Two TRB Commercial Truck & Bus Safety Synthesis Program (CTBSSP) Projects

- CTBSSP website:
  www.trb.org/SynthesisPrograms/Public/CommercialTruckandBusSafetySynthesisProgram.aspx
- Two current projects near completion:
  - **MC-23:** ***Driver Selection Tests & Measurements***
  - **MC-22:** ***Safety Effects of Carrier Efficiencies [nee "Risk Avoidance Strategies"]***

Participants

- ***Contractors:***
  - **Principal Investigator: Dr. Ron Knipling, Safety for the Long Haul**
  - **Co-Investigator: Dr. Steve Burks, University of Minnesota at Morris**
  - **Prime contractor: Mr. Gene Bergoffen, Maineway Services**
- ***Survey support from trade associations:***
  - **Bus Industry Safety Council (BISC)**
  - **National Private Truck Council (NPTC)**
  - **Truckload Carriers Association (TCA)**
- ***Motor carrier safety managers & other safety experts via project surveys***

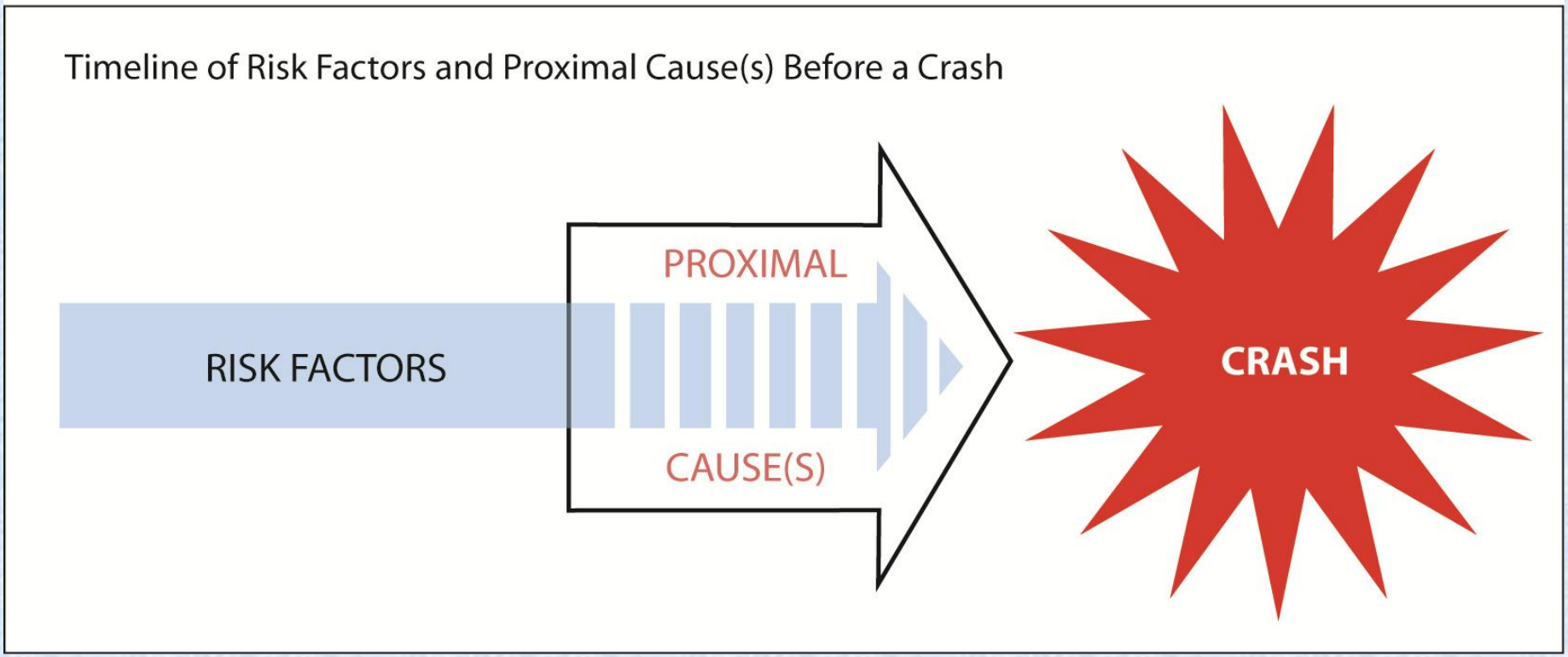
Driver Selection Tests & Measurements (MC-23)

- **Review research on individual differences relevant to safe driving.**
- **Review research and industry practices on methods used by carriers to select safe drivers.**
- **Convenience-sample surveys of carrier safety managers & other experts**
- **Case study interviews with carriers.**
- **Help carriers better assess driver risk and improve selection & hiring.**

Safety Effects of Carrier Efficiencies (MC-22)

- **Concept: Risk *avoidance* (as opposed to risk reduction).**
- **Review research relevant to carrier operational efficiencies that may also benefit safety through risk avoidance.**
- **Convenience-sample surveys of carrier safety managers & other experts**
- **Case study interviews with carriers.**
- **Assist carriers in deploying their trucks and buses in ways that minimize risk.**

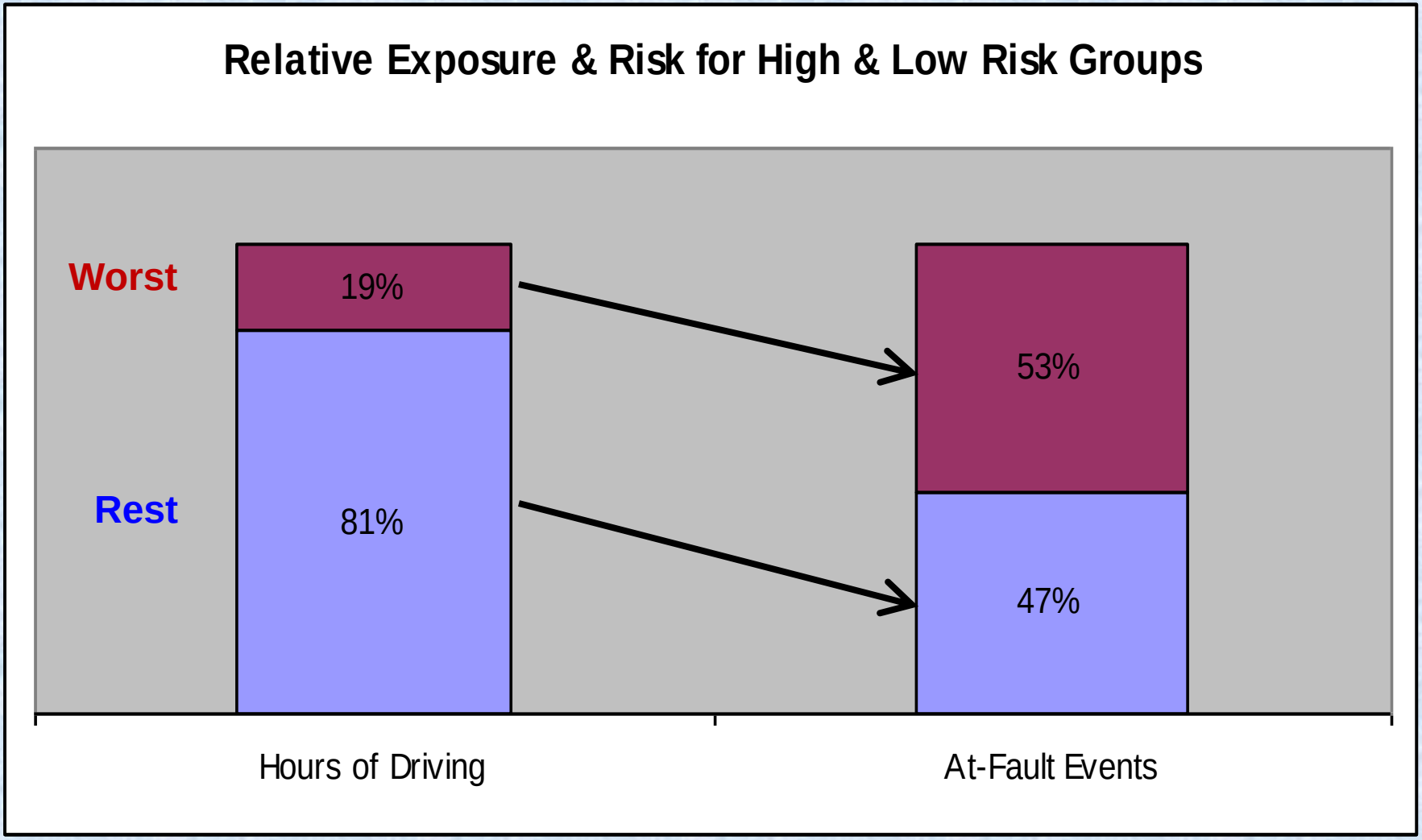
Crash Risk Factors



- **Risk Factors:**
  - **Driver:**
    - **Enduring → *Driver Selection Tests & Measurements* project**
    - **Temporary**
  - **Situational:**
    - **Roadway/Environmental → *Safety Effects of Carrier Efficiencies* project**
    - **Vehicle.**

Research suggests that worst 15-20% of drivers account for 50% or more of total CMV fleet risk.

Example: At-fault events (traffic conflicts) in VA Tech instrumented vehicle study of 95 truck drivers.



Driver Selection Tests & Measurements Study:

*W*ays that carriers can assess driver risk during hiring.

Safety-Relevant Driver Traits:

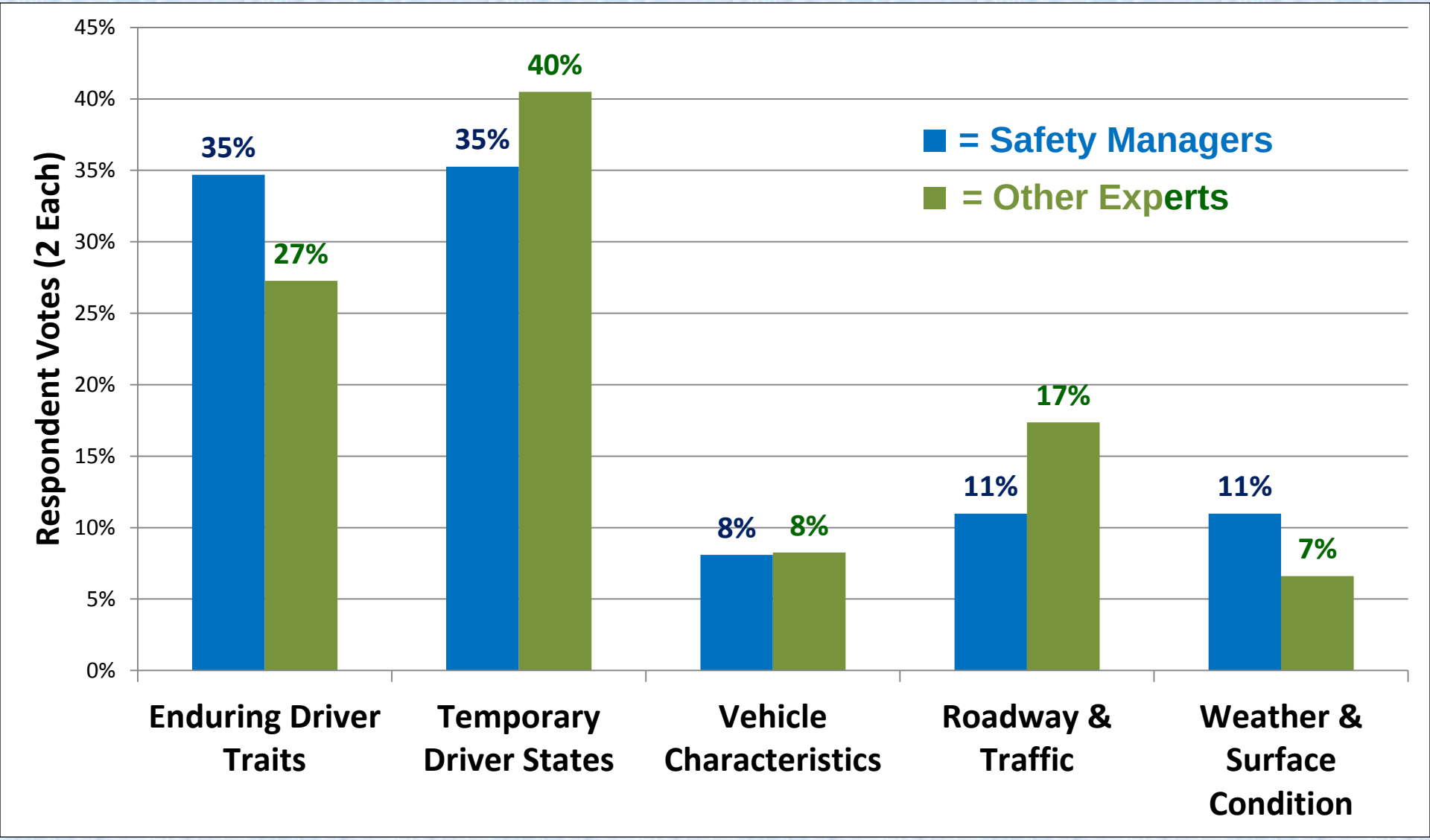
- Demographics; e.g., age
- Driving knowledge & skills
- Personality
- Risk perception & attitudes
- Psychomotor skills
- Medical status & conditions
- Behavioral history
- Cognitive abilities

MC-23 Report (Spring, 2011)

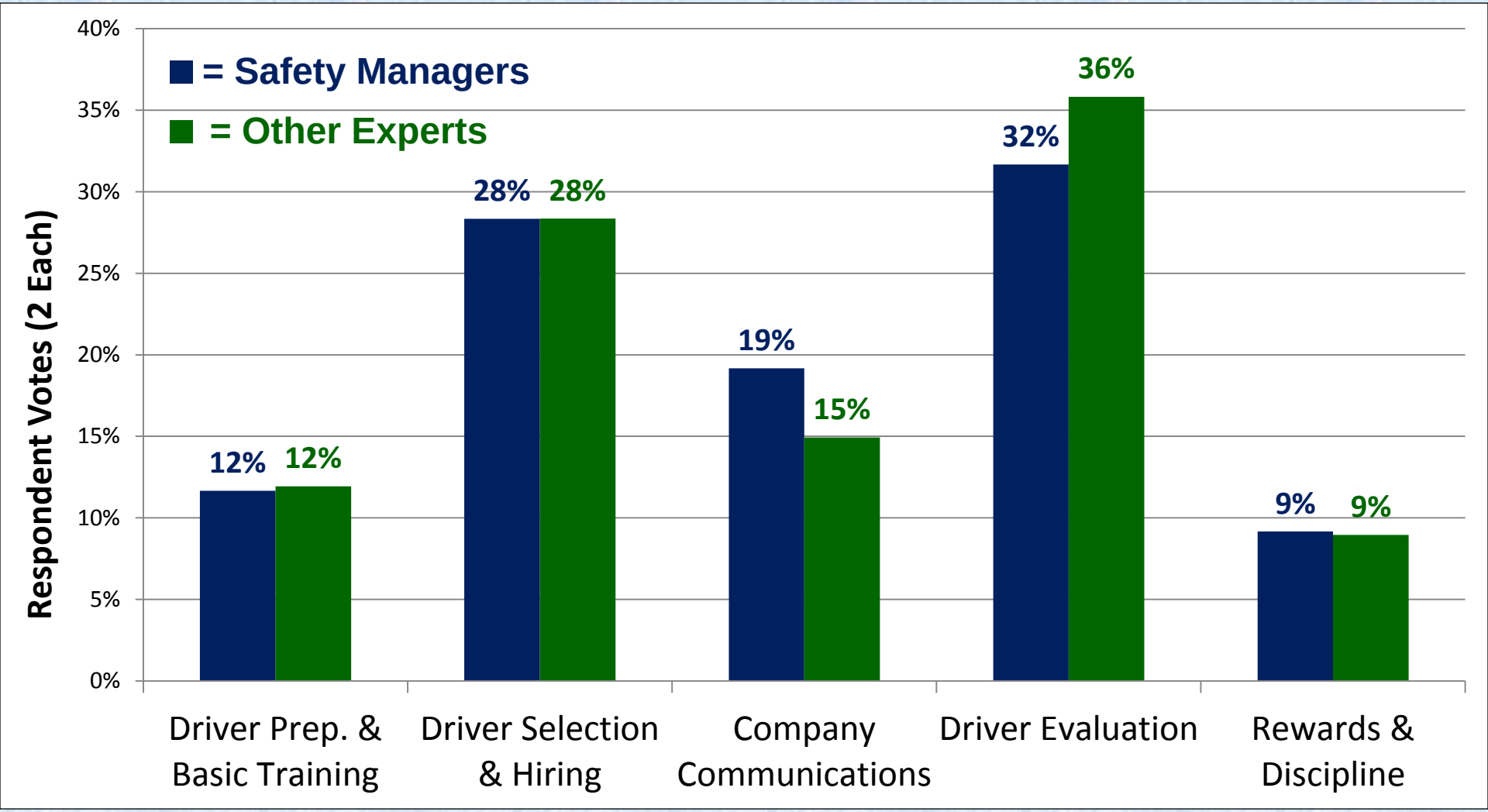
- **Introduction**
- **Driver individual differences**
- **Driver selection methods**
  - **Overview of selection & hiring**
  - **Test characteristics & requirements**
  - **Safety-relevant employment tests**
  - **Tests for retention likelihood**
- **Convenience-sample surveys**
  - **Safety managers**
  - **Other experts**
- **10 carrier case studies**
- **Conclusions**
  - **23 “best practices”**
  - **R&D needs**

Survey Results: Factors Affecting Safety & Risk

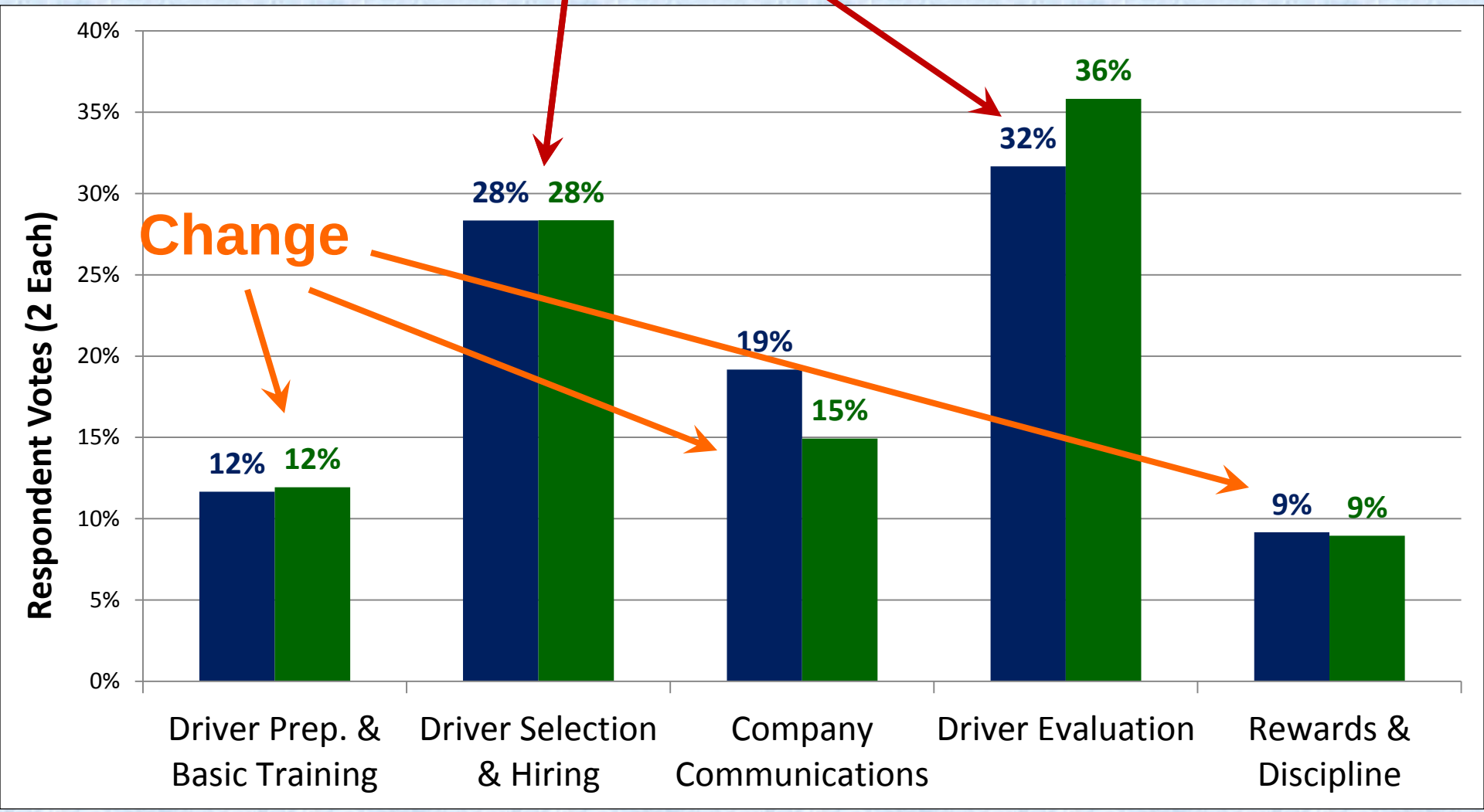
(Combined MC-22/MC-23 Data)



Survey Results: Most Important Carrier Practices
(MC-23 Data)



Survey Results: Most Important Carrier Practices



What Causes Differential Driver Risk?

Safety Manager Rankings of 12 Specific Driver Traits

1. Risk-taking personality
2. Poor vehicle handling skills
3. Aggressive personality
4. Dishonest/ untrustworthy
5. Unhappy/ personal problems
6. Dissatisfied with job
7. Poor physical health
8. Financial problems/debt
9. Overweight/obese
10. Low intelligence
11. Poor English skills
12. Introverted

Safety Effects of Carrier Efficiencies Study

-- Possible operational efficiencies to avoid risk --

Primary:

- Preventive maintenance
- ↓ empty trips
- ↓ loading/unloading delays
- Optimize routing and navigation
- ↑ travel on Interstates,
  ↓ travel on undivided roads
- Avoid work zones
- Avoid traffic
- Optimize travel times [day vs. night?]
- Avoid adverse weather
- Optimize vehicle size [larger trucks?]
- Onboard computers & communications

Added:

- Team drivers
- EOBRs?
- Improve fuel economy (e.g., speed limiters)
- Monitor vehicle condition (e.g., tire pressure)

Case in Point:
Is Speed the Friend or Enemy of CMV Safety?

At-Fault Truck Crashes: Top 6 Critical Reasons in the LTCCS	% of At-Fault Crashes
Too fast for traffic conditions or curve/turn	**21%**
Inattention, including distraction and other recognition failures	**17%**
Inadequate surveillance – looked but did not see	**12%**
Vehicle or cargo problem (all included)	**10%**
Asleep-at-the-wheel	**7%**
Illegal maneuver	**5%**

-- A Speed Paradox –

Truck Naturalistic Driving Study Traffic Conflicts ≤50mph vs. >50mph

Event Type: / Location:	Traffic Conflicts	Baseline (Random Sample)
0-50 mph	63%	16%
51+ mph	37%	84%

Odds Ratio: 0-50mph **:** 51+ mph

(63/16) **:** (37/84)

3.9 **:** 0.44 = **8.9**

(i.e., 8.9-fold incident risk when vehicle traveling ≤50mph)

Caveat: Finding based on incidents & minor crashes, not severe crashes.

Empty Backhauls & Safety

- **On project survey, reducing empty backhauls received average rating of +0.5 on -3 to +3 Likert safety scale.**
- **Truckload empty miles:**
  - **Average company: ~20%**
  - **Some companies: ~10%**

What are safety implications?

Empty Backhauls & Safety in Ron's Trucking

- **Over two successive years, *Ron's Trucking* uses the same drivers, same trucks, drives the same miles, and has the same number of crashes.**
- **Ron uses load boards, load brokers, etc. to reduce deadheads from 20% to 10% of miles. Has safety improved?**
- **Year One:**
  120 crashes/8 million ton-miles =
  15 crashes per million ton-miles.
- **Year Two:**
  120 crashes/9 million ton-miles =
  13.3 crashes per million ton-miles

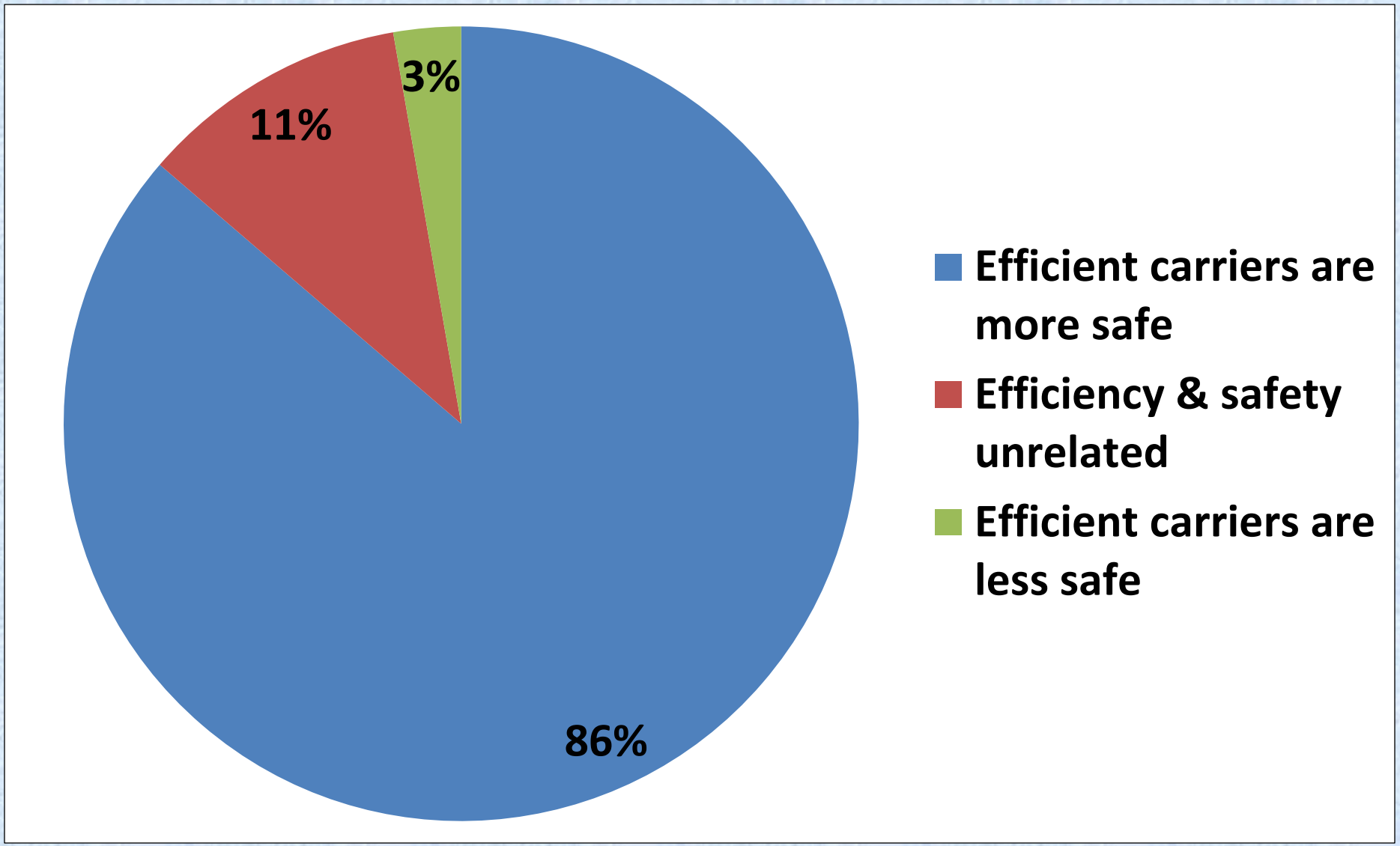
11% crash reduction in relation to revenues & productivity!

MC-22 Report (Spring 2011)

- **Introduction**
- **Evidence & product review**
  - Conceptual framework for risk avoidance strategies
  - 15 specific strategies
  - General relation between efficiency & safety
- **Survey results**
  - Safety managers
  - Other experts
- **11 carrier case studies**
- **Conclusions**
  - 24 “best practices”
  - R&D needs

Survey Results: Carrier Efficiency & Safety

(MC-22 Safety Manager Data)



General MC-22 Conclusion

While there may be exceptions and caveats, structuring trucking operations to maximize efficient transport is likely to also maximize safety.

Thanks for your attention!

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www.safetyforthelonghaul.com