Monitoring results for ensuring real behavioral changes

Doha, 24 October 2013

Mr. Kris Jooris
Key Driving Competences, Belgium
Key Driving Competences

Start KDC: 2005

Training Transport Professionals
- Train the Trainer + 50 organizations
- Train the Driver + 20,000 trainings
- Eco-Score + 100 Customers

Technology
- Key Driving Training System (KDTS or EETS)
- Eco-Score + 8000 vehicles in Europe

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Benefits

• Less fuel consumption
• Less CO₂
• Less goods damages
• Fewer accidents
• Lower maintenance costs
• Higher road safety
• Better producing and more aware drivers
Cost Structure in most regions & countries

- 24% Fuel
- 6% Maintenance and repair
- 3% Tyres
- 33% Salary, social costs and taxes
- 3% Insurance
- 3% Vehicle taxes
- 19% Capital costs
- 8% Administration

Source: Volvo Truck
Cooperative technology: Means to integrate several different systems with each other. They compile data and give direct feedback to drivers and back office.

Technology factors: Means to support the training and improve the results.

Managerial factors: How the work (of change) is managed in terms of goals, roles, responsibilities, incentives, resources, budget, process etc.

Human factors: Understanding peoples’ resources and capacities, i.e. physical, mental, cognitive and behavioural properties. These factors are the basic prerequisites for the training strategies.
Implementation process

Introduction Phase
- Why are we doing this?
- How are we going to do it?
- What measures what methods?

Feasibility study
- Goals and Purpose
- Organisation
- Data and Communication

Information phase
- Anchor the project in the organisation
- Incentives programs

Education & Training phase
- Set up the training program
- Theoretical education
- Practical training

Follow-up Summary
- Review the work
- Set up new goals and challenges
- Continuous training and education
Vision + Skills + Incentives + Resources + Action plan = Change

Vision + Skills + Incentives + Resources + Action plan = Confusion

Vision + Skills + Incentives + Resources + Action plan = Anxiety

Vision + Skills + Incentives + Resources + Action plan = Resistance

Vision + Skills + Incentives + Resources + Action plan = Frustration

Vision + Skills + Incentives + Resources + Action plan = Treadmill
ECOeffect Package

• Training methodology for TTT and EDP training
• Licensing EETS as training tool to ECOeffect partners
• Follow-up on quality of trainings delivered
Our offer – TTT

ECOeffect Train-the-Trainer:

- 3 day Course
- 1 to 3 Participants
- Training on customer’s truck (Can-bus enabled)
- Training at customer’s premises
- Free use of EETS software during the ECOeffect project
- ECOeffect Trainer Certificate
Our offer – EDP

ECOeffect Driver Program:

- 1 day Course
- 2 to 4 Participants
- Training on customer’s truck (Can-bus enabled)
- Training at customer’s premises
- Use of EETS software during the training
- ECOeffect Driver Certificate
Signals are taken from can bus on high frequency
Quality Assurance

REPORTING on training results with EETS

For Quality Assurance on the deployment of ECOeffect trainings: ALL training trips registered with EETS are stored on KDC server after replication by training company or internal fleet trainer.
ECOeffect main principles on eco-driving:

- Anticipation look further and wider.
- Drive fluently, avoid unnecessary braking's and stops.
- Drive at a constant speed in the highest possible gear.
## Individual training report

### EETS TRAINING SYSTEM

**Eco-Proactive Driving Behaviour "What You Can't Measure, You Can't Manage"**

<table>
<thead>
<tr>
<th></th>
<th>TRIP 1</th>
<th>TRIP 2</th>
<th>Difference</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elapsed Time</td>
<td>39:36</td>
<td>36:04</td>
<td>03:32</td>
<td>8,92%</td>
</tr>
<tr>
<td><strong>Average Speed</strong></td>
<td>34,25</td>
<td>37,53</td>
<td>3,28</td>
<td>9,58%</td>
</tr>
<tr>
<td>Total Fuel Consumption</td>
<td>11,67</td>
<td>9,21</td>
<td>-2,46</td>
<td>-21,09%</td>
</tr>
<tr>
<td><strong>Average Consumption</strong></td>
<td>51,6</td>
<td>40,8</td>
<td>-10,8</td>
<td>-20,94%</td>
</tr>
</tbody>
</table>

**RESULT ANALYSIS**

<table>
<thead>
<tr>
<th></th>
<th>TRIP 1</th>
<th>TRIP 2</th>
<th>Difference</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Position Trottle</td>
<td>27%</td>
<td>28%</td>
<td>1%</td>
<td>3,27%</td>
</tr>
<tr>
<td>Time vehicle in motion - Zero Throttle</td>
<td>08:42</td>
<td>10:24</td>
<td>01:42</td>
<td>19,54%</td>
</tr>
<tr>
<td>Time - Use of Breaks</td>
<td>06:12</td>
<td>03:18</td>
<td>02:53</td>
<td>46,65%</td>
</tr>
<tr>
<td><strong>Total Distance - Zero Throttle</strong></td>
<td>5,37</td>
<td>6,97</td>
<td>1,59</td>
<td>29,59%</td>
</tr>
<tr>
<td>Total Distance - Use of Breaks</td>
<td>2,60</td>
<td>1,34</td>
<td>-1,26</td>
<td>-48,54%</td>
</tr>
<tr>
<td><strong>Number of Brakings</strong></td>
<td>54</td>
<td>33</td>
<td>-21</td>
<td>-38,32%</td>
</tr>
<tr>
<td>Gear shifts</td>
<td>181</td>
<td>123</td>
<td>-58</td>
<td>-32,04%</td>
</tr>
<tr>
<td>Gear shifts(upshift)</td>
<td>116</td>
<td>72</td>
<td>-44</td>
<td>-37,93%</td>
</tr>
</tbody>
</table>

- Full release accelerator pedal
- Lower # of brakings

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## Training results HSF Poland

<table>
<thead>
<tr>
<th>TRIP 1</th>
<th>TRIP 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Average consumption</strong></td>
<td><strong>Average consumption</strong></td>
</tr>
<tr>
<td>32,9 L/100 km</td>
<td>28,9 L/100 km</td>
</tr>
</tbody>
</table>

(deviation between 23,8 and 55L / 100km) (deviation between 22,6 and 45L / 100km)

Average reduction in consumption (L /100km) = - 4 L/100km

Average reduction in fuel consumption during training = **-12,24%**

Number of drivers trained: 670 drivers trained

Accomplished by: HSF Logistics and Vive Transport

Training results from May 2011 to August 2013 (14 months)

Training performed by 20 ECOeffect certified internal trainers, measured with EETS

Training trips: all kind of road circumstances, approx. 35 km
<table>
<thead>
<tr>
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<th>TRIP 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Average consumption</strong></td>
<td><strong>Average consumption</strong></td>
</tr>
<tr>
<td>29,52L / 100</td>
<td>26,79L / 100</td>
</tr>
</tbody>
</table>

Average reduction in consumption (L /100km) = -2,7L / 100 km

Average reduction in fuel consumption during training

Number of drivers trained: more than 700 drivers


Training results from May 2011 to August 2013 (15 months)

Training performed by certified trainers, at 11 companies, measured with EETS

*Not including the results obtained at Cartrans Preda and Essers*
ATM approach

Optimize results… by installing dynamic ATM model in your company
Follow-up of drivers’ performance results on a permanent basis:

- Analysis of reduction in fuel consumption in relation to situation prior to training:
  - For the whole group of trained drivers
  - For each individual driver
- Monthly feedback to trained drivers
- Quarterly analysis of “corrective actions”:
  - Who needs corrective actions
  - What type of corrective actions
  - Who will undertake these actions
- Continued Follow-Up after corrective actions
Why measure driver performance?

Average weight, not constant (33-41 T)

Consumption decreases, then steadily increases

When did the driver perform well?
Focus on driver

Fuel Consumption

Driver

Environment
- Traffic density
- Road Type
- Short/long distance

Vehicle
- Type
- Weight
How to measure driving behaviour?

- **Quantitative measuring**: Measuring fuel events (e.g., fuel consumption)
- **Qualitative analysis**: Evaluating events
- **Objective Score**: Qualitative analysis of driving behaviour, independent from vehicle, activity, environment,…

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Qua\textbf{N}titative

✓ Statistics of vehicle metrics are not directly related to driver performance
✓ Difficult interpretation: very detailed knowledge of external conditions is needed
✓ External conditions are changing from day to day, trip to trip, ...

Qua\textbf{L}itative

✓ Evaluate the actions made by the driver
✓ Fuel consumption is not an input for the scoring
✓ A good driver score will lead to a low fuel consumption
✓ Ready to use for permanent evaluation and leader boards on driver competences

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EcoScore by KDC

EcoScore = objective evaluation of driver skills based on driver’s event queues while driving.

<table>
<thead>
<tr>
<th>Driver</th>
<th>TOTAL SCORE</th>
<th>ANTICIPATION</th>
<th>GEARING</th>
<th>IDLING</th>
<th>TECHNOLOGY</th>
<th>ACCELERATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>A A (4318)</td>
<td>47</td>
<td>35</td>
<td>56</td>
<td>100</td>
<td>56</td>
<td>33</td>
</tr>
<tr>
<td>A J (26538)</td>
<td>53</td>
<td>44</td>
<td>54</td>
<td>92</td>
<td>64</td>
<td>50</td>
</tr>
<tr>
<td>A S (1003)</td>
<td>49</td>
<td>33</td>
<td>64</td>
<td>90</td>
<td>57</td>
<td>33</td>
</tr>
<tr>
<td>A R (12004)</td>
<td>37</td>
<td>28</td>
<td>36</td>
<td>96</td>
<td>37</td>
<td>32</td>
</tr>
<tr>
<td>A R (552091)</td>
<td>51</td>
<td>29</td>
<td>69</td>
<td>100</td>
<td>70</td>
<td>36</td>
</tr>
<tr>
<td>A R (920210)</td>
<td>51</td>
<td>38</td>
<td>62</td>
<td>92</td>
<td>55</td>
<td>36</td>
</tr>
<tr>
<td>A A (26104)</td>
<td>52</td>
<td>30</td>
<td>72</td>
<td>89</td>
<td>63</td>
<td>40</td>
</tr>
<tr>
<td>B A (920826)</td>
<td>40</td>
<td>32</td>
<td>40</td>
<td>54</td>
<td>87</td>
<td>27</td>
</tr>
<tr>
<td>B A (1006)</td>
<td>52</td>
<td>34</td>
<td>77</td>
<td>40</td>
<td>81</td>
<td>39</td>
</tr>
<tr>
<td>D M (0343)</td>
<td>44</td>
<td>23</td>
<td>59</td>
<td>99</td>
<td>67</td>
<td>28</td>
</tr>
<tr>
<td>D M (4153)</td>
<td>43</td>
<td>30</td>
<td>50</td>
<td>93</td>
<td>54</td>
<td>27</td>
</tr>
<tr>
<td>D R (920979)</td>
<td>44</td>
<td>36</td>
<td>45</td>
<td>85</td>
<td>55</td>
<td>34</td>
</tr>
<tr>
<td>FLEET AVERAGE</td>
<td>43</td>
<td>31</td>
<td>43</td>
<td>85</td>
<td>54</td>
<td>37</td>
</tr>
</tbody>
</table>

In order to improve on specific driving skills, subscores are available for:
- Anticipation
- Gearing
- Acceleration
- Idling
- Technology

Total score is weighted sum of subscores: Anticipation (1/3), Gearing (1/3), Acceleration (1/6), Idling (1/12) and Technology (1/12).
Event Based Scoring

GOOD ?

BAD ?

GOOD ?

TIME

EVENT LOG

ACCELERATOR

COAST

ACCELERATOR

COAST

BRAKE

STOP

GEAR: 9

SHIFT

GEAR: 11

SHIFT

GEAR: 4

RPM!

BRAKE!

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ECOeffect monitoring

What is ECOeffect?

ECOeffect is a high-quality eco-driving programme combining the latest technology, advanced training techniques and safety behaviour specifically designed for the road transport sector. This programme includes techniques, training and monitoring tools for the most efficient fuel cost reduction across Europe. It provides knowledge and expertise to any transport operator and training centre interested in eco-driving. With the support of the European Commission it helps to promote the integration of an eco-driving training module into professional driver qualification and certification.

The ECOeffect programme aims to transfer knowledge from approved a using the ECOeffect Training System (ETS) the trainers will be able to the driving skills of each professional driver. The training will reinforce environmentally aware and economical driving behaviour.

Quantitative evaluation

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Level of fuel consumption is significantly lower than before training in ECOeffect project: -10% after 8 months of follow-up, i.e. -3L/100 km

Seasonal trend in fuel consumption – impact of changing weather conditions
Long term downward trend in fuel consumption: 7% savings, measured 8 months after the start Ecoeffect project.

Seasonal trend in fuel consumption – impact of changing weather conditions.

Current level of fuel consumption significantly lower than before training: savings up to – 1.8L/100 km.
A significant difference between the monthly consumption of the drivers trained (yellow line) versus the drivers untrained (blue line):

-4.5% savings on fuel consumption for 6 months
# Performance indicators

<table>
<thead>
<tr>
<th>Performance indicators</th>
<th>units</th>
<th>Achieved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuel consumption before training</td>
<td>L/100 km</td>
<td>30,23 L/100 km</td>
</tr>
<tr>
<td><strong>Fuel savings</strong></td>
<td>%</td>
<td>6.9%</td>
</tr>
<tr>
<td>Fuel price</td>
<td>€</td>
<td>1,2 €</td>
</tr>
<tr>
<td>Carbon emission</td>
<td>kg CO2/ liter</td>
<td>2.64</td>
</tr>
<tr>
<td>Average driving capacity</td>
<td>Km/driver/year</td>
<td>96.525 km</td>
</tr>
<tr>
<td>Fuel savings for 1 driver</td>
<td>€/driver/year</td>
<td>2.416 €</td>
</tr>
<tr>
<td>CO2 savings for 1 driver</td>
<td>kg C02/year</td>
<td>5.315 kg</td>
</tr>
<tr>
<td>CO2 savings per kilometer</td>
<td>g CO2/km</td>
<td>55,06 g/km</td>
</tr>
<tr>
<td>Number drivers trained</td>
<td></td>
<td>1.400</td>
</tr>
<tr>
<td>Fuel savings all trained drivers</td>
<td>€/year</td>
<td>3.382.111€</td>
</tr>
<tr>
<td>CO2 savings all trained drivers</td>
<td>tons/year</td>
<td>7.441 tons</td>
</tr>
</tbody>
</table>

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Less damages to vehicles

Also, it should be mentioned that the truck damage rate since applying the trainings is by 1/3 lower than before educating the drivers, among others in eco-driving.
Thank you!

Working together for a better future

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