution fades).

5.2 Some of the outputs are worth noting and we will monitor these over the course of the trial:

- The 'empty running' by distance appears to be significantly lower than the general HGV fleet, reflecting the large proportion of usage being between DCs.
- Where the LSTs are loaded, the proportion of distance travelled where the additional trailer length is in use, ranges from around 45% (for retail deliveries) up to 70-75% (for supplier deliveries to DC and DC/DC legs), with the figures being as high as 80% for supplier deliveries if only the 15.65m trailers are assessed.
- The preliminary analysis of injury incidents, at least for public/other road users, suggests that operating under the trial conditions, the LSTs are not introducing additional risk. Whilst it is not yet clear how much this is due to factors such as the routes they are running on (limited urban use) or the special care being applied in their operation, the data shows no evidence for safety concerns arising from the use of the LSTs on the trial.

Trial and evaluation management

5.3 The top priority during 2014 will be to introduce new participants into the trial smoothly. With the revised allocation process, we now need to consider the number of participants growing from about 75 at the end of 2013 to at least 130[37] by the end of 2014. For this to be managed efficiently the VCA, DfT and Risk Solutions processes will need to manage around three times as many new entrants as were seen in 2013.

5.4 For Risk Solutions this means:

- Helping existing participants to make their data collection more efficient and less demanding in terms of support, as well as improving the quality and completeness of the data produced.
- Supporting new participants in setting up their systems and, where possible, transferring experience and lessons from the existing participants.
- 'Tuning' our monitoring, contact tracking, data checking and resource management to further reduce the average time taken to support each participant.

[37] See para **Error! Reference source not found.**. 130 is the number who, at the time of writing, held VSOs or had provided proof of order to DfT. It is therefore the minimum number of operators expected to participate. The final total will not be certain until all allocations are taken up and VSOs granted.

Looking ahead

5.5 A mid-year trial evaluation project review will be held with DfT in October/November 2014.

5.6 A further trial participant forum may be held in November 2014.

5.7 These two events will be used to look ahead to 2015, which should be the first full year when we might expect the entire fleet of 1,800 LSTs to be on the road.

5.8 We will need to consider the next set of issues for trial management and evaluation, including, but not limited to:

- Further development of the data collection, checking and cleansing processes to handle up to three times the current quantity of data being submitted each period.
- Expansion/migration of the trial master data to a platform capable of holding and analysing the estimated two million journey leg records per year that will be generated once there are 1,800 semi-trailers in the trial.
- Consideration of alternatives to the current three data collection cycles per year, to reduce the time spent by operators and Risk Solutions/DfT on the submission process. For example, a reduction to two cycles per year might be considered if:
  - Operators and Risk Solutions/DfT agreed that it would be beneficial
  - Suitable safeguards could be agreed to ensure that data quality were not reduced
  - Adequate levels of support could still be offered to those who need it.
- Extension of the data sources and analysis to include not only the basic counterfactual information currently gathered in the survey, but other counterfactual data from DfT traffic flows, operational patterns and the DfT Continuing Survey of Road Goods Transport.
- Selection, by DfT, of key topics for special analysis, whether by Risk Solutions, our associate transport analysis experts or by specialists. For example, topics might include analyses of parameters such as distances travelled by road type, urban vs other etc. This might be achieved by route modelling, or it could be approached by working with major telematics companies to analyse the datasets they hold across multiple operators[38].
- Discussion of possible special analyses using corporate data from selected participating companies (for example, comparisons of damage only or staff injury data for LST vs. standard fleet).
- Consideration of whether a special empirical test of fuel consumption or other engineering parameters under operational, but controlled, conditions is required and how such a test would be arranged.

5.9 Finally, this trial depends very heavily on the continued goodwill of the participants. DfT and Risk Solutions need to continue to engage with the industry and its trade bodies to maintain interest and commitment to the trial. Open dialogue at industry events is generally well received and also provides us with valuable insights into the experience of those operating these new semi-trailers.

5.10 **Risk Solutions would like to record thanks to all operators on the trial, especially the individual data contacts, for their continued positive cooperation and hard work in collating, cleaning and submitting data in keeping with the operator undertaking. Without this effort the trial data for evaluation the trial and eventual evaluation could not take place.**

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[38] In discussion with two large telematics providers they noted that their contracts with operators permit the telematics company to undertake some forms of analysis using the data held on behalf of the hauliers. Obviously any such analysis is at a level where the individual companies are not identifiable. The concept is appealing not only because it would yield information about road type and similar parameters, but also because there is a possibility that exactly matching data could be extracted for a set of 13.6m trailers travelling on the same routes at a similar time to the trial data legs operated by the LSTs.

APPENDIX A THE DATA FRAMEWORK

The data framework for use by all participants is defined and explained in a document provided to all participants **"DfT High-Volume Semi-Trailer (LST) Trial: Data Gathering Guide for Trial Participants"**. The latest version (v2-3) was issued in April 2013, although the work undertaken during 2012 would have used earlier versions issued in April 2012 and updated in August and December 2012. Whilst there has been some change in the formatting, the content of the guide and the data framework itself has not changed substantially since August 2012 and we have therefore chosen to publish the summary information from the latest edition here, so that it is up to date, rather than any of the earlier versions actually used in 2012.

Sections A1-A4 which follow are taken directly from Appendices A-D of the April 2013 guide and hence the language is framed in terms of guidance to participants rather than a report.

A1 DfT Rationale for data requirement

The notes in this appendix have been edited from a DfT document outlining their rationale for the extent of the data being requested. The 'We' in these notes refers to DfT.

Company Information File (CIF)

We ask for three years' information as this helps to ensure that it reflects your true situation (in current circumstances in particular, one year's information might not be properly representative).

We need the information on size of business and total number of employees because of the requirement on Government to monitor the impact of measures on small or medium enterprises; this is something that we had to cover in the Impact Assessment and that we need to verify through the trial.

The information on the nature of your operation allows us to assess whether the longer semi-trailers are likely to be used by a broad spread of operators.

The section about your preparation for LST Trial / operations gives us background information on the way in which participants are using their vehicles that will help us to assess whether or not the original research was correct in assuming that the introduction of these vehicles would not be likely to have implications for infrastructure.

The questions about your Non-LST fleet provides an initial benchmark information that we need in order to ensure that the comparisons with the standard articulated fleet established through the trial are robust. Again, we are asking for three years' data to ensure we have a representative picture. Although this is not the only comparison being considered, it is a starting point.

Qualitative Survey File (QSF)

The QSF provides an opportunity for operators to convey the experience of operating the LSTs from the perspective of a range of staff and the business as a whole.

LST Data Submission File (DSF)

Aggregated Journey Log

Job Code: there is no obligation to enter anything here but it could be useful for you in cross-checking if there are any queries.

Client Code: providing this will allow the Department to get a clear picture of the type of operations where the longer semi-trailers are being used in practice. The Impact Assessment that was derived from the initial research and the consultation in 2011 contained a number of assumptions on the type of operations – gathering this information will help us to review the original Impact Assessment and adjust it if necessary. In later years we may look at refining this to a set of generic client types from which you select.

Date/Time: self-explanatory – time is of specific interest to see the balance of peak/off-peak or day/night usage of the new trailers.

Company trailer ID: this means we can cross-reference all the information to the specific trailer; if there were to be a number of incidents, this would give us an indication of whether there was a specific design that was particularly vulnerable. Specifically, it links to the trailer VIN, via the information given in the Trailer Reference Information sheet.

Journey leg details / Distance: this also helps build up a picture of the manner in which these vehicles are operating, and provides data for the assessment of the increased efficiency that they allow.

Incidents on leg: this column just takes a straight 'yes' or 'no'; the actual reporting of incidents is done on the Incident Log (see below).

Type of Goods: this is also to help us verify the assumptions in the research and the Impact Assessment on the type of loads for which these vehicles are most likely to produce the anticipated benefits.

Mode of appearance / Quantity of Units / Weight of goods carried / Estimated % of volume & % deck space) / Load limited by weight?: this information will help us to quantify the benefits by giving us data from which we can assess the increase in tonnes per lorry mile. This in turn will give us a more representative view of the carbon reduction than a straight comparison of fuel use would do.

(The trouble with just reporting on fuel consumption, without including load data, is that there could be any number of factors that affect this one way or another. For a start, the additional length of the trailer is likely to affect the fuel consumption so a straight comparison between a 13.6m trailer and a 15.65m trailer could be misleading.)

Multi-Drop: multi-drop journeys may treat runs with 5 or more drops as one data record (leg). For 1,2,3 or 4 drops, each part of the journey should be recorded as a separate Leg. This is the same principle as the DfT Continuing Survey of Road Goods Transport which will be familiar to most operators.

Trailer Reference Information

Relates the usage of a trailer to its VIN and some basic design information.

Some of the design data would be included in the VSO data, but much of is it not, such as the body construction, presence of features such as refrigeration. (An important example, since chilled trailers necessarily have perhaps 30% empty volume above the goods to allow for circulation and this needs to be considered in volume utilisation data.

Incident Log

Trailer ID / Job code / Company incident ref / Date incident recorded and reported: these columns will enable us to keep track of the circumstances of any incidents and cross-relate them to the vehicle.

Date / Time / Location (by road) / Location (by description): these will enable us to know what the driving environment was (for instance, trunk road at a time when there would be a steady traffic flow, built-up area in quiet hours).

Road User Category of Injured Person / Level of Injury/ Damage to vehicle or load / Damage to property: these will provide information on the degree of severity and the nature of any injuries. **Please note** that we are using STATS19 injury levels: these are explained on the next tab in the workbook. **Please also note** the more detailed lists of category of injured person. For the most part these should be reasonably self-explanatory, but just to clarify:

- The driver of the HGV counts as 'HGV occupant';
- 'Pedestrian' means a member of the general public who is not in/on another vehicle;
- 'Company staff' and 'Client staff' are staff members not in the vehicle at the time of the incident.
- **It is vital that we have information on all injuries, so you will see that you are asked to fill in a separate row for each person injured in any incident.**

Vehicle location / Incident location etc: these build up the picture of what happened and the extent to which the trailer length may or may not have been a factor.

Additional details: these allow you to enter a certain amount of additional relevant information. They will also allow you to enter 'near misses'; these could cover anything like having difficulty negotiating a roundabout, finding that the tail-swing narrowly misses parked vehicles, street furniture or buildings when turning corners, etc. The important thing is to record enough detail to describe the event and to include any details related to the trailer being an LST rather than a standard 13.6.

We know there has been a certain amount of concern that if any of these vehicles is involved in a serious accident, the trial could be halted. While we cannot second-guess what Ministers may decide in any given set of circumstances, it's important to remember that the intention of the trial is to compare the performance of these longer semi-trailers against that of the existing fleet. We know that accidents will sometimes occur. Among other things, the trial needs to look for evidence of whether or not the longer semi-trailers are more susceptible to accidents than the existing fleet. We will only know this if the trial uncovers a trend that can be linked to the extra length.

A2 CIF (Company Information File) questions (v2-3)

An outline of the CIF questions in use for every new entrant in to the trial and is collected only once.

(1) COMPANY AND LST TRIAL INFORMATION

1-1 Organisation Information

1-2 Respondent Details

1-3 Business Scale at end of last 3 years. Can be a best estimate if exact values are not easily available. Can be end of calendar or financial year depending on your data.

1-4 What is the PRIMARY or LARGEST part of your operation?

1-5 What, if any, systems do you use to generate and manage key data?

(As with all data, this will remain confidential. The purpose in asking is to allow us to see what the primary sources of data are in the trial) and to enable us to ensure we can keep all the main software systems providers informed about the data element of the trial so that they can support trial participants effectively).

Select products/suppliers from a list given.

1-6 What special limits have you put on your LST operations (Tick as many as apply)

1-7 Actual or Estimated Date of LSTs entering service (to be removed from v-2-4 May 2014)

(2) NON-LST SEMI-TRAILER FLEET INFORMATION

2-1 Fleet Size and Body Design Mix

- 2-1-1 Non-LST Trailer Fleet Size
- 2-1-2 Non-LST Trailer Fleet Basic Design

2-2 Fleet Utilisation Measures

- 2-2-1 Non-LST Trailer Fleet Utilisation
- 2-2-2 Trailer Availability. Number of days across all the operational fleet - estimated back in 2-1-1 as shown
- 2-2-3 Proportion of Journeys/Legs where the available DECK SPACE filled is (list of bands):
- 2-2-4 Proportion of Journeys/Legs where the available VOLUME filled is (list of bands)
- 2-2-5 Proportion of Journeys/Legs where load was limited by weight:
- 2-2-6 Proportion of trips by JOURNEY TYPE '
- 2-2-6a If 'Other' is >10% please indicate journey type please describe usage

2-3 Goods Transported

Estimate of the actual average for your non-LST semi-trailer fleet for 2012 for

- 2-3-1 Nature of Goods Transported
- 2-3-1 MODE OF APPEARANCE of Goods Transported

2-4 Incidents Involving Non-LST Semi-Trailers

We are aware that different companies will hold differing levels of detail on incidents involving their regular fleet. In this section, apply common sense in terms of the materiality of the incidents and where appropriate, give estimates

2-4-1 Incidents Involving Injury

2-4-2 Known Injuries

2-4-3 Accidents where Police Involved

2-4-4 Accidents by location

2-4-5 Damage to Other Vehicles & Property

2-4-6 Damage to Your Vehicle (Ignore minor damage if in depot etc.)

A3 QSF (Qualitative Survey File) questions (v2-3)

This sheet differs from the others in three ways.

1. It can be filled in more than once in a single period – for example if the operator would like to submit a copy from each depot to reflect their differing experiences.
2. Not all the questions need to be answered every time it is completed.
3. The questions may change from time to time as the trial develops.

The questions shown here are those used in 2012-P2 and 2013-P1

3-1 Did you encounter any issues or problems with incorporating the LSTs into your operation?

3-1a If 'Yes' to Q1, in which areas did you encounter problems (tick all that apply)?

During loading / During driving / Negotiating client depots / Other

3-1b: If 'Yes' to Q1, please describe the issues or problems you encountered:

3-2 Did you undertake any special training of staff in advance of operating the LSTs?

3-2a If 'Yes' to Q2, which staff underwent training (tick all that apply)?

Loading/ depot staff / Drivers / Planners/ Managers / Other (please specify)

3-2b If 'Yes' to Q2, please briefly describe the training that was given to staff:

3-3 Did you undertake any other special preparation in advance of operating the LSTs? (e.g. staff training, physical changes to loading areas or depots, changes to planning or operations processes etc.)

3-3a If 'Yes' to Q3, please describe the preparations you made

3-4 Have you had any feedback (positive or negative) from any of the staff and/or other groups listed here on the introduction of the LSTs? (tick all that apply)

Loading/ depot staff / Drivers / Planners / Managers / Clients / General Public / Local Authorities or Politicians / Lobby Groups / Other (please specify)

3-4a If 'Yes' to Q4, please briefly summarise the feedback (positive or negative) you received.

3-4b How would you summarise the feedback you have received (Across all groups together)?

3-5 Have you chosen to operate the LSTs in a more restrictive way than your other semi-trailers?

3-5a If 'Yes' to Q5 please describe any restrictions you imposed and the reasons for them:

3-6 Overall, what is your view of the performance of the LSTs for your business?

A4 Data Submission File (DSF) journey data fields (v2-3)

The tables overleaf give a more detailed description of each data field in the journey log.

This information will be of interest in any case where the operator is creating their own data gathering or collating tools, or more likely, in setting up a standard export or report from an existing IT system. In order to ensure the data created using these methods is 100% compatible with data from other operators, the format of key data fields is important.

The key examples are

- date and time fields need to be in Excel Date/Time format
- text fields need to be **Text** or **General**
- numeric fields need to be **Number** or **General**
- percentage fields need to be **Percent format** (which can be forced by simply including a % symbol after any number.

The second important area is where responses to the trial bespoke fields are being generated or derived from existing IT systems and the actual entry is being created automatically. These include Leg Type, Goods Type, MOA and Estimate Volume % or Deck Space % Utilised. Here it is vital that the text (or 'string') generated matches the standard values exactly.

Existing users from periods prior to 2013-P1 need to note that the text strings have been changed (tidied up) and hence any embedded copies of the text lines in automated reports needs to be updated. We apologise for this change, but judged that we needed to make this adjustment before the numbers of trial participants increased further.

Special category lists for LST trial in Trailer Reference and Incident Log Sheets

Other specialised category lists are used in the DSF Trailer Reference Data and Incident Log sheets. However, they are not detailed here as it is expected that operators will simply fill in these data directly into a copy of the worksheet. If participants wish to generate this data by another means and hence required the detailed formats/options used, please contact Risk Solutions for information on how to unlock the file.

TABLE 1: Journey Log Data Fields and Validation/Formatting Requirement

Col	Title	Description (*Purpose*)	Validation / Format
A	**Row**	Log row number (only required in log file)	
B	**Company (& Depot)**	Hidden and automatically generated in Log file – revealed in Data Submission File (DSF) Depot only if DfT notified of depot submission	Text with '>>' delimiter i.e. **Company>>Depot**
C	**Data Code Stamp**	Hidden and automatically generated in Log file – revealed in DSF A coded reference to the originating log file it is actually the exact Excel DATE/Time when the file was last saved.	Excel 'General' – numeric If not from LOG File leave blank or insert own ref.
D	**Job Code (Optional)**	Company unique reference for the leg/journey. One code may apply to several consecutive journey legs.	Text Company's own format.
E	**Client(Optional)**	Name or reference to client for whom the goods are being carried	Text
F	**Date**	Date of journey START	Date dd-mmm-yy
G	**Day of the Week**	Three letter format (Mon, Tue, Wed etc.) of journey START *Provides a cross-check on dates in data*	Text – 3 Char ddd format (Mon, Tue etc.)
H	**Company Trailer ID**	Company normal trailer ID (T146, ET4076 etc.). *Allows easy reference to trailer - VIN/TIN matching in DSF sheet*	Text – as used by company
JOURNEY INFORMATION FOR EVERY POINT TO POINT LEG.			
I	**Origin Location**	Town (and Postcode) of Origin	None – free text
J	**Depart**	Time of departure from origin 24hr Format hh:mm	Automatic – time
K	**Arrive**	Time of arrival at destination Format hh:mm	Automatic – time
L	**Dest'n Location**	Town (and postcode) of Destination	None – free text
M	**Journey Leg Type**	Special set of journey descriptions, based on the likely market uses for LSTs from the trial feasibility and impact report	Text from Valid Options as in Table 2
N	**Distance (mile) (Optional)**	Distance travelled in miles if that is your raw data format. If you enter data here it will be converted to km in column O.	Number – Zero Decimal Places (can be integer)
O	**Distance (km)**	Distance travelled in km. If you enter data here it will override (permanently) the conversion from miles of data in column N. **This is the only distance unit used in summary and analysis**	Number – Zero Decimal Places (can be integer)
P	**Incidents**	If any reportable incident occurs during the journey then record YES or company assigned incident references *Allows later matching of incident data to journey information*	Text Default / Empty is **blank** (not zero)
CARGO AND LOADING INFORMATION			
Q	**Type of Goods**	Not the standard DfT commodity list – a special shortened set of options for this trial	Text from Valid Options as in Table 2
R	**MOA**	Mode of Appearance - the way the goods are present and loaded	
S	**MOA Quantity (Optional)**	Number of units of the Mode (Pallets etc). For Bulk goods or Livestock use 1. For Empties, use 0 (Automated in LOG File)	Automatic – Zero or Positive whole number.
T	**Goods Weight**	The weight of goods loaded in kg. (i.e. If from weighbridge data, need to remove weight of tractor unit and trailer)	Kg Numeric – no decimals
U	**(Estimated) Volume Utilised**	From data, central estimate (based on knowledge of load and trailer, or driver best estimate – selected form bands OR (from v2-3 onwards) as actual % values	List of bands (overleaf) or Excel % format
V	**(Estimate) Deck Space Utilised**	From data (e.g. pallet count if all one size), central estimate or driver best estimate – selected from bands (Empty, 0-25% etc). OR (from v2-3 onwards) as actual % values	List of bands (overleaf) or Excel % format
W	**Load Limited By Wt**	Was the trailer less than 100% loaded due to 44 tonne limit or trailer load limit	Text - 'Yes' or 'No'
X	**Multi-Stop**	Multi-drop/pickup journeys with 5 or more stops, can be recorded on a single row. Simply enter number of drop/pickup stops here.	Integer. Default=1 - Any value >=5 then valid.

TABLE 2: Special Trial 'Valid Options' Lists

Some of the data to be collected for the trial is likely to be part of the normal information gathered by companies and is similar to that required by DfT when operators contribute to the Continuing Survey of Road Goods Transport. However, this trial differs from regular data gathering because it needs to:

a. Gather data about TRAILERS, rather than whole vehicles or tractor units
b. Gather data in order to verify specific claims / forecasts that have been made in regard to the costs and benefits of permitting LSTs in the UK

Four of the data fields requested therefore have bespoke lists of response options and validation in the log will ensure only these are used.

Note to IT/Data Analysts Creating Data from Corporate Systems
For these fields the LOG file requires the full option text. However, the DATA SUBMISSION FILE will accept just the number of the option to generate the results in the Summary worksheet. (I.e. Journey Type '4) DC to DC' can be coded simply as '4', 90=76-90%' as '90'). Hence when generating this bespoke data from existing systems or to insert into such data, only the numeric code from the option need be created if this is easier.

JOURNEY LEG TYPE (Column M)	TYPE OF GOODS (Column Q)
1) EMPTY FROM DEPOT TO JOB 2) EMPTY BETWEEN JOBS 3) SUPPLIER TO DIST CENTRE 4) DC TO DC 5) To/from RETAIL SITE 6) To/from INDUSTRIAL SITE 7) PALLETISED TRUNKING 8) EMPTY BACK TO DEPOT 9) OTHER LEG TYPE	0) NO CARGO 1) EMPTIES / WASTE PACKING 2) FMCG (MIXED PRODUCTS) 3) FMCG (SINGLE PRODUCT) 4) RAW MATERIAL/SUPPLIES 5) INDUSTRIAL PRODUCTS 6) BIOMASS / FUEL 7) MAIL / PARCELS 8) OTHER - RETAIL 9) OTHER - NON-RETAIL 10) PALLETS - MIXED/UNKNOWN
MODE OF APPEARANCE (Column R)	**VOLUME % (Column U) & DECK % (Column V)**
0) NONE 1) EMPTIES / WASTE PACKING 2) STD PALLETS 3) STD ROLLER CAGES 4) OTHER PALLETS / CAGES 5) PRE-SLUNG GOODS 6) LIVESTOCK 7) LOOSE / BULK 8) MIXED M.O.A 9) INTERMODAL UNIT / ISO	0=EMPTY 25=BELOW 25% 50=26-50% 75=51-75% 90=76-90% 100=91%- FULL **NB: The format of these text lines has changed with v2-3 to remove spaces and minor inconsistencies in the format. Users with these text lines embedded in their download systems will need to make appropriate adjustments, although the old formats will still 'work' during 2013-P1 only.**

A5 Trailer reference information

5-1 Number of Trailers

5-2 Changes in Trailer Status (during survey period)

No Change / New Entry / Sold / Scrapped / Out of Service

5-3 Basic Body Construction

FLATBED

BOX

CURTAIN SIDED

CURTAIN WITH RETENTION

SWAP-BODY

CONTAINER CARRIER

TANKER / BULK

OTHER

5-4a Other Features

Refrigerated / Top / Roof Loading / Tail Lift / Self-Loading (Montecon, Crane, etc.) / Walking Floor / Similar / Additional safety features (sensors, cameras, driver aids)

5-4b If Additional Safety Features are present on some trailers, please give an indication of the nature of the features and number of trailers fitted.

5-5 Decks (Numbers of trailers with each arrangement)

Single / Fixed Dual – Full / Fixed Dual – Partial / Moving Dual – Full / Moving Dual - Partial

5-6 Axles Overall Arrangement (Number of trailers with each configuration)

All Fixed / 1 or 2 Self-Steer / 1 or 2 Command Steer (Passive) / ACTIVE (Any more complex)

5-7 Axle Structures (Number of trailers with each structure)

Standard / Wheel Box

5-8 Tyres Fitted

Super Single (All Axles) / Double (All Axles) / Single (All Axles) / Mixed

5-9 Individual Axle Load and Lift Design – for each axle:

a) Design Max Load: Lowest cited [kg]

b) Design Max Load: Highest cited [kg]

c) Lift / Retractable:

A6 Incident log

The incident log fields are based on a selection of the fields used in the national STATS19 database which is completed when the police attend a road incident. Some fields have then been expanded to allow recording of serious incidents on private property, such as in a depot, which would not fit into the normal STATS19 framework.

The fields are listed below. In most cases the user selects their response from a list given in the sheet and based on the STATS19 response options.

- Date and time of Incident
- Location (Road or nearest road)
- Location Description
- Person Number (if multiple injuries use one row per person)
- STATS19 Injury Level
- Damage to Vehicle and /or Load
- Damage to Property
- Vehicle manoeuvre at time of incident
- Vehicle location at time of incident
- Incident Location - relative to nearest junction
- Any vehicle skidding or overturning?
- Did vehicle hit object on road?
- Did vehicle hit another vehicle?
- Did vehicle leave carriageway?
- First object hit by vehicle off carriageway
- First point of impact on vehicle
- Comments on incidents and near misses (in addition to any comment in Part 3 of the survey)
- [NEW DURING 2013]
  Operator assessment (judgement) of whether the incident was affected by the design being an LST. Judgements made according to a defined scale as shown below.

LST Related?	Judgement Guidance
YES	The fact that the trailer was an LST was the major contributor to either the fact the event occurred or the severity of the outcome.
YES - PARTLY	The fact that the trailer was an LST was only one of the contributors to the event occurring or the severity of the outcome.
MAYBE	It is possible that the fact the trailer was an LST was a factor, but not certain.
NO	The fact the trailer was an LST was not a factor in the event.
UNCLEAR	The information about the event, or the circumstances mean no judgement can be made. (For example, damage to the trailer discovered on depot 'walk round' – no information of how and when it was sustained)

(Copy of)

APPENDIX B: LST TRIAL EVALUATION LOGIC MODEL

HMT evaluation principles and the use of logic models

- The HM Treasury Magenta Book ('Guidance for Evaluation')[39] is " . . . the recommended central government guidance on evaluation that sets out the best practice for departments to follow . . . for all policy makers and analysts".
- A central element of the guidance in the Magenta Book is the structuring of the policy / initiative objectives and intended outcomes into a 'logic model' as illustrated in Figure 26.

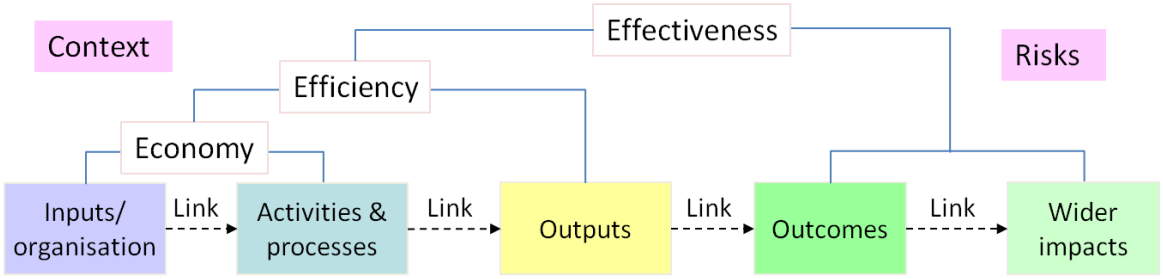

Figure 26: Generic evaluaton Programme Logic Model (PLM)

- The PLM provides a structure for evidence gathering, collation and analysis. It maps, in broad terms, how the inputs, key activities and outputs are used to deliver the desired outcomes of the trial (the delivery chain).
- The remainder of this report has been structured around the PLM elements, which are:
  - **Inputs** include items such as financial inputs, people, data and infrastructure, and organisational structures necessary to allow the trial to proceed. (Chapter 1)
  - **Activities and processes** use inputs and result in outputs. They are valuable only to the extent that they produce useful outputs. (Chapter 2)
  - **Outputs** are of value to the extent they are necessary for beneficial outcomes to be achieved or in this case, include the data to demonstrate that this is so. (Chapter 3)
  - **Outcomes** are the direct end products, in this case being responses to the sorts of questions noted in 1.11 and demonstrated by analysis of the trial outputs. (Chapter 4)
  - **Wider impacts** include indirect impact on wider society or stakeholders and unanticipated impacts, good or bad. (Chapter 5).
- Each element of the PLM must be set within the delivery **context** and an understanding of the **risks** to delivery, which will be covered in the text for each section.
- The **Links** describe how each element is related to the next – for example how an activity leads to the required output. Links can flow 'backwards' on the PLM.

[39] 'The Magenta Book: Guidance for Evaluation' HM Treasury April 2011 (available from .GOV) See also 'Logic Mapping: hints and tips for better transport evaluations' Tavistock Institute for DfT October 2010

Initial Logic model for the LST trial evaluation

- In the case of this work, the focus of the benefits of operating LSTs in terms of efficiency, emissions and safety outcomes, based on the sample of data being produced by the trial. The evaluation must also address the extent to which the trial itself has developed, since this affects the robustness, or otherwise, of the data it has produced.

The PLM for the LST trial can be represented as shown in Figure 27.

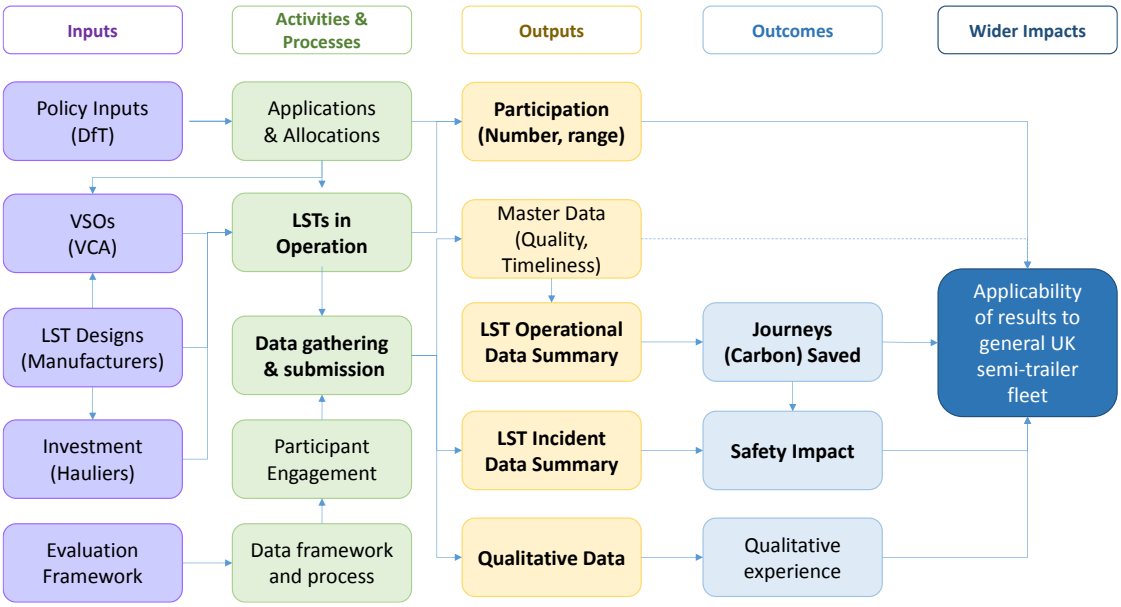

Figure 27: LST Trial Evaluation Programme Logic Model (v1)

- Some elements of the model and the progress being made on them can be expressed as a metric (e.g. How many operators have been signed up? How many LSTs are operating compared to the planned total?). Others may only be expressed qualitatively (e.g. Has the trial attracted a range of operator types and sizes as was hoped?) as no numeric or quantified target was set at the start of the trial.
- Where metrics were explicit in the original formation of the trial (e.g. 1,800 LSTs on the road), they will have been cited in this report and progress against them evaluated as the trial continues.
- Where no numeric metric can be established, then progress will be reported qualitatively.
- We expect to develop the logic model further and provide a related summary of metrics in future reports.

APPENDIX C: INCIDENT ANALYSIS – SUPPORTING INFORMATION

C1: Fatalities and Weighted Injuries (FWI)

The analysis in chapter 4 includes reference to the measure 'Fatalities and Weighted Injuries'. Although this measure is not one cited in published DfT road safety statistics, it is used in some other GB transport risk analysis, notably in the rail sector and some other industries. The fact that FWI is not cited in GB road safety statistics does not preclude its use in analysis, since the concept of FWI is implicit in the casualty severity ratings in STATS19 and the value of FWI is derived directly and transparently from the casualty severity data.

What is FWI

Some GB road safety analyses use the measure KSI - 'Killed and Seriously Injured.

KSI is a simple total of the number of casualties in the Fatal and Serious STATS19 categories - in this measure a broken arm 'counts' for the same as a fatality.

FWI differs in two ways from KSI:

- FWI takes Slight injuries into account
- FWI is weighted measure in which different severities of injury are assigned a proportionate 'value' to the total

$$\text{FWI for a collision} = \text{Fatal} + (n \times \text{Serious}) + (m \times \text{Slight})$$

Who is using FWI in evaluation?

Use of FWI rather than KSI as a more useful measure has been growing in the safety analysis domain for some years now, for reasons including:

- FWI has been used by DfT for some time in relation to the Rail Sector and by HSE in relation to hazardous industries
- The Highways Agency is already moving to use of this measure in a number of their safety analysis activities, influenced by what they have seen in the rail sector. They use it alongside their more traditional monitoring of numbers of collisions and KSI

What factors are used in FWI?

In the Rail Sector, RSSB (and HSE) use the following values,

$$\text{FWI for a collision} = \text{Fatal} + (0.1 \times \text{Serious}) + (0.05 \times \text{Slight})$$

based on their work published in "Taking Safe Decisions" (2009)[40]. The values, when originally agreed, were pegged to the ratio of value of preventing a casualty which were in that approximate proportions. These values are also cited in the DfT WebTAG data book table 4.1.5[41].

The HA risk model now uses an FWI measure, but in view of the differences between the meaning of the slight injury category (Rail includes verbal abuse) the HA have adopted a value of m=0.01. i.e.

$$\text{FWI for a collision} = \text{Fatal} + (0.1 \times \text{Serious}) + (0.01 \times \text{Slight})$$

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40 http://www.rssb.co.uk/Library/risk-analysis-and-safetyreporting/Taking%20Safe%20Decisions%20-%20combined.pdf

41 https://www.gov.uk/government/publications/webtag-tag-data-book

This 1 : to : 10 : to : 100 set of ratios is broadly consistent with the value of preventing a casualty on the roads, cited in the WebTAG data book table 4.1.1.

Why introduce FWI in this evaluation?

The reasons for introducing FWI in analysis are:

- As safety has improved over time (due to better vehicles, road safety awareness and improvements to the built asset) the sparseness of the KSI data make it a rather blunt a measure for many analyses.
- FWI introduces a proportionate treatment of difference injury severity levels - which is sensible for impact assessment (whether for commercial or policy appraisals)
- FWI increases the usable population of data by including the slights.
- FWI is easily calculated from the existing historic data without further data gathering
- FWI provides a transparent and direct link to any economic assessment of safety gains, through the "Value of prevention per casualty" (VpC) figures published in WebTAG where the values for preventing serious and slight injuries are given as (roughly) 0.1 and 0.01 of the value for preventing a fatality (VpF).

In short, for the evaluation of the safety aspect of the LST trial, we believe using the FWI measure will, once we have more data, provide a more refined basis for analysis that makes use of the larger population of Slight injuries.

C2: Statistical analysis of incidents involving LSTs compared to GB-registered general articulated HGVs

C2-1: Comparison based on ALL LST incidents

COMPARISON OF LST Collision AND CASUALTY (FWI) RATES TO ALL GB-REGISTERED ARTICULATED HGVs

Based on 3 year average figures 2010-2012

	Test Name	Incidents Data	Exposure Data	LST Event Count	LST Billion Veh Km	UK Artic Event Count 3 yr avg 2010-12	UK Artic Billion Veh km 3 yr avg 2010-12	Difference significant (5%) if <0.05 Test Outcome
			Data Souce	LST Trial Data	LST Trial Data	STATS19	DfT Traffic Stats Table TRA3105	
TEST 1: CONSERVATIVE COMPARISON : ALL INJURY INCIDENTS INVOLVING LSTs								
1A	**RT Collisions: Conservative**	LST - ALL injury Incidents (inc private land)	All LST Km	5	0.041	2,436	13.0	0.3338
		UK Artics - ALL Injury Incidents - 3yr avg 2010-2012 (to match the km data)	All Articulated - All Road Types	**LST Rate**	122.0	**UK Artic Rate**	187.4	per Billion veh km
				Ratio of LST to UK Artic Rate		**65%**	Difference in rates not significant at 5% level	
1B	**Casualties: Conservative**	LST - Number of Casualties in these collisions (inc private land)	All LST Km	5	0.041	3,412	13.0	0.0793
		UK Artics - Casualties in ALL Injury Incidents - 3yr avg 2010-2012 (to match the km data)	All Articulated - All Road Types	**LST Rate**	122.0	**UK Artic Rate**	262.5	per Billion veh km
				Ratio of LST to UK Artic Rate		**46%**	Difference in rates not significant at 5% level	
1C	**FWI: Conservative**	LST - FWI for ALL injury Incidents (inc private land)	All LST Km	0.14	0.041	193	13.0	0.5487
		UK Artics - FWI for ALL Injury Incidents - 3yr avg 2010-2012 (to match the km data)	All Articulated - All Road Types	**LST Rate**	3.415	**UK Artic Rate**	14.8	per Billion veh km
				Ratio of LST to UK Artic Rate		**23%**	Difference in rates not significant at 5% level	

Statistical Significance Test:
The two populations of incidents are assumed to be Poisson distributed and a Chi-squared test was applied to the difference in the mean rates for the two populations (events per million vehicle km). Test results <0.05 confirm that there is less than a 5% chance that the difference in the two mean rates is due to random chance

C2-2: Comparison based on LST incidents on Public Roads*

* Or publically accessible areas such as motorway services or retail sites

COMPARISON OF LST Collision AND CASUALTY (FWI) RATES TO ALL GB-REGISTERED ARTICULATED HGVs

Based on 3 year average figures 2010-2012

	Test Name	Incidents Data	Exposure Data	LST Event Count	LST Billion Veh Km	UK Artic Event Count 3 yr avg 2010-12	UK Artic Billion Veh km 3 yr avg 2010-12	Difference significant (5%) if <0.05 Test Outcome
			Data Souce	LST Trial Data	LST Trial Data	STATS19	DfT Traffic Stats Table TRA3105	
TEST 2: REALISTIC COMPARISON: ALL INJURY INCIDENTS ON THE ROAD/IN PUBLIC PLACE INVOLVING LSTs								
2A	**Collisions: Most Realistic**	LST - ALL injury Incidents (inc private land)	All Articulated - All Road Types	2	0.041	2,436	13.0	0.0404
		UK Artics - ALL Injury Incidents - 3yr avg 2010-2012 (to match the km data)		**LST Rate**	48.8	**UK Artic Rate**	187.4	per Billion veh km
				Ratio of LST to UK Artic Rate	**26%**		Statistically significant at 5% level	
2B	**Casualties: Most Realistic**	LST - Number of Casualties in these collisions (inc private land)	All LST Km All Articulated - All Road Types	2	0.041	3,412	13.0	0.0076
		UK Artics - Casualties in ALL Injury Incidents - 3yr avg 2010-2012 (to match the km data)		**LST Rate**	48.8	**UK Artic Rate**	262.5	per Billion veh km
				Ratio of LST to UK Artic Rate	**19%**		Statistically significant at 5% level	
2C	**FWI: Most Realistic**	LST - FWI for ALL injury Incidents (inc private land)	All LST Km All Articulated - All Road Types	0.11	0.041	193	13.0	0.5233
		UK Artics - FWI for ALL Injury Incidents - 3yr avg 2010-2012 (to match the km data)		**LST Rate**	2.6829	**UK Artic Rate**	14.8	per Billion veh km
				Ratio of LST to UK Artic Rate	**18%**		Difference in rates not significant at 5% level	

Statistical Significance Test:

The two populations of incidents are assumed to be Poisson distributed and a Chi-squared test was applied to the difference in the mean rates for the two populations (events per million vehicle km). Test results <0.05 confirm that there is less than a 5% chance that the difference in the two mean rates is due to random chance