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## **VIII. HIGHER LEVEL ANALYSIS**

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Higher level analysis was performed on the data set to accomplish the following objectives:

- Determine which attributes are associated with driver acceptance of technologies in their vehicles
- Discover which attribute is the primary determinant of positive feelings about the technologies as measured by the other attributes
- Classify demographic groups of the population by whether they tend to accept, reject or be skeptical about the technologies
- Isolate various “clusters” of respondents who react similarly to the technologies and are united by demographic and other commonalities

To meet these goals, we employed the following types of analysis:

- Multiple regression analysis
- Factor analysis
- Higher-level cross-tabular analysis
- Cluster analysis

### **MAJOR FINDINGS OF HIGHER LEVEL ANALYSIS**

The higher level analysis yielded clear results that are consistent across the different technologies tested. The regression and factor analysis each tend to confirm the findings of the other, as do the cross-tabular and cluster analyses.

The regression and factor analysis determined:

- The most important cause of driver acceptance of the technologies is a feeling that the technologies are reliable and useful (Regression)
- Positive feelings about particular aspects of the technologies tend to be “grounded” or determined by a feeling that the technology will make the drivers’ work easier (Factor analysis)

- The most damaging negative attribute that the technologies could possess is that they represent an invasion of driver privacy by the government

Looked at strategically, these results indicate that a campaign to gain driver support for CVO services should focus on the fact that the technologies will work reliably and usefully to make individual drivers' jobs easier. The personal rather than societal or procedural benefits of the technologies need to be emphasized. In other words, a CVO service is best described as being useful, reliable and able to make a driver's job easier, rather than as, for instance, able to make it easier to comply with regulations, to reduce paperwork, or to increase safety on the road. Further, drivers need to be convinced that the technologies will not cause a serious loss of privacy to the government -- or to their companies.

Cluster and cross-tabular analysis point to certain segments of the industry that are more likely to accept the technologies. In particular, the cross-tabular analysis shows that members of the following groups tend to be more likely to be favorable to the installation of CVO services in their vehicles:

- Motorcoach operators
- Less experienced drivers
- Lower income
- Spend more than half an hour per day at weigh stations, inspection sites, or filling out paperwork

Among truck drivers, the following additional groups are also more likely to be favorable to the installation of the technologies:

- Union drivers
- Company or private fleet drivers
- Drivers in large fleets
- Paid by the mile

Among motorcoach operators, the following additional groups are more likely to be favorable to the technologies:

- CB radio in motorcoach
- Drive predominantly in the South
- Charter drivers
- Daily route varies

*What follows are the complete results and supporting documentation for the higher level analysis conducted on the data set.*

## FACTOR ANALYSIS

The factor analysis groups and weighs the attributes by determining which were most highly correlated with each other in order to identify patterns, or underlying factors, in driver responses.

The factor analysis was conducted on the set of attributes overall, as well as the attribute sets for each of the individual technologies separately. Each factor analysis was performed for the general respondent population, and separately for motorcoach and truck drivers.

The factor analysis was conducted using principal components to generate factors. The number of factors generated in each unit of analysis was determined by the number of Eigen values greater than 1. Rotation of the factor matrix was conducted using the Varimax method. Cases with missing values in the relevant variables were excluded from the analysis.

The factor analysis determines which attributes cluster together. In most of the situations analyzed, factor analysis produced two distinct factors, loosely defined as:

- Positive underlying attitudes
- Negative underlying attitudes

Variation was seen in the factor loadings of the specific attributes, and therefore the relative importance of the different attributes in defining the factors.

### **Results of Factor Analysis**

#### **All Technologies**

**The positive underlying attitude toward the technologies is grounded by the variable *makes my work easier*.** Thus, this is the most important attribute -- not in influencing favorability towards installation of the technology as is analyzed by regression analysis below, but in defining an overall positive regard for the technologies, as measured across the range of attributes (see Chart VIII.I). Thus, the rating given for *makes my work easier* is the primary determinant of how positively respondents rate technologies on all the other attributes: the driving factor behind a positive view of the technologies on the other attributes tested.

On the other hand, the negative attributes *invasion of my privacy by government*, *invasion of my privacy by company*, grounded the negative factor, followed with *relies too much on computers/loss of human judgment* (Chart VIII.1).

## Individual Technologies

Looking specifically at the individual technologies, in addition to *makes my work easier, gives me an advantage over other drivers* is also an important attribute in the positive factors for Commercial Fleet Management (Charts VIII.4-6), Commercial Vehicle Administrative Process (Charts VIII.10-12), and Automated Roadside Safety Inspection (Charts VIII.13-15), and tends to be more important to the positive factors generated on bus drivers only. Likewise, *useful for me* is important in the positive factors for Commercial Vehicle Electronic Clearance (Charts VIII.7-9), and Commercial Vehicle Administrative Process. The attributes *makes it easier to comply with existing regulations* and *improves road safety* are important to the positive factor for On Board Safety Monitoring (Charts VIII.17-19).

Finally, the factors generated for Hazardous Materials Incident Response (Chart VIII. 16) follow a different pattern entirely. One factor represents independence and simplicity, while the other represents confidence or lack of confidence in reliability the technology.

The specific factor analyses are as follows:

### Overall Favorability Toward The Technologies

The most important attribute in the positive factor overall was *makes my work easier*, followed by a number of other positive attributes. ***Thus, the positive composite factor centers on general positive effects of the technologies, not on specific aspects of the technology such as making it easier to comply with regulations or to complete paperwork.*** The only

positive attribute with a low loading on the positive factor was easy to use / *requires no training*. The negative factor is based primarily on *invasion of privacy by company* and *invasion of privacy by government*, followed by *relies too much on computers*. The same pattern was observed for the composite factor analysis conducted on truck drivers only.

**Chart VIII.1 -- Factor Analysis -- All Technologies --All respondents**

KMO=.933 Bartlett=1 1871 Signif=.0000

Variable	Factor 1	Factor 2
useful for me	.79116	-.30155
improves safety on the road	.76888	-.14186
reduces traffic congestion	.73754	-.05309
makes my work easier	.87450	-.18901
reduces paperwork	.78007	-.00204
advantage over other drivers	.79842	-.18852
invasion of privacy by company	-.04777	.87326
invasion of privacy by government	-.17987	.85790
makes it easier to comply w/ regs	.78809	-.18644
makes me more independent	.74854	-.12442
relies too much on computers	-.22111	.73848
easy to use / requires no training	.52720	-.09438
will work / I would rely on it	.77841	-.31521
Eigen values:	6.53659	1.77158
% of variance:	50.3	13.6

**Chart VIII.2 -- Factor Analysis -- All Technologies -- Truck Drivers**

KMO=.937    Bartlett=8984    Signif=.0000

Variable	Factor 1	Factor 2
useful for me	.79233	-.34486
improves safety on the road	.78463	-.14071
reduces traffic congestion	.73944	-.08843
makes my work easier	.86797	-.21689
reduces paperwork	.79487	-.01327
advantage over other drivers	.78573	-.21966
invasion of privacy by company	-.06254	.87097
invasion of privacy by government	-.19828	.85014
makes it easier to comply w/ regs	.79049	-.17699
makes me more independent	.73461	-.14646
relies too much on computers	-.26450	.73084
easy to use / requires no training	.50443	-.15816
will work / I would rely on it	.77625	-.34950
Eigen values:	6.71808	1.63682
% of variance:	51.7	12.8

The bus driver composite factor analysis was very similar to the truck driver composite factor analysis. The attribute *gives me an advantage over other drivers* is loaded slightly higher among bus drivers.

**Chart VIII.3 -- Factor Analysis -- All Technologies-- Motorcoach Operators**

KMO=.906 Bartlett=2900 Signif=.0000

Variable	Factor 1	Factor 2
useful for me	.77525	-.15513
improves safety on the road	.71432	-.09639
reduces traffic congestion	.72119	.04476
makes my work easier	.89611	-.10432
reduces paperwork	.72677	.06049
advantage over other drivers	.82306	-.10535
invasion of privacy by company	-.00165	.87967
invasion of privacy by government	-.09848	.88076
makes it easier to comply w/ regs	.78908	-.17130
makes me more independent	.77668	-.03898
relies too much on computers	-.08115	.73213
easy to use / requires no training	.55935	.05656
will work / I would rely on it	.76991	-.19185
Eigen values:	5.92835	2.07688
% of variance:	45.6	16.0

**Commercial Fleet Management (CFM)**

The factors for the Commercial Fleet Management attributes are similar to the overall factors. *Makes my work easier* is the most important attribute, and here *advantage over other drivers* is more central to the positive attitude factor than in the general case.

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**Chart VIII.4 -- Factor Analysis -- CFM --All respondents**

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KMO=.880 Bartlett=1 5 7 7      Signif=.0000

Variable	Factor 1	Factor 2
useful for me	.64404	-.34610
improves safety on the road	.68138	-.03766
reduces traffic congestion	.64743	.15632
makes my work easier	.80045	-.15995
reduces paperwork	.65665	.22384
advantage over other drivers	.74992	-.20192
invasion of privacy by company	-.00270	.77094
makes me more independent	.64963	-.04376
relies too much on computers	-.09799	.76408
easy to use / requires no training	.43230	-.19872
will work / I would rely on it	.68874	-.36494
Eigen values:	4.22532	1.41490
% of variance:	38.4	12.9

Among truck drivers, the most important components of a positive attitude towards Commercial Fleet Management is makes my work easier, followed by *reduces paperwork* and *reduces traffic congestion*.

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**Chart VIII.5 -- Factor Analysis -- CFM -- Truck Drivers**

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KMO=.879 Bartlett=1 1 5 6    Signif=.0000

Variable	Factor 1	Factor 2
useful for me	.50125	.51885
improves safety on the road	.68942	.11147
reduces traffic congestion	.70208	-.07254
makes my work easier	.74984	.32832
reduces paperwork	.71238	-.03102
advantage over other drivers	.68266	.37937
invasion of privacy by company	.05319	-.70608
makes me more independent	.59377	.21042
relies too much on computers	-.01036	-.74899
easy to use / requires no training	.24764	.50157
will work / I would rely on it	.53332	.56956
Eigen values:	4.27051	1.40534
% of variance:	38.8	12.8

Among bus drivers, the most important components of a positive attitude towards the Commercial Fleet Management attributes is *makes my work easier*, followed by *will work/I would rely on it*.

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**Chart VIII.6 -- Factor Analysis -- CFM -- Motorcoach Operators**

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KMO=.864   Bartlett=495   Signif=.0000

Variable	Factor 1	Factor 2
useful for me	.76378	-.07682
improves safety on the road	.73839	.02013
reduces traffic congestion	.56363	.36882
makes my work easier	.84876	.05048
reduces paperwork	.47676	.50922
advantage over other drivers	.75506	.03015
invasion of privacy by company	-.00569	.74130
makes me more independent	.63434	.28548
relies too much on computers	-.12044	.71665
easy to use / requires no training	.43170	.41540
will work / I would rely on it	.81164	.01796
Eigen values:	4.43716	1.51154
% of variance:	40.3	13.7

**Commercial Vehicle Electronic Clearance (CVEC)**

The factors for attitudes towards Commercial Vehicle Electronic Clearance are similar to the factors for the technologies overall. Here, the most important attributes for the positive factor are *makes my work easier and useful for me*.

**Chart VIII.7 -- Factor Analysis -- CVEC -- All respondents**

KMO=.898   Bartlett=7045   Signif=.0000

Variable	Factor 1	Factor 2
useful for me	.74506	-.19894
improves safety on the road	.69093	-.07282
reduces traffic congestion	.61194	-.10768
makes my work easier	.80540	-.14511
reduces paperwork	.66842	.06609
advantage over other drivers	.72925	-.14541
invasion of privacy by company	-.05720	.86765
invasion of privacy by government	-.14549	.85342
makes it easier to comply w/ regs	.70320	-.14866
makes me more independent	.66804	-.09952
relies too much on computers	-.15776	.66453
easy to use / requires no training	.41381	-.06517
will work / I would rely on it	.72678	-.26310
Eigen values:	5.13473	1.72028
% of variance:	39.5	13.2

**Chart VIII.8 -- Factor Analysis -- CVEC -- Truck Drivers**

KMO=.909 Bartlett=5350 Signif=.0000

Variable	Factor 1	Factor 2
useful for me	.74662	-.30348
improves safety on the road	.72353	-.10481
reduces traffic congestion	.58566	-.20263
makes my work easier	.78965	-.21360
reduces paperwork	.68025	.10056
advantage over other drivers	.70366	-.18446
invasion of privacy by company	-.06798	.85683
invasion of privacy by government	-.18978	.83239
makes it easier to comply w/ regs	.70407	-.16056
makes me more independent	.65559	-.09813
relies too much on computers	-.21368	.65060
easy to use / requires no training	.34955	-.15160
will work / I would rely on it	.70283	-.33632
Eigen values:	5.33751	1.55156
% of variance:	41.1	11.9

While the truck factor analysis follows the same pattern as the overall factors, the bus driver positive attitude factor places more weight on *gives men an advantage over other drivers* and less on *useful for me*.

**Chart VIII.9 -- Factor Analysis -- CVEC -- Motorcoach Operators**

KMO=.871 Bartlett=1 973 Signif=.0000

Variable	Factor 1	Factor 2
useful for me	.70782	-.00096
improves safety on the road	.60063	.10463
reduces traffic congestion	.64023	-.01658
makes my work easier	.82203	-1.1835
reduces' paperwork	.69764	.02579
advantage over other drivers	.78311	-.08681
invasion of privacy by company	-.00743	.89851
invasion of privacy by government	-.02636	.89132
makes it easier to comply w/ regs	.73995	-.05744
makes me more independent	.74681	-.05145
relies too much on computers	.00595	.64231
easy to use / requires no training	.51181	1.046
will work / I would rely on it	.75535	-.07405
Eigen values:	4.99305	2.04224
% of variance:	38.4	15.7

**Commercial Vehicle Administrative Process (CVAP)**

The positive attitude factor for Commercial Vehicle Administrative Process is based primarily on *makes my work easier*, followed by *useful for me* and *advantage over other drivers*. The negative factor follows the same pattern as the overall negative factor.

**Chart VIII.10 -- Factor Analysis -- CVAP -- All respondents**

KMO=.893   Bartlett=3288   Signif=.0000

Variable	Factor 1	Factor 2
useful for me	.82539	-.22693
makes my work easier	.87852	-.20117
reduces paperwork	.78150	-.11497
advantage over other drivers	.82365	-.20668
invasion of privacy by company	-.10532	.90192
invasion of privacy by government	-.20718	.88533
makes it easier to comply w/ regs	.76690	-.17055
makes me more independent	.63377	-.26386
relies too much on computers	-.25406	.69695
easy to use / requires no training	.54532	-.04343
will work / I would rely on it	.72330	-.30623
Eigen values:	5.52163	1.57477
% of variance:	50.2	14.3

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**Chart VIII.1 1 -- Factor Analysis -- CVAP -- Truck Drivers**

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KMO=.901   Bartlett=2498   Signif=.0000

Variable	Factor 1	Factor 2
useful for me	.80766	-.29981
makes my work easier	.86522	-.23110
reduces. paperwork	.77335	-. 12499
advantage over other drivers	<b>.81456</b>	<b>-.25952</b>
invasion of privacy by company	-. 13373	<b>.89254</b>
invasion of privacy by government	<b>-.22557</b>	.87564
makes it easier to comply w/ regs	.76050	-.16367
makes me more independent	<b>.64691</b>	-.26111
relies too much on computers	-.27505	.70306
easy to use / requires no training	.56865	-.06112
will work / I would rely on it	.72094	-.35641
Eigen values:	5.71083	1.44572
% of variance:	<b>51.9</b>	13.1

Both the truck driver and bus driver factor analyses follow the same pattern as the overall population for this technology.

**Chart VIII.12 -- Factor Analysis -- CVAP -- Motorcoach Operators**

KMO=.803 Bartlett=791      Signif=.0000

Variable	Factor 1	Factor 2
useful for me	.82467	.02341
makes my work easier	.90151	-.11081
reduces paperwork	.80147	-.04850
advantage over other drivers	.81497	-.08940
invasion of privacy by company	.03500	.92624
invasion of privacy by government	-.07700	.92199
makes it easier to comply w/ regs	.78513	-.20309
makes me more independent	.53710	-.29974
relies too much on computers	-.18303	.65784
easy to use / requires no training	.44168	.02756
will work / I would rely on it	.65720	-.14126
Eigen values:	4.61780	2.06980
% of variance:	42.0	18.8

**Automated Roadside Safety Inspection (A RSI)**

The positive attitude factor for Automated Roadside Safety Inspection is based primarily on *makes my work easier*, followed by *reduces paperwork* and *advantage over other drivers*. The negative factor for ARSI follows the same pattern as the overall negative factor.

**Chart VIII.13 -- Factor Analysis -- ARSI --All respondents**

KMO=.940 Bartlett=8345      Signif=.0000

Variable	Factor 1	Factor 2
useful for me	.73521	.33798
improves safety on the road	.70729	.25847
reduces traffic congestion	.71323	.13204
makes my work easier	.83540	.21081
reduces paperwork	.78119	.02832
advantage over other drivers	.77702	.13925
invasion of privacy by government	-.11276	-.82635
makes it easier to comply w/ regs	.71359	.17625
makes me more independent	.73394	.10093
relies too much on computers	-.18654	-.80332
easy to use / requires no training	.50220	.06103
will work / I would rely on it	.73863	.34806
Eigen values:	5.93850	1.17347
% of variance:	49.5	9.8

**Chart VIII.14 -- Factor Analysis -- ARSI -- Truck Drivers**

KMO=.941 Bartlett=6230 Signif=.0000

Variable	Factor 1	Factor 2
useful for me	.72901	.36113
improves safety on the road	.70194	.27756
reduces-traffic congestion	.71280	.17385
makes my work easier	.82961	.22843
reduces paperwork	.79079	.03663
advantage over other drivers	.76684	.14846
invasion of privacy by government	-.12133	-.82592
makes it easier to comply w/ regs	.70325	.18033
makes me more independent	.73291	.09715
relies too much on computers	-.20795	-.79019
easy to use / requires no training	.49164	.09445
will work / I would rely on it	.73689	.36889
Eigen values:	5.99449	1.12056
% of variance:	50.0	9.3

While the truck driver factors follow the same patterns as the full population factors for this technology, the bus driver positive factor places a greater weight on *gives me an advantage over other drivers* rather than *reduces paperwork*.

**Chart VIII.15 -- Factor Analysis -- ARSI -- Motorcoach Operators**

KMO=.905 Bartlett=1 926 Signif=.0000

Variable	Factor 1	Factor 2
useful for me	.71969	-.25488
improves safety on the road	.68516	-.14224
reduces traffic congestion	.67451	.02108
makes my work easier	.84786	-.15546
reduces paperwork	.72586	.01965
advantage over other drivers	.79895	-.10868
invasion of privacy by government	-.06999	.82787
makes it easier to comply w/ regs	.73038	-.12768
makes me more independent	.71901	-.07976
relies too much on computers	-.09391	.82910
easy to use / requires no training	.49204	.04236
will work / I would rely on it	.71265	-.26976
Eigen values:	5.36897	1.36358
% of variance:	44.7	11.4

**Hazardous Materials Incident Response**

*The factors for Hazardous Materials Incident Response differ from the overall factors.* The first factor represents independence and simplification, loading heavily on *makes me more independent, reduces paperwork, reduces traffic congestion and makes it easier to comply with existing regulations.* The second factor represents confidence in reliability, contrasting *will work// would rely on it* with *relies too much on computers.*

**Chart VIII.16 -- Factor Analysis -- HAZ MAT -- All respondents (Trucks only)**

KMO=.873 Bartlett=668 Signif=.0000

Variable	Factor 1	Factor 2
useful for me	.52069	.47154
improves safety on the road	.52556	.52411
reduces traffic congestion	.76488	.02104
makes my work easier	.64165	.50499
reduces paperwork	.76354	.19047
makes it easier to comply w/ regs	.73954	.22893
makes me more independent	.78971	.03724
relies too much on computers	.13090	-.71902
easy to use / requires no training	.13113	.57788
will work / I would rely on it	.40284	-.70481
Eigen values:	4.45111	1.23341
% of variance:	44.5	12.3

**On Board Safety Monitoring (OBSM)**

The positive attitude factor for On Board Safety Monitoring is based primarily on *makes my work easier*, followed by *makes it easier to comply with existing regulations* and *improves safety on the road*. The negative factor follows the same pattern as the overall negative factor.

**Chart VIII.17 -- Factor Analysis -- OBSM -- All respondents**

	KMO=.910	Bartlett=3516	Signif=.0000
Variable	Factor 1	Factor 2	
useful for me	.74386	-.37115	
improves safety on the road	.70956	-.21452	
reduces traffic congestion	.69149	-.06136	
makes my work easier	.83959	-.19411	
reduces paperwork	.73876	-.03723	
advantage over other drivers	.77444	-.19067	
invasion of privacy by company	-.08901	.90707	
invasion of privacy by government	-.19688	.88359	
makes it easier to comply w/ regs	.79934	-.21373	
makes me more independent	.68632	-.19971	
relies too much on computers	-.20055	.74035	
easy to use / requires no training	.54558	-.02574	
will work / I would rely on it	.75614	-.33218	
Eigen values:	6.38270	1.75570	
% of variance:	49.1	13.5	

For truck drivers, three scores were generated. The first score represents simplicity and independence, loading heavily on *reduces traffic congestion, makes me more independent* and *reduces paperwork*. The second factor represents ease of use and reliability, loading on *easy to use /requires no training, improves safety on the road, makes it easier to comply with existing regulations* and *will work/I would rely on it*. The third factor is the same form as the overall negative factor.

**Chart VIII.18 -- Factor Analysis -- OBSM -- Truck Drivers**

KMO=.910 Bartlett=2460 Signif=.0000

Variable	Factor 1	Factor 2	Factor 3
useful for me	.45629	.59712	-.37461
improves safety on the road	.35469	.74270	-.16622
reduces traffic congestion	.78503	.14921	-.10048
makes my work easier	.66623	.52279	-.15878
reduces paperwork	.74506	.27530	-.06755
advantage over other drivers	.51271	.55374	-.24339
invasion of privacy by company	-.06678	-.09305	.89942
invasion of privacy by government	-.13928	-.18123	.86923
makes it easier to comply w/ regs	.48287	.65486	-.17532
makes me more independent	.77639	.11510	-.23210
relies too much on computers	-.21715	-.15360	.71353
easy to use / requires no training	-.02939	.78917	-.01689
will work / I would rely on it	.41725	.63599	-.31999
Eigen values:	6.32385	1.61694	1.00185
% of variance:	48.6	12.4	7.7

The positive attitude factor for bus drivers is based primarily on makes *my work easier*, followed by makes *it easier to comply with existing regulations and advantage over other drivers*.

**Chart VIII.19 -- Factor Analysis -- OBSM -- Motorcoach Operators**

KMO=.866 Bartlett=1 124 Signif=.0000

Variable	Factor 1	Factor 2
useful for me	.76794	-.28687
improves safety on the road	.77677	-.24898
reduces traffic congestion	.71210	.03806
makes my work easier	.85215	-.22179
reduces paperwork	.73285	.06798
advantage over other drivers	.82219	.00424
invasion of privacy by company	-.08040	.93624
invasion of privacy by government	-.13193	.92468
makes it easier to comply w/ regs	.82257	-.23569
makes me more independent	.76943	-.13695
relies too much on computers	-.08009	.77318
easy to use / requires no training	.61321	.03097
will work / I would rely on it	.82544	-.30135
Eigen values:	6.45274	2.23800
% of variance:	49.6	17.2

## MULTIPLE REGRESSION ANALYSIS

Multiple regression analysis was used to determine the relationship between attributes tested and acceptance of the CVO technologies being installed in drivers' vehicles. Composite scores for all the attributes and for overall technology acceptance were created by computing the means over all the technologies.

Multiple regression analysis was conducted using backwards variable elimination on both the attributes and questions about acceptance of installation of the technologies for three groups: the entire population, motorcoach operators only and truck drivers only. The regression was conducted for all of the technologies together and for each individually. Cases with missing values in the relevant variables were not used.

The results of the regression analysis can be interpreted as follows: ***a unit increase in favorability on a given attribute will result in an change in overall favorability to installation of the services equal to the co-efficient. If the co-efficient is positive, then the change in favorability would be an increase.***

The regression analysis determined that two attributes were overall the most significant in producing acceptance of the technologies:

- *will work/i would rely on it*
- *useful for me*

For all six technologies tested, these two factors rated first and second in terms of importance in driver acceptance.

The strongest negative attribute was:

- *invasion of my privacy by government*

Furthermore, *reduces paperwork*, a seemingly positive attribute, had no effect or even a negative effect on approval for some technologies.

These results, however, describe the respondents views of the technologies in general. Regarding the individual technologies, *useful for me* and *will work/I would rely on it* were the most important determinants of driver acceptance among all respondents overall and among truck drivers in every case. The same attributes were most significant among bus drivers, except in three instances which are noted below.

*The results of the multivariate regressions are as follows:*

### **Overall Opinions of CVO Services**

In looking at overall favorability to the installation of the CVO services, the most important attributes overall were *will work/ would rely on it* and *useful for me*. The strongest negative attribute working against approval was *invasion of privacy by government*. Other attributes had smaller effects on overall approval, as can be seen in the following chart. It is important to note that *reduces paperwork*, a seemingly positive attribute, had a statistically significant negative effect on overall approval.

**Chart VIII.20 -- Regression Analysis -- All Technologies -- All Respondents**

F=437.79    signif=.0000    R<sub>2</sub>=77.5

Variable	Coefficient	T value	Significance
Constant	.638	10.45	.0000
will work / I would rely on it	.290	14.08	.0000
useful for me	.284	12.14	.0000
improves safety on the road	.108	5.71	.0000
makes my work easier	.084	3.39	.0007
makes me more independent	.074	4.80	.0000
makes it easier to comply w/ regs	.065	3.36	.0008
advantage over other drivers	.055	3.01	.0027
easy to use / requires no training	.033	1.79	.0736
invasion of privacy by company	-.032	-2.10	.0361
reduces paperwork	-.036	-2.27	.0232
relies too much on computers	-.039	-2.61	.0090
invasion of privacy by government	-.103	-6.76	.0000

Among truck drivers, *useful for me* was slightly more significant than *will work / I would rely on it*.

**Chart VIII.21 -- Regression Analysis --All Technologies -- Truck Drivers**

F=462.06    signif=.0000    R<sub>2</sub>=78.8

Variable	Coefficient	T value	Significance
Constant	.610	9.39	.0000
useful for me	.347	12.41	.0000
will work / I would rely on it	.335	14.61	.0000
makes my work easier	.099	3.50	.0005
improves safety on the road	.084	3.84	.0001
makes me more independent	.072	4.09	.0000
advantage over other drivers	.043	2.09	.0365
invasion of privacy by company	-.032	-1.91	.0561
reduces paperwork	-.038	-2.10	.0356
invasion of privacy by government	-.105	-6.20	.0000

Among motorcoach operators, reliability (*will work/I would rely on it*) had a larger effect on approval than did usefulness (*useful for me*). *Assisting in compliance* with regulations was third in importance with bus drivers, unlike with truck drivers.

**Chart VIII.22 -- Regression Analysis -- All Technologies -- Motorcoach Operators**

F=130.77    signif=.0000    R<sub>2</sub>=72.2

Variable	Coefficient	T value	Significance
Constant	.664	6.70	.0000
will work / I would rely on it	.223	6.03	.0000
useful for me	.164	3.96	.0001
makes it easier to comply w/ regs	.150	3.69	.0003
improves safety on the road	.142	4.03	.0001
make my work easier	.130	2.86	.0044
advantage over other drivers	.101	2.81	.0052
relies too much on computers	-.065	-2.40	.0170
invasion of privacy by government	-.114	-4.74	.0000

**Commercial Fleet Management (CFM)**

Looking specifically at Commercial Fleet Management, the most important issues in producing acceptance of the technology are reliability (*will work// would rely on if*), usefulness (*useful for me*) and making work easier. *Invasion of privacy by company* had a negative effect, as did *reducing paperwork*.

**Chart VIII.23 -- Regression Analysis --CFM -- All respondents**

F=78.81      signif=.0000      R <sub>2</sub> =57.1			
Variable	Coefficient	T value	Significance
Constant	.413	3.413	.0007
will work / I would rely on it	.401	9.475	.0000
useful for me	.251	6.295	.0000
makes my work easier	.152	3.322	.0010
reduces traffic congestion	.075	2.535	.0116
easy to use / requires no training	.071	1.688	.0921
advantage over other drivers	.070	1.675	.0945
reduces paperwork	-.075	-2.520	.012
invasion of privacy by company	-.075	-2.839	.0000

While *improves safety on the road* had no significant effect for truck drivers, it did boost approval of Fleet Management among motorcoach operators.

**Chart VIII.24 -- Regression Analysis -- CFM -- Truck Drivers**

F=64.63      signif=.0000      R<sub>2</sub>=56.9

Variable	Coefficient	T value	Significance
Constant	.337	2.10	.0369
will work / I would rely on it	.435	-8.87	.0000
useful for me	.243	5.14	.0000
makes my work easier	.193	3.52	.0005
easy to use / requires no training	.109	2.05	.0410
reduces traffic congestion	.082	2.20	.0288
invasion of privacy by company	-.066	-2.02	.0437
reduces paperwork	-.080	-2.12	.035

**Chart VIII.25 -- Regression Analysis -- CFM -- Motorcoach Operators**

F=33.68      signif=.0000      R<sub>2</sub>=57.0

Variable	Coefficient	T value	Significance
Constant	.523	3.15	.0021
will work / I would rely on it	.340	4.57	.0000
useful for me	.275	3.60	.0005
improves safety on the road	.145	2.08	.0394
advantage over other drivers	.128	2.00	.0475
invasion of privacy by company	-.081	-1.87	.0641

**Commercial Vehicle Electronic Clearance (CVEC)**

The strongest positive effect on approval for Commercial Vehicle Electronic Clearance was based on reliability (*will work// would rely on it*) and usefulness (*useful for me*), and the strongest negative effect was from concern over invasion of privacy by government.

**Chart VIII.26 -- Regression Analysis -- CVEC -- All respondents**

Variable	Coefficient	T value	Significance
Constant	.755	9.55	.0000
will work / I would rely on it	.261	11.92	.0000
useful for <b>me</b>	.226	10.12	.0000
makes it easier to comply w/ regs	.096	4.77	.0000
improves safety on the road	.095	4.87	.0000
advantage over other drivers	.091	4.61	.0000
makes me more independent	.073	4.20	.0000
makes my work easier	.070	3.02	.0025
easy to use / requires no training	.049	2.33	.0198
relies too much on computers	-.039	-2.39	.0169
invasion of privacy by company	-.068	-3.49	.0005
invasion of privacy by government	-.114	-6.14	.0000

*Invasion of privacy by company* had a larger effect on the approval of bus drivers, while *invasion of privacy by government* had a greater effect on truck drivers. While the strongest positive effects for truck drivers was from *useful for me*, bus drivers' approval was boosted most by *advantage over other drivers*.

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**Chart VIII.27 -- Regression Analysis -- CVEC -- Truck Drivers**

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F=244.30    signif=.0000    R<sub>2</sub>=69.6

Variable	Coefficient	T value	Significance
Constant	.829	8.78	.0000
useful for me	.332	11.80	.0000
will work / I would rely on it	.274	10.83	.0000
makes my work easier	.089	3.26	.0012
improves safety on the road	.081	3.52	.0004
advantage over other drivers	.056	2.49	.0130
makes me more independent	.056	2.86	.0043
makes it easier to comply w regs	.053	2.34	.0196
relies too much on computers	-.045	-2.33	.0199
invasion of privacy by company	-.056	-2.58	.0100
invasion of privacy by government	-.115	-5.47	.0000

**Chart VIII.28 -- Regression Analysis -- CVEC -- Motorcoach Operators**

F=80.02    signif=.0000    R<sub>2</sub>=63.6

Variable	Coefficient	T value	Significance
Constant	.550	4.60	.0000
advantage over other drivers	.185	4.97	.0000
will work / I would rely on it	.177	4.43	.0000
makes it easier to comply w/ regs	.174	4.30	.0000
useful for me	.126	3.83	.0002
makes me more independent	.099	2.90	.0039
easy to use / requires no training	.087	2.25	.0248
improves safety on the road	.085	2.44	.0153
invasion of privacy by company	-.155	-5.61	.0000

**Commercial Vehicle Administration Process (CVAP)**

The attributes generating the strongest positive effect on Commercial Vehicle Administration Process approval were *useful for me* and *will work// would rely on it*. The attributes generating the strongest negative effect were *relies too much on computers* and *invasion of privacy by government*.

Truck drivers were affected by concerns about privacy from the government as well as over-reliance on computers. Motorcoach operators, on the other hand, were not affected by concerns over their privacy from the government. Among motorcoach operators, the most important positive attribute was *makes it easier to comply with existing regulations*.

**Chart VIII.29 -- Regression Analysis -- CVAP --All respondents**

F=177.57    signif=.0000    R <sub>2</sub> =71 .0			
Variable	Coefficient	T value	Significance
Constant	.724	5.69	.0000
useful for me	.279	6.25	.0000
will work / I would rely on it	.253	7.39	.0000
makes my work easier	.171	3.66	.0003
makes me more independent	.143	5.19	.0000
easy to use / requires no training	.077	2.42	.0160
relies too much on computers	-.083	-2.86	.0044
invasion of privacy by government	-.096	-3.61	.0003

**Chart VIII.30 -- Regression Analysis -- CVAP -- Truck Drivers**

F=142.06    signif=.0000    R<sub>2</sub>=72.5

Variable	Coefficient	T value	Significance
Constant	.908	6.02	.0000
useful for me	.289	5.65	.0000
will work / I would rely on it	.271	6.94	.0000
makesmywork easier	.129	2.50	.0130
makes me more independent	.110	3.43	.0007
easy to use / requires no training	.087	2.47	.0141
relies too much on computers	-.088	-2.62	.0091
invasion of privacy by government	-.109	-3.50	.0005

Motorcoach drivers approval was most affected by *makes it easier to comply with existing regulations*, and, while they were concerned about excessive reliance on computers, *invasion of privacy by government* had no statistically significant effect.

**Chart VIII.31 -- Regression Analysis -- CVAP -- Motorcoach Operators**

F=39.76      signif=.0000      R<sub>2</sub>=66.0

Variable	Coefficient	T value	Significance
Constant	.242	1.19	.2365
makes it easier to comply w/ regs	.330	4.08	.0001
useful for me	.208	2.37	.0192
makes my work easier	.188	1.79	.0768
makes me more independent	.154	2.96	.0037
will work / I would rely on it	.141	2.09	.0385
relies too much on computers	-.083	-1.71	.0902

**Automated Roadside Safety Inspection (ARSI)**

While the two attributes with the greatest positive impact on Automated Roadside Safety Inspection approval were *will work// would rely on it* and *useful for me, improves safety on the road* also had a strong effect on approval. *Invasion of privacy by government* had the strongest negative effect.

Motorcoach operators were most positively affected by *improves safety on the road* as an argument for Automated Roadside Safety Inspection. They were more concerned about over-reliance on computers than about privacy from the government, while truck drivers were more affected by issues of privacy from the government than they were by concerns about computer reliance.

**Chart VIII.32 -- Regression Analysis -- ARSI -- All respondents**

F=391.07    signif=.0000    R<sub>2</sub>=73.1

Variable	Coefficient	T value	Significance
Constant	.614	9.09	.0000
will work / I would rely on it	.282	13.84	.0000
useful for me	.220	10.35	.0000
improves safety on the road	.132	6.18	.0000
reduces traffic congestion	.079	4.24	.0000
makes me more independent	.068	3.97	.0001
makes it easier to comply w/ regs	.064	3.461	.0006
makes my work easier	.057	2.64	.0083
advantage over other drivers	.049	2.64	.0083
relies too much on computers	-.058	-3.65	.0003
invasion of privacy by government	-.102	-7.58	.0000

**Chart VIII.33 -- Regression Analysis -- ARSI -- Truck Drivers**

F=298.81    signif=.0000    R<sub>2</sub>=73.8

Variable	Coefficient	T value	Significance
Constant	.634	7.68	.0000
will work / I would rely on it	.291	12.17	.0000
useful for me	.270	10.97	.0000
improves safety on the road	.086	3.52	.0005
reduces traffic congestion	.083	3.75	.0002
makes it easier to comply w/ regs	.070	3.32	.0009
makes me more independent	.065	3.20	.0014
makes my work easier	.046	1.85	.0652
advantage over other drivers	.037	1.72	.0855
relies too much on computers	-.043	-2.28	.0230
invasion of privacy by government	-.111	-6.93	.0000

While *improves safety on the road* was a distant third among truck drivers, it was the most effective attribute among bus drivers. Bus drivers, as opposed to truck drivers, were more concerned about excessive reliance on computers than about an invasion of their privacy from the government.

**Chart VIII.34 -- Regression Analysis -- ARSI -- Motorcoach Operators**

F=114.25    signif=.0000    R<sub>2</sub>=68.4

Variable	Coefficient	T value	Significance
Constant	.651	6.02	.0000
improves safety on the road	.324	8.60	.0000
will work / I would rely on it	.253	6.98	.0000
makes my work easier	.134	3.42	.0007
advantage over other drivers	.099	2.71	.0070
makes me more independent	.070	2.39	.0171
invasion of privacy by government	-.072	-3.01	.0028
relies too much on computers	-.093	-3.31	.0010

**Hazardous Materials Incident Response**

*Useful for me, will work/I would rely on it and improves safety on the road* had a positive effect on approval for Hazardous Materials Incident Response. Privacy concerns did not have a significant effect on approval, but concerns about over-reliance on computers did.

**Chart VIII.35 -- Regression Analysis -- HAZ MAT -- Truck drivers**

F=74.32      signif=.0000      R<sub>2</sub>=62.7

Variable	Coefficient	T value	Significance
Constant	.523	3.46	.0007
useful for me	.417	6.90	.0000
will work / I would rely on it	.290	5.34	.0000
improves safety on the road	.200	3.01	.0030
relies too much on computers	-.118	-3.09	.0023

**On Board Safety Monitoring (OBSM)**

*Useful for me* and *will work/I would rely on it* have the strongest effect on approval of On Board Safety Monitoring, while *makes me more independent* also has a strong effect. *invasion of privacy by government* is the only significant concern.

Truck drivers were more positively affected by the possibility of greater independence when it came to On Board Safety Monitoring, while motorcoach operators were more impacted by the possibility of reduced traffic congestion.

**Chart VIII.36 -- Regression Analysis -- OBSM --All respondents**

F=202.90    signif=.0000    R<sub>2</sub>=73.1

Variable	Coefficient	T value	Significance
Constant	.519	4.23	.0000
useful for me	.340	9.21	.0000
will work / I would rely on it	.329	9.12	.0000
makes me more independent	.120	3.68	.0003
advantage over other drivers	.064	1.98	.0484
reduces traffic congestion	.061	1.91	.0566
invasion of privacy by government	-.128	-4.75	.0000

**Chart VIII.37 -- Regression Analysis -- OBSM -- Truck Drivers**

F=167.60    signif=.0000    R<sub>2</sub>=71.6

Variable	Coefficient	T value	Significance
Constant	.714	4.83	.0000
useful for me	.338	7.47	.0000
will work / I would rely on it	.338	8.41	.0000
makes me more independent	.125	3.65	.0003
improves safety on the road	.084	1.86	.0638
invasion of privacy by government	-.134	-4.07	.0001

Bus drivers and truck drivers displayed similar responses for this set of attributes, although *reduces traffic congestion* was more important to bus drivers, and *makes me more independent* was more important to truck drivers.

Motorcoach drivers had a negative effect from *reduces paperwork*.

**Chart VIII.38 -- Regression Analysis -- OBSM -- Motorcoach Operators**

F=57.32      signif=.0000      R<sub>2</sub>=78.8

Variable	Coefficient	T value	Significance
Constant	.248	1.32	.1894
will work / I would rely on it	.327	4.44	.0000
useful for me	.274	3.69	.0004
reduces traffic congestion	.206	3.35	.0011
makes my work easier	.182	2.28	.0244
makes me more independent	.133	2.12	.0367
invasion of privacy by company	-.108	-2.36	.0198
reduces paperwork	-.159	-2.70	.0081

ACCEPTANCE OF TECHNOLOGY: DEMOGRAPHIC PROFILE

In order to better understand driver attitudes toward the technologies in question, we classified all respondents as either “acceptors,” “skeptics,” or “rejecters.” **Acceptors** are those who are favorable toward the implementation of all of the technologies to which they were exposed. **Skeptics** were favorable to the implementation of at least one, but not all of the technologies, while **Rejecters** were not favorable to the implementation of any of the technologies. Overall, the sample broke down as follows:

- Acceptors                      46%
- Skeptics                        42%
- Rejecters                        12%

Motorcoach operators are significantly more likely than truck drivers to accept CVO services:

	<u>Motorcoach Operators</u>	<u>Truck Drivers</u>
Acceptors	61%	41%
Skeptics	35%	44%
Rejecters	4%	15%

Among truck drivers, these groups are more likely to be acceptors of CVO services in their vehicles:

- Very favorable to technology in future of industry (56% acceptors)
- Women (49%)
- Union (48%)
- Company (46%) or private fleet drivers (44%)
- Large fleets (45%)
- More than half hour per day at weigh stations/inspections/completing paperwork (44%)
- Paid by the mile (44%)
- Drivers for less than 15 years (44%)

Among truck drivers, the following groups are more likely to be rejecters of the technologies in their vehicles:

- Unfavorable to technology in future of industry (37% are rejecters)
- Paid by the hour (21%)
- Independent owner/operators (20%)
- Higher income (\$60K) (20%)
- Older (55+) (20%)
- Drive primarily in the West (19%)
- No high school degree (19%)
- Small fleets (18%)

Biggest daily problems are:

- D.O.T./regulations/speed limits (22%)
- Rigid schedules/timing (19%)
- Paperwork (18%)

Among motorcoach operators, the following groups are more likely to be acceptors of CVO services in their vehicles:

- CB radio in motorcoach (73% are acceptors)
- Drive predominantly in the South (72%)
- Very favorable toward technology in future of industry (70%)
- Charter motorcoach drivers (67%)
- Route varies daily (66%)
- More than half hour per day at weigh stations/inspections/completing paperwork (66%)
- Drivers for less than 5 years (65%)
- Lower (<\$30K) income (65%)

And among motorcoach operators, the following groups are more likely to be skeptics or rejecters of ITS technologies in their vehicles:

- Drive predominantly in the West (48%)
- Fixed daily route (47%)
- Somewhat favorable toward technology in future of industry (47%)
- Route within one state or city (47%)
- Income over \$30K per year (45%)
- Less than half hour per day at weigh stations/inspections/completing paperwork (44%)
- Age 18-44 (44%)
- Line run drivers (44%)

Drivers who currently have technology installed in their vehicles do not seem to be any more likely to accept CVO technologies. Other factors such as whether the respondent is a truck or motorcoach driver, union membership, size of the fleet, and years driving and others appear to be more significant in identifying who is in favor of having CVO technologies in their vehicles.

What follows tables showing the distribution of acceptors, skeptics and rejecters among segments of the sample:

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**Chart VIII.39 -- Acceptance of Technology -- All Respondents**

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<b>SUBGROUP</b>	<b>ACCEPTORS</b>	<b>SKEPTICS</b>	<b>REJECTERS</b>
<b>TOTAL</b>	<b>46</b>	<b>42</b>	<b>12</b>
<b>TYPE DRIVER</b>			
Truck driver	41	44	15
Bus Driver	61	35	4

**Chart VIII.40 -- Demographic Analysis -- Among Truck Drivers**

<b>SUBGROUP</b>	<b>ACCEPTORS</b>	<b>SKEPTICS</b>	<b>REJECTERS</b>
<b>TYPE TRUCK DRIVER</b>			
Company	46	42	12
Private fleet	44	43	12
Independent	32	48	20
<b>SIZE FLEET</b>			
Small	39	43	18
Medium	40	45	14
Large	45	44	11
<b>YEARS DRIVING</b>			
Less than 5	45	44	10
5-15 years	44	41	15
15 years plus	37	47	17
<b>TYPE COMMODITIES</b>			
Hazardous materials	39	47	14
Building materials	42	47	10
Perishables	41	47	13
Agricultural	42	43	14
Frozen goods	41	45	14
Packages/delivery	38	47	15
Household goods/furniture	39	50	11
Manufactured	40	45	15
Food products	42	45	13
<b>TYPICAL ROUTE</b>			
Interstate	42	44	14
Within one city or state	34	53	13
Both	38	44	18

*\*Note: Very small base size*

**Chart VIII.40a -- Demographic Analysis -- Among Truck Drivers**

SUBGROUP	ACCEPTORS	SKEPTICS	REJECTERS
<b>BIGGEST DAILY PROBLEM</b>			
Paperwork	38	44	18
Fatigue	39	48	13
Rigid timing/ scheduling	40	40	19
Problems w/ Management	53	38	9
Waiting at weigh stations	36	48	17
Dealing w/ cargo	42	45	13
Getting pulled over for roadside inspections	37	46	17
Traffic	44	43	13
Dealing with cars on road	42	43	14
D.O.T./regulations/ speed limits	33	45	22
<b>ATTITUDE TOWARD TECH IN FUTURE OF INDUSTRY</b>			
Very favorable	56	38	6
Somewhat	39	47	14
Not very favorable	14	58	28
Not at all	9	48	43
<b>TIME PER DAY WEIGH STATIONS/ INSPECTIONS/ PAPERWORK</b>			
Half hour or less	37	46	17
More than half hour	44	44	12

*\*Note: Very small base size*

**Chart VIII.40b -- Demographic Analysis -- Among Truck Drivers**

SUBGROUP	ACCEPTORS	SKEPTICS	REJECTERS
<b>NEW TECH IN VEHICLE NOW</b>			
Yes	40	47	14
No	42	43	15
<b>WHERE DRIVE MOST</b>			
Northeast	40	47	13
Midwest	38	46	16
South	41	46	14
Southwest	37	47	16
West	39	42	19
<b>UNION MEMBER</b>			
yes	48	34	17
No	41	45	15
<b>HOW PAID</b>			
By hour	37	42	21
By mile	44	42	14
By trip	37	49	14
<b>EDUCATION</b>			
Not HS grad	44	37	19
HS grad/GED	40	45	15
Some college or more	41	46	13
<b>AGE</b>			
18-34	39	47	14
35-44	42	43	15
45-54	44	44	13
55+	38	42	20
<b>INCOME</b>			
<\$30K	45	45	10
\$30-39K	44	42	14
\$40-49K	41	43	16
\$50-59K	45	39	16
\$60K+	28	52	20
<b>GENDER</b>			
Male	41	44	15
female	49	44	8

\*Note: Very small base size

**Chart VIII.41 -- Demographic Analysis -- Among Motorcoach Operators**

<b>SUBGROUP</b>	<b>ACCEPTORS</b>	<b>SKEPTICS</b>	<b>REJECTERS</b>
<b>TYPE BUS DRIVER</b>			
Charter	67	27	6
Line Run	56	42	2
<b>ROUTE</b>			
Fixed	53	43	4
Varies daily	66	30	4
<b>TYPICAL ROUTE</b>			
Interstate	63	34	3
Within one city or state	53	40	7
<b>YEARS DRIVING</b>			
Less than 5	65	34	1
5-15 years	57	38	5
15 years plus	62	33	5
<b>ATTITUDE TOWARD TECH IN FUTURE OF INDUSTRY</b>			
Very favorable	70	28	1
Somewhat	54	43	4
<b>TIME PER DAY WEIGH STATIONS/ INSPECTIONS/ PAPERWORK</b>			
Half hour or less	56	39	5
More than half hour	66	31	3

\* *Note: Very small base size*

**Chart VIII.41a -- Demographic Analysis -- Among Motorcoach Operators**

<b>SUBGROUP</b>	<b>ACCEPTORS</b>	<b>SKEPTICS</b>	<b>REJECTERS</b>
<b>NEW TECH IN VEHICLE NOW</b>			
Yes	60	38	2
No	61	35	5
<b>CB RADIO IN BUS</b>			
Yes	73	21	7
No	57	39	3
<b>WHERE DRIVE MOST</b>			
Northeast	64	33	3
South	72	24	4
Southwest	61	36	3
West	52	45	3
<b>UNION MEMBER</b>			
Yes	57	41	2
No	64	30	6
<b>EDUCATION</b>			
HS grad or less	63	33	4
Some college or more	57	39	4
<b>AGE</b>			
18-44	56	40	4
45+	64	31	5
<b>INCOME</b>			
<\$30K	65	30	5
\$30+	55	41	4

*\*Note: Very small base size*

## **CLUSTER ANALYSIS**

To supplement the demographic profile of acceptors and rejecters of the technologies, cluster analysis was performed on the entire data set as a whole to generate demographic /job characteristic-based clusters of respondents. The following variables were used to generate the clusters:

- Bus driver or truck driver
- Years Truck / Bus driver
- Time spent at weigh stations / paperwork
- Union membership
- Method of payment
- Level of education
- Age
- Income
- Sex
- Interstate or within state routes
- Region

Cluster analysis was conducted using the QuickCluster procedure in SPSS, which is equivalent to an iterative Euclidian distance k-means cluster analysis. Cluster analyses were generated with the number of clusters ranging from 10 to 5, and in each case clusters with less than 5% of valid respondents were eliminated. A cluster analysis using 7 clusters was selected, because it had the best coverage of the data (98.1% of valid cases). The clusters are as follows:

## **Cluster 1: Youna Drivers**

**26% of total sample**

### ***Demographics:***

Drivers in this group are young, less experienced and make less money. They tend to drive company trucks in larger than average fleets, are paid by the mile rather than the hour, and have below average incomes. They spend more time than average at weigh stations and inspections. Bus drivers in this segment are less likely to be charter drivers. Respondents in this cluster are more familiar than average with VCRs and computers. This cluster includes less union members than average and more females. Young drivers are more common in the Northeast, and less prevalent in the Southwest and West.

### ***Attitudes To ward CVO Services:***

Drivers in this group are, in general, slightly more positive than average about the technologies.

Looking at support for installation of the technologies in their vehicles, respondents in this cluster are about average, slightly higher than average for Hazardous Material Incident Response and slightly lower for On Board Safety Monitoring.

SUPPORT FOR INSTALLATION OF TECHNOLOGY	Percent Cluster 1 Strongly favor	Percent All Respondents Strongly favor	Ratio of % Cluster 1 Strongly In Favor To % Completely Opposed
Commercial Fleet Management	52	49	6.71
Commercial Vehicle Electronic Clearance	44	42	2.85
Commercial Vehicle Administrative Processes	31	33	1.58
Automatic Roadside Safety Inspection	30	34	1.70
Hazardous Materials incident Response	70	63	10.22
On Board Safety Monitoring	22	27	.93

Looking at the attribute ratings for the technologies, Cluster 1 respondents are more favorable to the technologies in the many areas. Overall, they are more positive about the technologies as a group in terms of:

- √ *makes me more independent*
- √ *would give me an advantage over other drivers*
- √ *improves safety on the road*
- √ *useful for me*
- √ *invasion of my privacy by government*
- √ *makes my work easier*
- √ *makes it easier to comply with existing regulations*

For the following specific technologies, Cluster 1 respondents were more favorable on the following attributes:

### **Commercial Fleet Management**

- *makes my work easier*
- *would give me an advantage over other drivers*
- *improves safety on the road*
- *relies too much on computers/loss of human judgment*
- *useful for me*

### **Commercial Vehicle Electronic Clearance**

- *makes me more independent*
- *improves safety on the road*
- *invasion of my privacy by government*
- *makes it easier to comply with existing regulations*
- *useful for me*

### **Commercial Vehicle Administrative Processes**

- *would give me an advantage over other drivers*
- *useful for me*

### **Automated Roadside Safety Inspection**

- *makes me more independent*

### **On Board Safety Monitoring**

- *invasion of my privacy by government*

## **Cluster 2: Experienced Drivers**

**23% of total sample**

### ***Demographics:***

Experienced drivers have been driving for more years, are better educated, are more likely to be union members, spend less time at weigh stations and inspections, and are more likely to be paid by the hour. This cluster includes a high proportion of bus drivers, who are more likely to have fixed routes. Truck drivers in this cluster are more likely than average to be driving in-

state. These respondents have slightly lower incomes than average and tend to be a little older. They have above average familiarity with computers, but have a lower opinion of new technology in general. They are less prevalent in the Northeast, Midwest and South.

**Attitudes Toward CVO Services:**

Experienced drivers have much the same attitudes as drivers in general regarding the technologies. They are more likely to say they strongly favor the installation of Commercial Vehicle Administration Processes, and are slightly more positive than average on the attribute ratings regarding the effect of Auto Roadside Safety Inspections on safety. They are less likely than average to favor the installation of Hazardous Material Incident Response.

<b>SUPPORT FOR INSTALLATION OF TECHNOLOGY</b>	<b>Percent Cluster 2 Strongly favor</b>	<b>Percent All Respondents Strongly favor</b>	<b>Ratio of % Cluster 2 Strongly In Favor To % Completely Opposed</b>
Commercial Fleet Management	50	49	2.95
Commercial Vehicle Electronic Clearance	41	42	2.26
Commercial Vehicle Administrative Processes	44	33	2.39
Automatic Roadside Safety Inspection	35	34	2.04
Hazardous Materials Incident Response	55	63	5.50
On Board Safety Monitoring	30	27	.84

In terms of being *useful for me*, Cluster 2 drivers are less favorable than average to Commercial Vehicle Electronic Clearance.

But, these drivers are also more likely than average to rate Automated Roadside Safety Inspection highly for *improves safety on the road*.

### **Cluster 3: Older Inexperienced Drivers      13% of total sample**

#### ***Demographics:***

These drivers are inexperienced and tend to drive company trucks and buses. They are slightly more educated and older than average, and have lower incomes. Bus drivers among them are less likely to be driving fixed routes. They spend more time than average at weigh stations and inspections. These drivers are less prevalent in the Southwest.

#### ***Attitudes Toward CVO Services:***

These drivers are generally significantly more positive about the technologies. While we found that older drivers are often less positive about the technologies, the cluster analysis has shown that among older drivers there are differences between those that have many years of driving experience and those who do not. The more experienced older drivers tend to be less favorable to the technologies (see Cluster 4 below).

Cluster 3 drivers are more likely than average to strongly favor the installation of Commercial Fleet Management, Commercial Vehicle Electronic Clearance, Commercial Vehicle Administrative Processes, Automated Roadside Safety Inspection and On Board Safety Monitoring.

SUPPORT FOR INSTALLATION OF TECHNOLOGY	Percent Cluster 3 Strongly favor	Percent All Respondents Strongly favor		Ratio of % Cluster 3 Strongly In Favor To % Completely Opposed
Commercial Fleet Management	77	49		9.56
Commercial Vehicle Electronic Clearance	50	42		5.27
Commercial Vehicle Administrative Processes	39	33		2.28
Automatic Roadside Safety Inspection	44	34		3.50
Hazardous Materials Incident Response	65	63		17.21
On Board Safety Monitoring	33	27		1.83

They are more likely to see the technologies as useful and advantageous, and less likely to be concerned about too much reliance on computers.

Looking at the composite attribute ratings for the technologies as a whole, Cluster 3 respondents are more favorable to the technologies in the following areas:

- √ *relies too much on computers/loss of human judgment*
- √ *would give me an advantage over other drivers*
- √ *will work/I would rely on it*
- √ *useful for me*
- √ *makes me more independent*
- √ *makes my work easier*
- √ *invasion of my privacy by government*
- √ *makes it easier to comply with existing regulations*
- √ *reduces paperwork*
- √ *invasion of my privacy by company*
- √ *improves safety on the road*
- √ *reduces traffic congestion*

For each of the following CVO services, respondents in Cluster 3 are more favorable to the technologies than average on the listed attributes:

**Commercial Fleet Management**

- *relies too much on computers/loss of human judgment*
- *would give me **an advantage** over other drivers*
- *will work/I would rely on it*
- *reduces traffic congestion*
- *makes my work easier*

**Commercial Vehicle Electronic Clearance**

- *relies too much on computers/loss of human judgment*
- *would give me an advantage over other drivers*
- *invasion of my privacy by government*
- *reduces traffic congestion*

**Commercial Vehicle Administrative Processes**

- *reduces paperwork*

**Automated Roadside Safety Inspection**

- *useful for me*
  - *invasion of my privacy by government*
  - *makes me more independent*
  - *reduces traffic congestion [at the station -- where applicable]*
  - *makes my work easier*
  - *will work/I would rely on it*
  - *relies too much on computers/loss of human judgment*

**Hazardous Material Incident Response**

- *reduces paperwork*

**On Board Safety Monitoring**

- *useful for me*
- *relies too much on computers/loss of human judgment*
- *makes it easier to comply with existing regulations*

**Cluster 4: Older Experienced Truck Drivers      12% of total  
sample**

***Demographics:***

These drivers tend to be older, have been driving for more years, are less educated and are less familiar with VCRs and computers. There are fewer bus drivers and union members in this group than average. Bus drivers are more likely to be charter drivers and less likely to be line run drivers. Drivers in this cluster spend less time than average at weigh stations and inspections, and tend to drive in smaller fleets. They have slightly lower incomes than average.

***Attitudes Toward CVO Services:***

These respondents have similar attitudes to drivers in general, but tend to be somewhat more negative than average about the technologies. In particular, they are less favorable to Commercial Fleet Management, Commercial Vehicle Administrative Processes and Hazardous Material Incident Response, and are more likely to be concerned with over reliance on computers.

<b>SUPPORT FOR INSTALLATION OF TECHNOLOGY</b>	Percent Cluster 4 Strongly favor	Percent All Respondents Strongly favor	Ratio of % Cluster 4 Strongly In Favor To % Completely Opposed
Commercial Fleet Management	30	49	1.50
Commercial Vehicle Electronic Clearance	43	42	1.86
Commercial Vehicle Administrative Processes	23	33	.61
Automatic Roadside Safety Inspection	38	34	1.74
Hazardous Materials Incident Response	52	63	2.76
On Board Safety Monitoring	31	27	1.12

These drivers are more likely than average to rate the technologies as a group better for reducing traffic congestion.

For two technologies, respondents in this cluster rated the services lower than average on the following attributes:

**Commercial Fleet Management**

- *relies too much on computers/loss of human judgment*
- *useful for me*
- *would give me an advantage over other drivers*
- *easy to use/won't require too much training*

**Commercial Vehicle Administrative Processes**

- *would give me an advantage over other drivers*

On three of the services, however, these respondents were more positive on the listed attributes:

**Automated Roadside Safety Inspection**

- *easy to use/won't require too much training*

**Hazardous Material Incident Response**

- *relies too much on computers/loss of human judgment*

**On Board Safety Monitoring**

- *reduces paperwork*
- *easy to use/won't require too much training*

**Cluster 5: Independent Truck Drivers Paid By Mile**

**11% of total sample**

***Demographics:***

These drivers are high income independent drivers, mostly paid by the mile, and rarely by the hour. They are more likely to drive interstate, less likely to drive in-state, and spend less time than average at weigh stations and inspections. There are very few bus drivers or union members in this cluster. They are more experienced, somewhat older, and tend to have a positive attitude towards technology in general. These drivers are more prevalent in the Midwest, Southwest and West.

**Attitudes Toward CVO Services:**

These drivers, while initially positive about the role of technology in the future of the busing and trucking industry in general, were consistently negative about the technologies themselves. They were less likely than average to favor the installation of all of the technologies except On Board Safety Monitoring. On the attribute ratings, this cluster rated even On Board Safety Monitoring less favorably than average.

SUPPORT FOR INSTALLATION OF TECHNOLOGY	Percent Cluster 5 Strongly favor	Percent All Respondents Strongly favor	Ratio of % Cluster 5 Strongly In Favor To % Completely Opposed
Commercial Fleet Management	43	49	3.33
Commercial Vehicle Electronic Clearance	32	42	1.04
Commercial Vehicle Administrative Processes	24	33	.58
Automatic Roadside Safety Inspection	29	34	.79
Hazardous Materials Incident Response	50	63	4.00
On Board Safety Monitoring	28	27	.61

Drivers in this cluster expressed greater concerns about a loss of privacy to the government, and were consistently less impressed than average with the technologies' usefulness, ability to make work easier and effect on independence and compliance with regulations.

Looking at the composite attribute ratings for the technologies as a whole, Cluster 5 respondents are less favorable to the technologies overall in the following areas:

- *makes it easier to comply with existing regulations*
- *invasion of my privacy by government*
- *makes me more independent*
- *makes my work easier*
- *useful for me*
- **would give me an advantage** over other drivers
- *improves safety on the road*
- *will work/I would rely on it*
- *reduces paperwork*
- *invasion of my privacy by company*
- *relies too much on computers/loss of human judgment*
- *reduces traffic congestion*

For the following technologies, respondents in Cluster 5 are significantly less favorable to the technologies on the listed attributes:

#### **Commercial Vehicle Electronic Clearance**

- *invasion of my privacy by government*
- *makes me more independent*
- *makes it easier to comply with existing regulations*
- *invasion of my privacy by company*
- *relies too much on computers/loss of human judgment*

#### **Commercial Vehicle Administrative Processes**

- *reduces paperwork*
- *makes my work easier*
- *useful for me*
- *makes it easier to comply with existing regulations*
- *would give me an advantage over other drivers*
- *will work/I would rely on it*

### **Automated Roadside Safety Inspection**

- *useful for me*
- *makes it easier to comply with existing regulations*
- *invasion of my privacy by government*
- *improves safety on the road*
- *would give me an advantage over other drivers*
- *will work/I would rely on it*
- *relies too much on computers/loss of human judgment*
- *makes my work easier*
- *makes me more independent*
- *reduces traffic congestion*

### **On Board Safety Monitoring**

- √ *makes it easier to comply with existing regulations*
- √ *makes me more independent*
- √ *useful for me*
- √ *makes my work easier*
- √ *reduces traffic congestion [at the station -- where applicable]*
- √ *would give me an advantage over other drivers*
- √ *improves safety on the road*
- √ *invasion of my privacy by government*
- √ *reduces paperwork*

## **Cluster 6: Interstate Truck Drivers Paid by the Mile and Affected by Bureaucracy** **9% of total sample**

### ***Demographics:***

These drivers are predominantly interstate truck drivers, with an above average proportion of private fleet drivers and fewer independent drivers. They are generally paid by the mile and spend much more time than average at weigh stations, inspections and filling out paperwork. These drivers tend to be non-union, more experienced, less educated and have slightly lower incomes than

average. They are more familiar with VCRs and computers. They are more likely to drive in the Midwest, South, Southwest and West.

**Attitudes Toward CVO Services:**

These drivers' attitudes are largely indistinguishable from those of the respondents in general. Looking at support for installation of the technologies, they are slightly more skeptical of Commercial Vehicle Administrative Processes and slightly more positive about Hazardous Material Incident Response.

TECHNOLOGY	Percent Cluster 6 Strongly favor	Percent All Respondents Strongly favor	Ratio of % Cluster 6 Strongly In Favor To % Completely Opposed
Commercial Fleet Management	47	49	2.50
Commercial Vehicle Electronic Clearance	38	42	1.67
Commercial Vehicle Administrative Processes	21	33	.69
Automatic Roadside Safety Inspection	30	34	1.33
Hazardous Materials Incident Response	74	63	17.19
On Board Safety Monitoring	27	27	.80

For three of the technologies, respondents in Cluster 6 are less favorable to the CVO services on the listed attributes:

**Fleet Management**

√ *reduces traffic congestion*

**Auto Roadside Safety Inspection**

√ *easy to use/won't require too much training*

### **On Board Safety Monitoring**

- *invasion of my privacy by government*

But for Hazardous Materials Incident Reporting, respondents are more likely to think that the technology *makes my work easier*.

### **Cluster 7: High Income Independent Drivers Affected By**

#### **Bureaucracy**

**5% of total sample**

#### ***Demographics:***

These drivers are high income truck drivers, generally independent and paid by the trip. They spend significantly more time than average at weigh stations and inspections. These drivers are less likely to be union members and are more likely to drive interstate in smaller fleets. They tend to have been driving for more years, and are older than average. These drivers are more positive than average about technology in general and are more prevalent in the Midwest.

#### ***Attitudes Toward CVO Services:***

In terms of support for installation of the technologies, drivers in this cluster are less favorable than average to Commercial Fleet Management, On Board Safety Monitoring and Automated Roadside Safety Inspection.

TECHNOLOGY	Percent Cluster 7 Strongly favor	Percent All Respondents Strongly favor	Ratio of % Cluster 7 Strongly In Favor To % Completely Opposed
Commercial Fleet Management	32	49	1.14
Commercial Vehicle Electronic Clearance	42	42	2.36
Commercial Vehicle Administrative Processes	31	33	1.43
Automated Roadside Safety inspection	28	34	1.05
Hazardous Materials Incident Response	71	63	*N/A
On Board Safety Monitoring	18	27	.50

\* This category had no "strongly disapprove" responses.

These drivers are somewhat more skeptical of the positive attributes of the technologies. Specifically, they were less impressed with the effects of the technologies on safety, compliance with regulations and independence. Regarding Hazardous Materials Incident Reporting, however, the drivers all agreed it would improve safety.

Respondents rated the technologies as a group lower on the following attributes:

- *makes me more independent*
- *makes it easier to comply with existing regulations*
- *improves safety on the road*

For Commercial Fleet Management, Automated Roadside Safety Inspection, and Commercial Vehicle Electronic Clearance respondents in this cluster rated the technologies lower on the listed attributes:

**Commercial Fleet Management**

- *improves safety on the road*
- *will work/I would rely on it,*

### **Automated Roadside Safety Inspection**

- *makes me more independent*
- *makes it easier to comply with existing regulations*
- *useful for me*
- *reduces paperwork*
- *will work/I would rely on it*

### **Commercial Vehicle Electronic Clearance**

- *makes me more independent*
- *makes it easier to comply with existing regulation?*
- *improves safety on the road*

However, on Commercial Vehicle Electronic Clearance, respondents in this cluster were more positive about-*easy to use/won't require too much training.*

For Hazardous Materials Incident Response, this cluster is more likely to say the technology *improves safety on the road.*