On-Board Safety Systems: Enabling Management and Logistics

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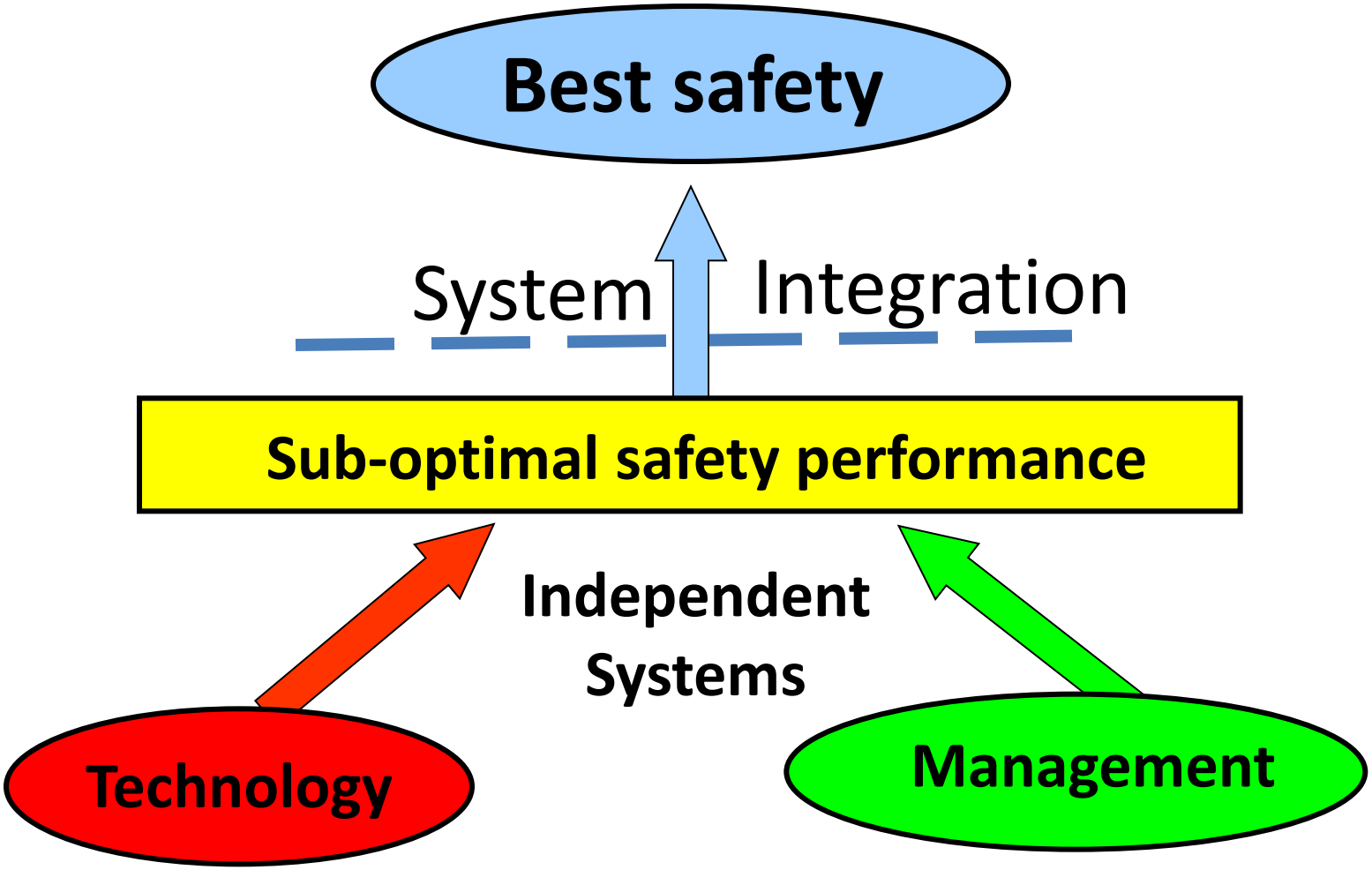
Outline

1. Relationship between safety technology and management practice
2. On-board safety technologies
3. Management practices reliant on safety technology
4. Driver acceptance of on-board technology
5. New roles for multi-modal freight movement related to on-board technology
6. Barriers to the deployment of transformational technologies

Relationship between safety technology and management practice


Best safety
System Integration
Sub-optimal safety performance
Independent Systems
Technology
Management

On-board safety technologies

Safety Technology	
Driver + Management	Driver only
Stability control	Lane keeping/departure
Over-speed alert system	Adaptive cruise control
Forward control and crash mitigation braking	Automated transmissions
Electronic log book	Disc brakes
In-cab cameras	
Forward facing cameras	

Innovative evolution of safety technologies supporting management and logistics

Electronic logging devices (ELD)

- Originally conceived to track driver hours of service
- The addition of GPS and communications has upgraded it to a vehicle system reporting tool
- It will likely become the central node for truck communications due to Dec 2017 mandate

Brilliant unintended consequence

Electronic logging device capabilities

- Data keeps dispatchers up to date on driver and delivery status
- Provides early identification of potential HOS violations
- Identifies drivers who are already in violation (real time)
- Provides data on available hours left per driver to complete jobs
- Determines if driver hours contribute to inefficient vehicle use
- Supports comprehensive driver coaching programs
- Continually assess job assignments to improve efficiency

Electronic logging device capabilities

- Ability to create customizable driver task lists
- Integration with dispatch systems resulting in automatic flow of trip information, status updates, and completed forms
- Turn by turn navigation that takes into account vehicle road restrictions such as weight, length, width, and height, as well as hazardous materials (HAZMAT) routing

Management practices reliant on safety technology

Measuring fleet safety performance

- Examined six fleets heavily invested in safety technology and advanced management practice. *Safety Adoption for Economic Return* (SAFER)
  - Interviews with safety executives
  - Driver survey of safety technology and management practice
- A literature review of safety management practice was also conducted.

Safety management liturature
what does not work

- A culture of fear
- Termination threats
- “Customer is always right” attitude, because sometimes the customer is wrong about safety
- Adversarial approach to training (“cop and robber”) as opposed to a coaching approach
- Incentives without recognition
- Generic safety programs
- Pretending compliance is the same thing as safety

Safety management
what works

- Messages from the top leadership through the departments to drivers
- Consistent verbal communication
- Participation and buy-in for all departments, not just the safety department
- Internal cooperation across departments
- Education and training on how to do things right*
- Balanced positive and negative reinforcement*
- Demonstrated management commitment to safety*
- Screening during hiring*
- Simple, consistent, repeated safety messages*

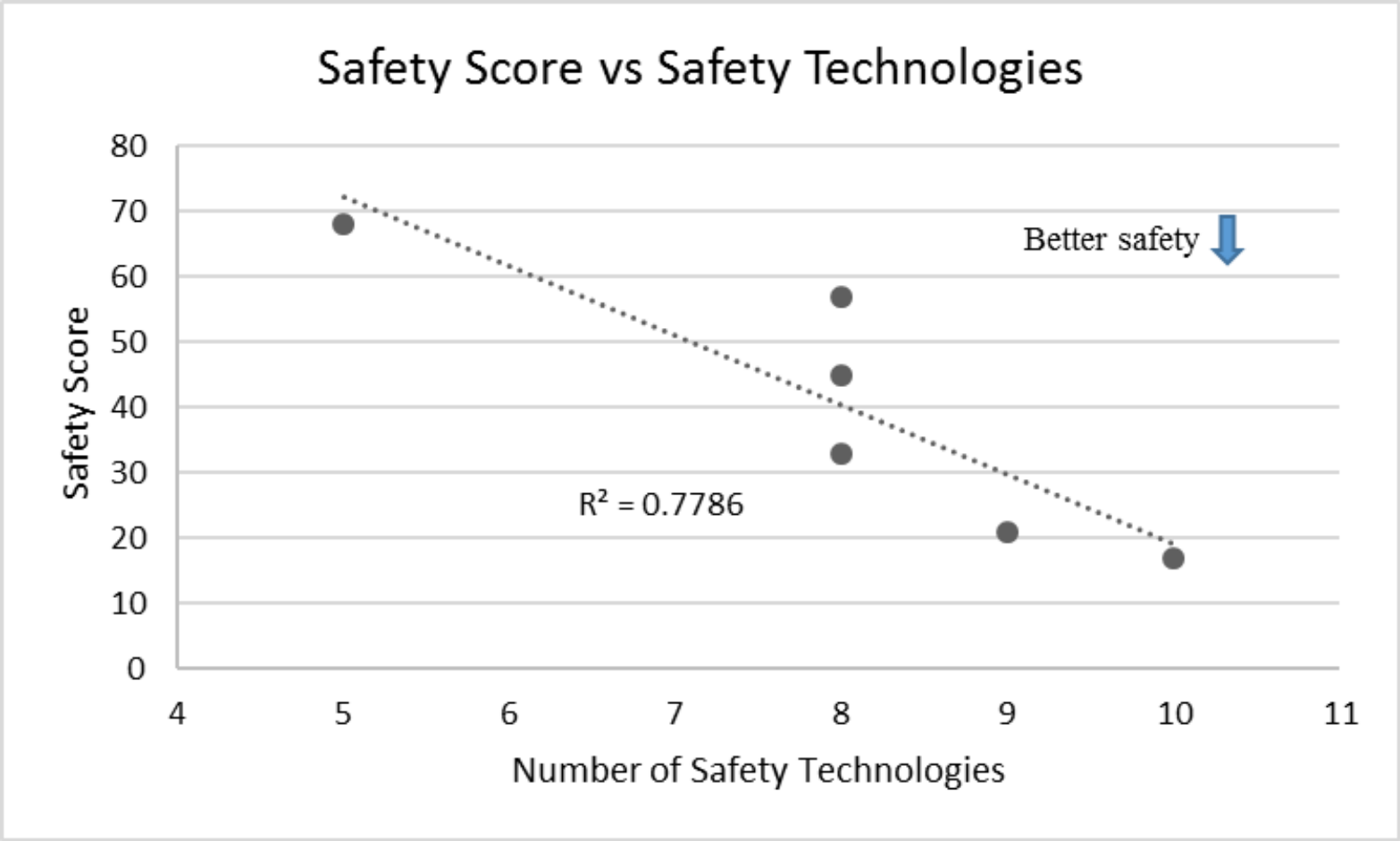
Measuring safety benefit

- Used an aggregate of the selected BASICs

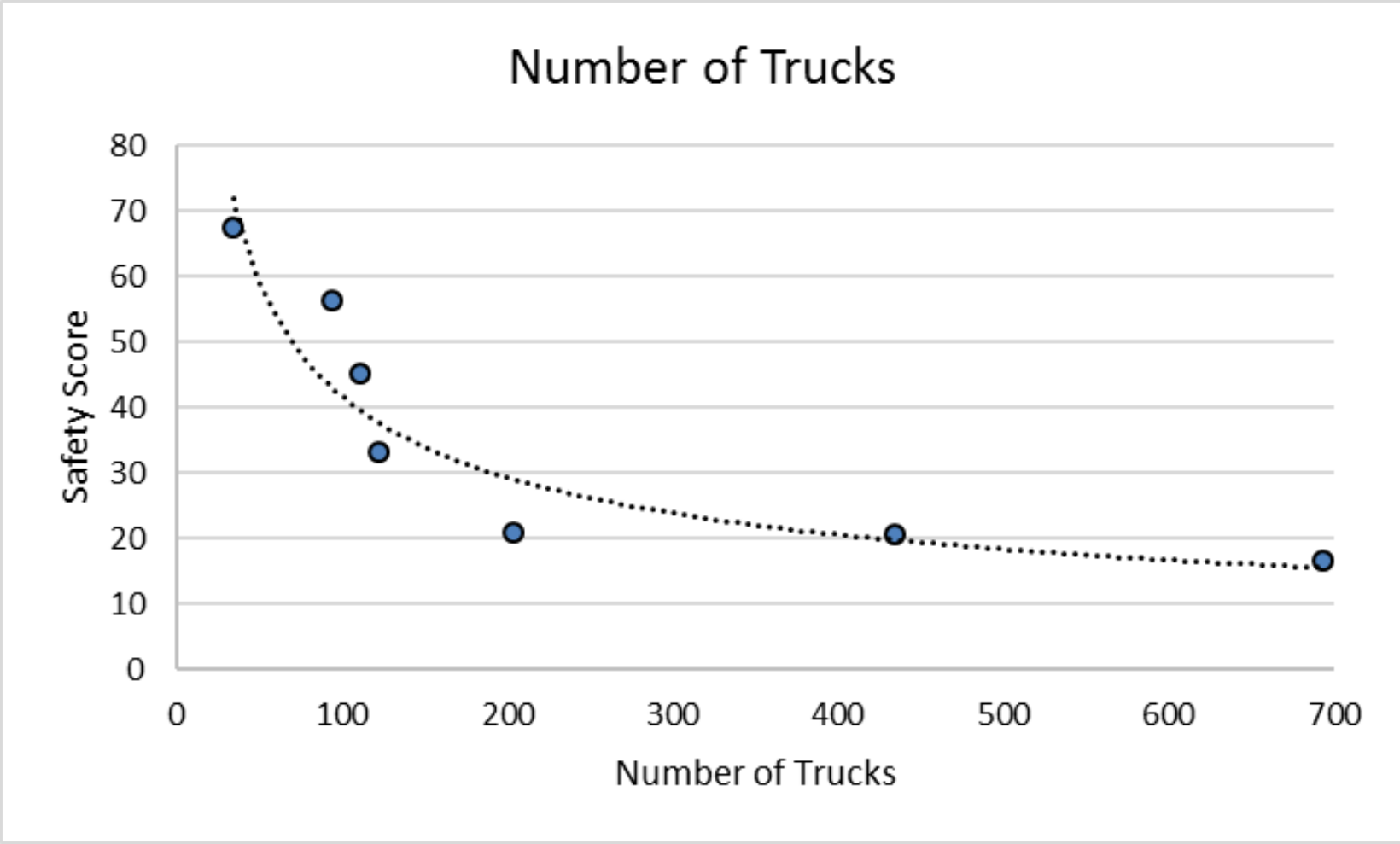
Safety Score = unsafe driving + hours of service + vehicle maintenance

Fleet	Safety Score
A	21
B	45
C	33
D	17
E	57
F	68

Number of safety technologies per truck



Number of trucks in fleet



Driver assessment of technology

Technology	Accepted	Satisfied	Rank
Highly Effective Technology			
Disk Brakes	91%	86%	1
Auto Transmission	79%	71%	2
Electronic Log Book	91%	69%	3
Effective Technology			
Stability control	74%	59%	4
Adaptive cruise control	74%	57%	5
Forward facing Cameras	77%	55%	6
Speed monitoring with GPS	66%	52%	7
Forward collision control and braking	66%	49%	8
Lane keeping/departure	65%	43%	9
Less- Effective Technology			
In-Cab Facing Cameras	48%	32%	10

Executive assessment of technology

Safety Technology	Type	Safety effectiveness
Highly Effective Technology		
Stability control	Independent	High
Forward collision control and braking	Independent	High
Disk brakes	Independent	High
In-cab and forward facing cameras with coaching	Dependent	High
Adaptive cruise control	Dependent	High
Electronic log book	Dependent	High
Speed monitoring with GPS (identifies speed zones)	Dependent	High
Effective Technology		
Lane keeping/departure	Independent	Moderate
Automatic transmission	Independent	Moderate
Forward cameras only with coaching	Dependent	Moderate
Less Effective Technology		
In-cab and forward facing cameras no coaching	Independent	Low
Forward cameras only without coaching	Independent	Low

New roles for multi-modal freight movement related to on-board technology

National Multimodal Freight Analysis Framework data challenges

- Applying the data for reasoning, “what if?’ scenario analyses, and trend or pattern analysis
- Provisional and future year estimation
- Inadequate cost and temporal factors
- Calibration and validation problems are due to a lack of reference data
- Insufficient geographic scale
- Data deficiencies of coverage, aggregation, sparseness, consistency, and accuracy
- Accurate capture of transfers among modes

Critical need for multimodal transport

Achieve an internationally compliant system

- Safe
- Compliant
- Sustainable
- Paperless
- Unencumbered by red tape
- Reliable, cost-effective, timely (fast if needed, slow if possible…).

Unified Documentation

- Standardized and interoperable systems
- Protect and secure information
- E-documents
- Increased data sharing

In 2013, the United Nations Convention on the Contract for the International Carriage of Goods by Road addressed various legal issues concerning the transportation of cargo by road including additional protocol for electronic documents.

Barriers to the deployment of transformational technologies

About barriers

- Transformational technologies tend to be inventive rather than planned
- Market place validates relevance
- Barriers include institutional and regulatory stagnation, cost and ROI
- For transformational on-board technology, the main barrier appears to be a lack of system maturity and standardized requirements due to the early stage of transport system digital integration.

Conclusions

The number of safety technologies per truck is a strong indicator of overall fleet safety performance.

Fleet size was found to have an influence on safety outcome.

Safety technologies that provide direct digital feedback to fleet safety management were found to support better safety outcome.

On-board safety technologies present new opportunities for management and logistics in the road transport industry.

Conclusions

Improvements in multi-modal freight movement related to on-board safety technology will require standardized accurate and timely data transfer.

It appears that the electronic log book (electronic logging device) platforms offer a means of enabling standardized information and data for use in multi-modal freight movement.

Barriers to deployment for enabling safety management, logistics and intermodal transport include a lack of system clarity, maturity and a lack of standardized international systems.

Thank You

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