Voluntary Standards Development of Advanced Safety Systems
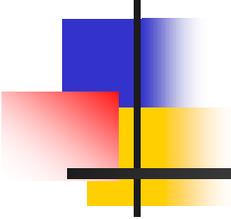
Dan Selke

Chair

SAE Safety & Human Factors Committee

NHTSA Forum on Human Factors Research

to support

Advanced Vehicle Safety Technologies

Falls Church, VA

January 25, 2007
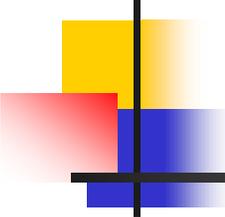
Objectives

- Review SAE Safety & Human Factor's Mission
- New Recommended Practices
- Current Recommended Practices as Works in Progress (WIP)
- ISO Relationship
- Published ISO Standards
- Six SAE S&HF Subcommittees
- Review of Subcommittee work
- Conclusions
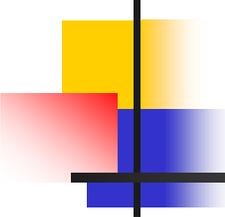
SAE S&HF's Mission

- To focus on Human Factors as a cross-cutting discipline that has applications to the design, operation, and evaluation of human-machine operating characteristics for advanced vehicle systems.

- Address issues of interface design, driver workload, safety system complexity, ease of use, and the response of drivers to automatic control systems, especially with regard to risk compensation.

- Provides input to the work of ISO TC22/SC13.
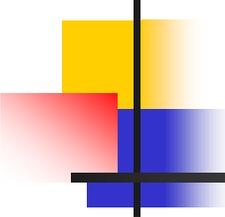
New Recommended Practices developed simultaneously or just before market introduction

- SAE J2364 – Navigation & Route Guidance Function Accessibility While Driving
- SAE J2365 – Calculation of the Time to Complete In-Vehicle Navigation & Route Guidance Tasks
- SAE J2395 – ITS In-Vehicle Message Priority
- SAE J2399 – Adaptive Cruise Control Operating Characteristics and User Interface
- SAE J2400 – Human Factors in Forward Collision Warning Systems: Operating Characteristics & User Interface Requirements
- SAE J2678 – Navigation & Route Guidance Function Accessibility While Driving Rationale
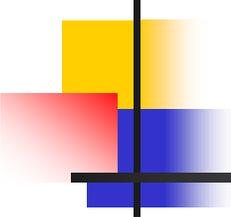
Current Recommended Practices as Works in Progress (WIP)

- SAE J2396 – Definitions and Experimental Measures Related to the Specification of Driver Visual Behavior Using Video-Based Techniques

- SAE J2397 – Integration of ITS In-Vehicle User Interface Standard

- SAE J2398 – In-Vehicle ITS Display Legibility Standard

- SAE J2478 – Proximity Type Lane Change Collision Avoidance
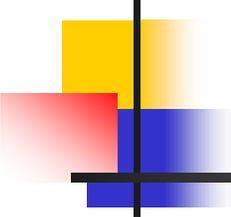
ISO Relationship

- SAE S&HF works closely with ISO in developing standards
- Four Working Groups within TC22/SC13/:
  - WG3 – Localization of Controls & Telltales
  - WG5 – Symbols
  - WG7 – Hand Reach and R- and H-Point determination
  - WG8 – TICS On-Board MMI (e.g., HMI of telematics systems)
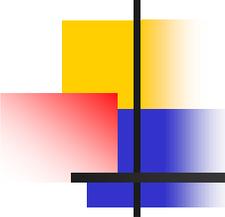
Published ISO Standards

- ISO 2575 – Symbols for controls, indicators and tell-tales
- ISO 16352 – Ergonomic aspects of in-vehicle presentation for transport information and control systems – Warning systems
- Documents under 5-year review:
  - ISO 3958 – Driver hand-control reach
  - ISO 4040 – Location of Hand Controls, indicators and tell-tales in motor vehicles
- New Working Draft Items:
  - ISO 15008 revision – Visual presentation of information (legibility)
  - ISO AWI 26022 – Simulated lane change test to assess driver distraction
  - DIS 16673.2 – Occlusion method to assess visual distraction due to the use of in-vehicle information and communication systems
  - N2657 – Calibration Task
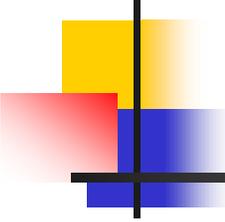
Six SAE S&HF Subcommittees

- Warning Integration
- ITS Symbols
- Blind Spot Monitoring
- Driver Interface Design Requirements for In-Vehicle Text Messaging
- Road/Lane Departure
- DRIver Performance Operational Definitions (DRIPOD)
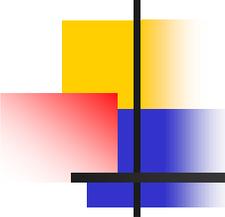
Warning Integration

- Drafted 2 methods to evaluate the effectiveness of integrated warning systems
  - Appropriate Response
  - Timely Comprehension
- Members of the Subcommittee completed a pilot study to evaluate/develop the timely comprehension method
- Currently, balloting next draft of ISO 16352 document for WG8 Task Force
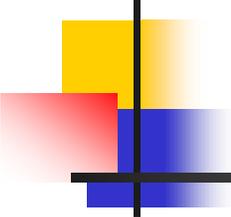
ITS Symbols Project

- Propose active safety symbols for SAE J2402 (ISO 2575)
- Proposed a general process/procedure on symbol comprehension testing
- Process considers:
  - the maturity of active safety technology,
  - the need for a standard, and
  - any prioritization
- Recently worked with Alliance on developing symbol for Electronic Stability Control
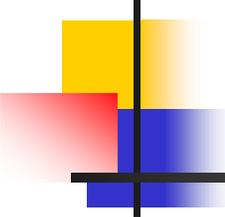
Blind Spot Monitoring

- Focuses on specifying the minimum requirements for Blind Spot Monitoring System (BSMS) operational characteristics and elements of the user interface.

- BSMS detects and conveys to the driver the presence of a Target (e.g., a vehicle), adjacent to the subject vehicle in the "traditional" Adjacent Blind Spot Zone (ABSZ) via a visual display. The BSMS is not intended to replace the need for interior and exterior rear-view mirrors or reduce mirror size. BSMS is only intended as a supplement these mirrors and will not take any automatic vehicle control action to prevent possible collisions. While the BSMS will assist drivers in detecting the presence of vehicles in their ABSZ, the absence of an Indicator will not guarantee that the driver can safely make a lane change maneuver (e.g., vehicles may be approaching rapidly outside the ABSZ area).

- Created initial draft in September 2006; Full Committee is crrently balloting this initial draft
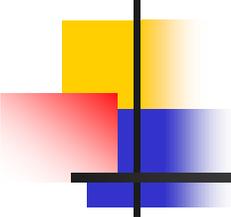
Driver Interface Design Requirements for In-Vehicle Text Messaging

- Develop design guidelines for text message display design
- Summarize literature regarding the most efficient presentation, content, and interaction
- Identify credible procedures, heuristics, and principles for textual display
- Examine specific formats and methods for display
- Build on previous work done by the U of Iowa, GM and others.
- Expect an initial draft sometime in 2007
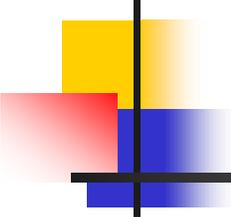
Road/Lane Departure

- Developing an Informational Report on:
  - Warning levels
    - "…the time course of lane departure events will typically not allow for a graded series of warnings - several warnings of increasing urgency." (Pomerleau et al., 1999)
  - Warning presentation modality
    - Visual; haptic; auditory;
    - Auditory + Haptic;
    - Auditory + Visual;
    - Haptic + Visual; and
    - Auditory + Haptic + Visual
  - System status indication
  - System interface
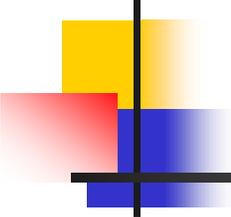
DRIver Performance Operational Definitions (DRIPOD)

- Inconsistent use of driving performance measures due to lack of standard definitions makes comparison of studies difficult.
  - **Example:** Is a lane departure when tire touches the edge of a line, the midpoint of a line, or crossing the line into the next lane or when part of the body…
  - **Solution:** Standard definitions, and where there are options, provide them (e.g., headway per SAE Recommended Practice xyz definition B). Ease of referencing makes them likely to be used.
- Have a graduate student draft his Master's Thesis on this topic
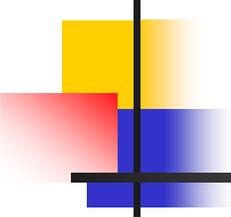
Conclusions

- SAE S&HF is able to react quickly to the market by introducing Recommended Practices before a regulation or standard is promulgated.

- We will continue to work closely with ISO in developing common practices for all markets.

- We see ourselves as a partner with NHTSA and the US DOT in promoting road and vehicle safety.

THANK YOU