



FCM Workshop

Victoria, B.C.

February 8th, 2011

Dr Pierro Hirsch

## Driving Simulator-based Ecodrive Training

# Agenda

- Who is Virage Simulation?
- Nine advantages of driver simulator training
- Ecodriving training requirements
- Successful learning
- Questions



# Virage Simulation

October 2005 - Virage Simulation was founded by six engineers from CAE with over 120 years of collective experience in all aspects of flight simulation

January 2006 - Dr Pierro Hirsch joins the team bringing with him with over 30 years of experience in road safety education and research

## Simulation-based training in aviation

- 1929 - First Flight Simulator
- 1970 - Simulator used to reduce costs and risks during training
- 1983 - “Zero flight time” achieved
- 1990 - Simulator used for pedagogical quality i.e. reduction of human error during flight
- 2000+ - No simulator, no airplane



Ed Link, 1929



Today

# Nine advantages of driving simulator training\*

1. **Safety:** Practice dangerous maneuvers without risk
2. **Scenario versatility:** Create any weather, road or traffic environment
3. **Standardization:** Specific scenarios for specific learning goals

\*Robin, J.L., Knipling, R.R., Derrickson, M.L. et al. (2005) Truck imulator validation (“SimVal”) training effectiveness study. Proceedings of the 2005 Truck & Bus Safety & Security Symposium. Alexandria, VA, November 14-16 2005.

# Nine advantages of driving simulator training

**4. Thoroughness:** All learners exposed to each lesson

**5. Repeatability:** Repetition of lessons and tests enables skill mastery

**6. Improved time and space perspectives:** Record and playback and alternative camera angles enhance learning

# Nine advantages of driving simulator training

7. **Augmented cuing:** Images, symbols, and sounds accelerate learning and reduce barriers of language and culture \*
8. **Sophisticated measurement:** More precise recording and analysis of learner performance
9. **Efficiency:** More training events in a given time period (2 to 4 times more)



# What is Ecodriving?

Ecodriving is a new approach focused on optimizing driver behavior to:

- improve fuel efficiency, and;
- reduce air pollution and greenhouse gas emissions without sacrificing travel time.



# Fuel and CO<sup>2</sup> reductions

Ecodrive training can help drivers reduce fuel consumption by 5 to 30%

Fuel savings: 5% = 4,500 litres/yr or \$4,500 \*

Reduced environmental harm: 4,500 litres = 12 tons CO<sup>2</sup> †

\* Based on annual mileage of 200,000 km; fuel consumption 45 litres/100 kms; total consumption 90,000 litres of fuel per year

† One liter of diesel produces 2.7 kg of CO<sup>2</sup>



# Ecodriving

In 2008 and 2009, Virage Simulation was commissioned to create simulator-based ecodriving training programmes for commercial drivers of light and heavy vehicles.

The efficacy of these courses are currently being evaluated.

## THE GAZETTE MONTREAL JUNE 30, 2008

### Environment and safety...driving forces

The Green Life - Michelle Lalonde



MONTREAL – When the dreaded time comes, Pierro Hirsch is the guy I want to teach my kids to drive. Not only does Hirsch have 30 years of experience as the former owner of a Montreal driving school, he also has a doctorate in public health. His study and research focused on driver safety and car crashes as a public health issue, so Hirsch is intimately aware of the real risks we all face when we get behind the wheel.

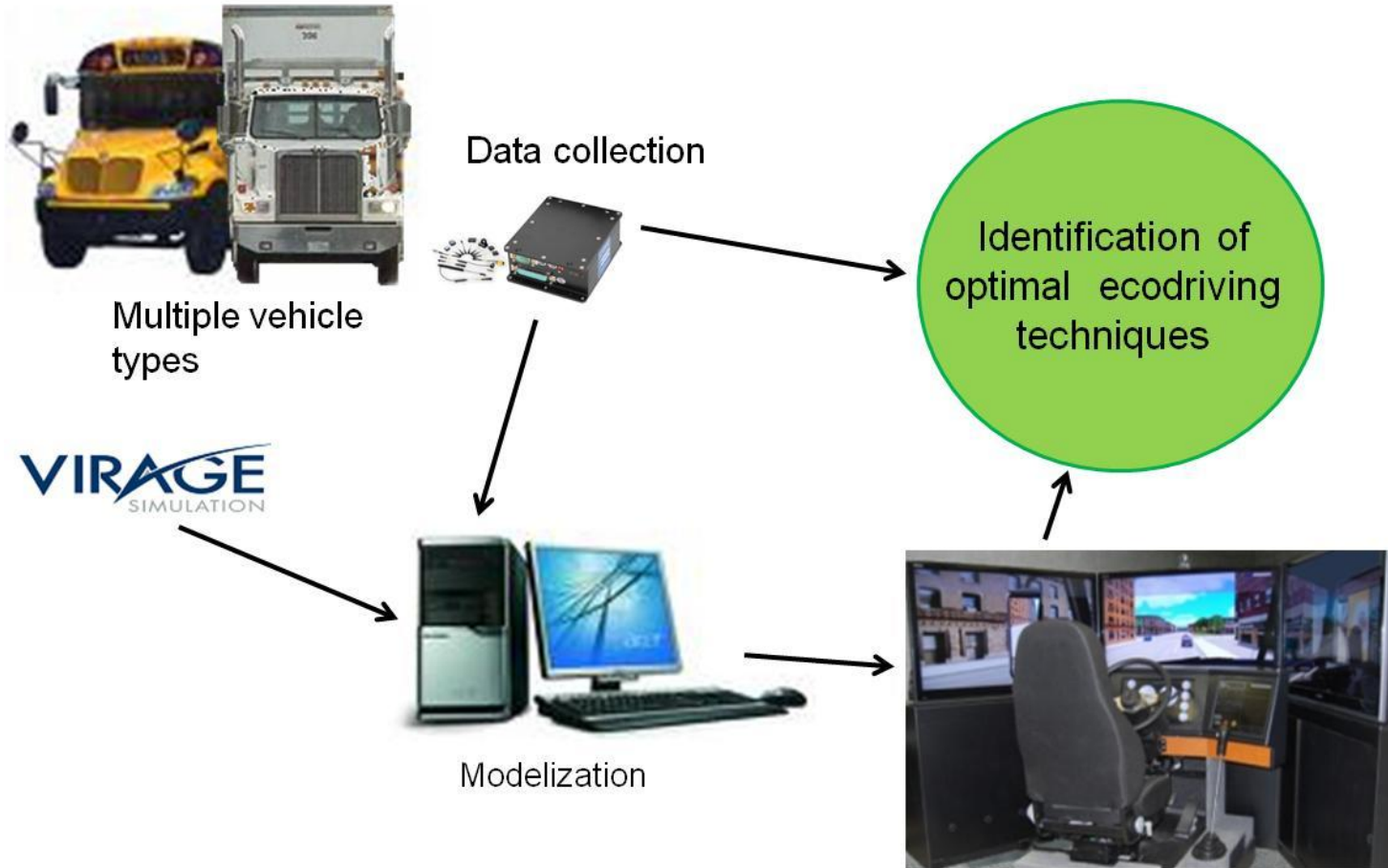
Hirsch is also an expert on “eco-driving” – that is, techniques to improve fuel efficiency and thus reduce air pollution and greenhouse gas emissions. ....he has joined a young Montreal company called Virage Simulation, which is aiming to make car simulators commonplace in Quebec driving schools...

**...The Société de l'assurance automobile du Québec has recently approved car simulators for driver education. Driving schools are now allowed to have their students use simulators for up to 50 per cent of their practical courses.**

# Ecodriving training requirements

1. Precise and accurate vehicle models
2. Precise and accurate fuel efficiency measurements
3. Precise and accurate feedback to learners
4. Engaging training methods based on research and best practices

## Precise modelization = Precise feedback



## Multiple vehicle models in one



Vehicle selection includes:

- Car
- Pickup truck with trailer
- Dump truck
- Other vehicles available

### Multi-function display

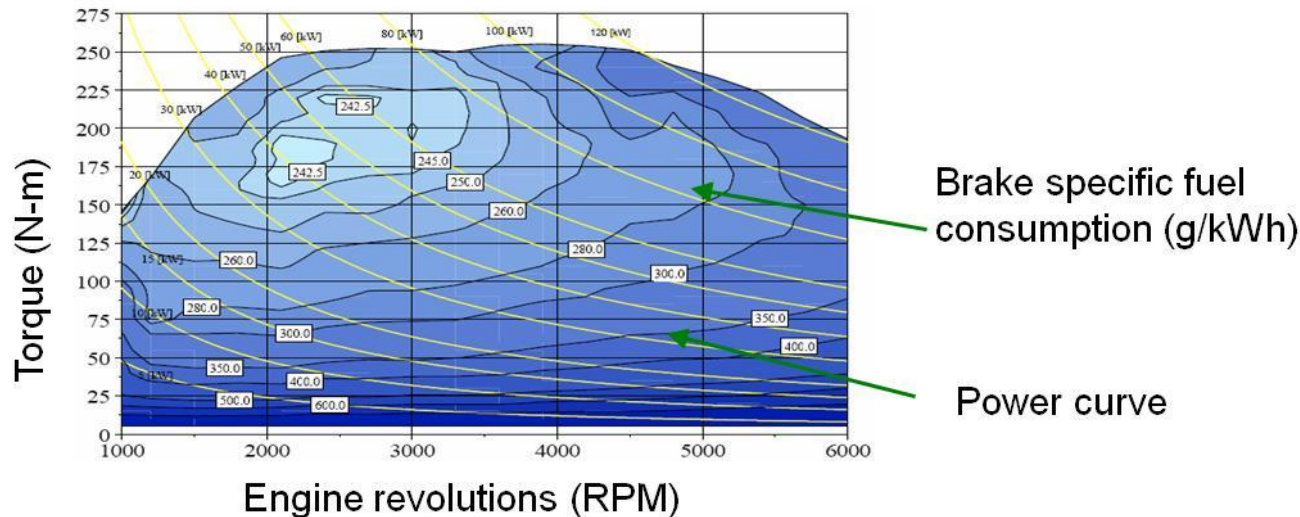
Touch screen to select:

- Training scenarios
- Vehicle types
- Vehicle-specific controls
  - Parking brake
  - Transmission
  - Airbrake system information
  - Trailer connect / disconnect



## An engineer's viewpoint

### Efficiency of a gasoline engine \*



For a given power requirement, the engine is more efficient fully loaded at lower RPMs

Ref.: Engine map TNO

\* Comparable to a diesel engine at lower RPMs

# Precise feedback to learners



- Glass dashboard reproduces look of most available vehicles
- Simulator motion and vibration on clutch and shifter creates realistic feel and enhances learning
- Real-time feedback guides self-paced learning



# Group ecodriving training

- **One-day** - Theory and practice (groups of 4)
- **Half-day** - Theory and practice, limited to essentials (groups of 4)
- **30-minute express training** - Demonstration (groups of 10)
- **5-minute public demonstration** - Scored drive comparing average and best scores
- **Ecodrive challenge:** Express-training plus a 5-minute evaluation comparing individual and group results, designed for events where the participants receive immediate feedback and where the best scores (individual or by group) are projected on a large screen.

# “Watch-Do-Teach” ecodrive group training



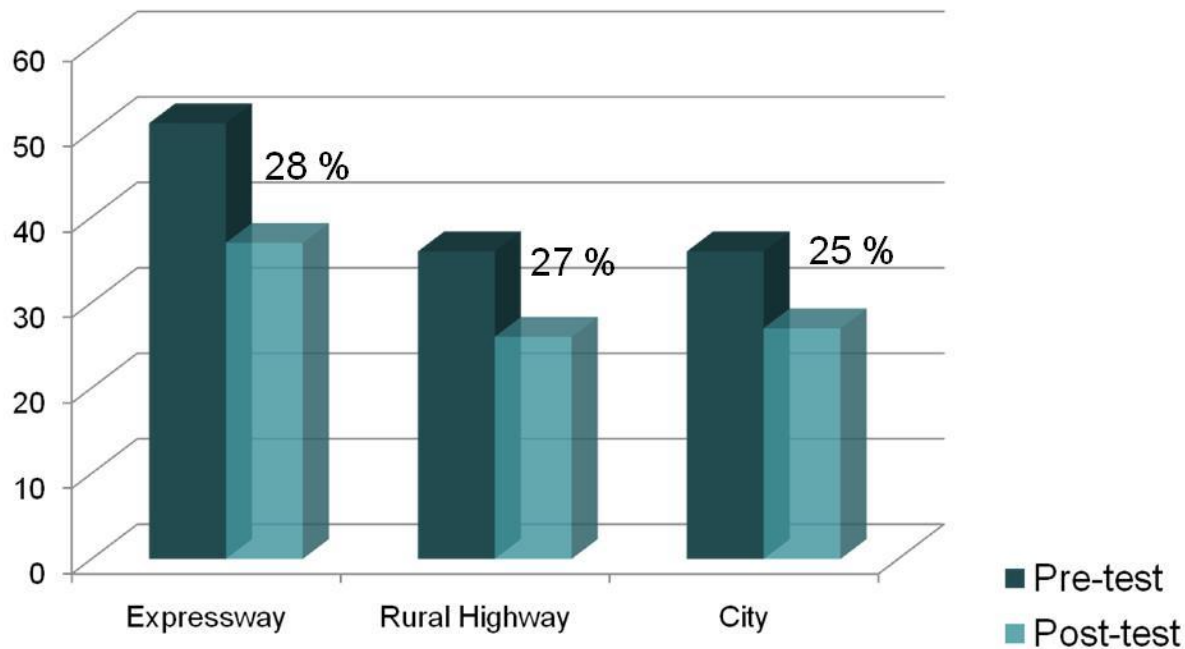
Increase driver buy-in with  
interactive learning



Promote an ecodrive culture  
with objective standards  
and friendly competitions

## Preliminary results of one-day ecodriving course

Number of accelerator pedal reversals (ARR) during standardized route



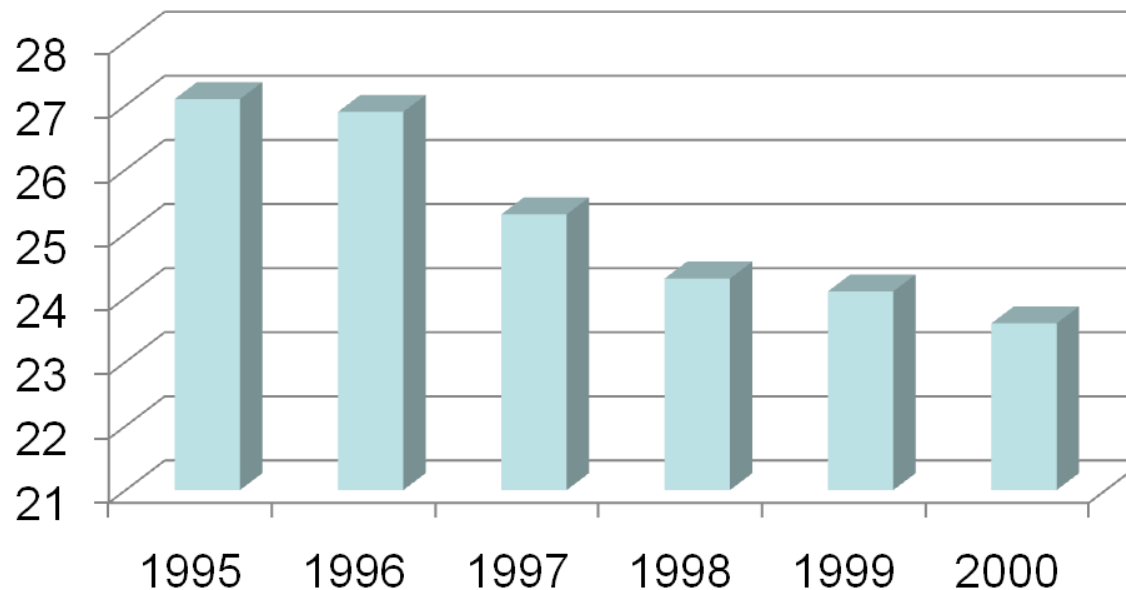
# Successful ecodrives program

## Example of successful application by Setz Transport

- Modest goal – 2% annual improvement
- Monthly driver evaluations
- Driver training
- Improved vehicle maintenance
- Revised routing
- Every month, the 10 worst drivers received corrective training from external instructor
- Dispatchers reviewed routes to avoid stop & go
- All drivers received annual refresher, *including simulator practice*

# Successful ecodrive training

Average fuel consumption  
(l/100km)



*Improvements in Setz company annual average fuel consumption from continuous driver evaluation and training. IRU, 2003 Second Report on Road Transport Best Practices. iru.org.*



# Ecodrive on simulator

A complementary tool with potential to help fleet managers:

- Efficiently deliver ecodrive training
- Set baselines of driver performance
- Increase driver buy-in
- Validate and support other fleet management tools





Thank you

Questions?