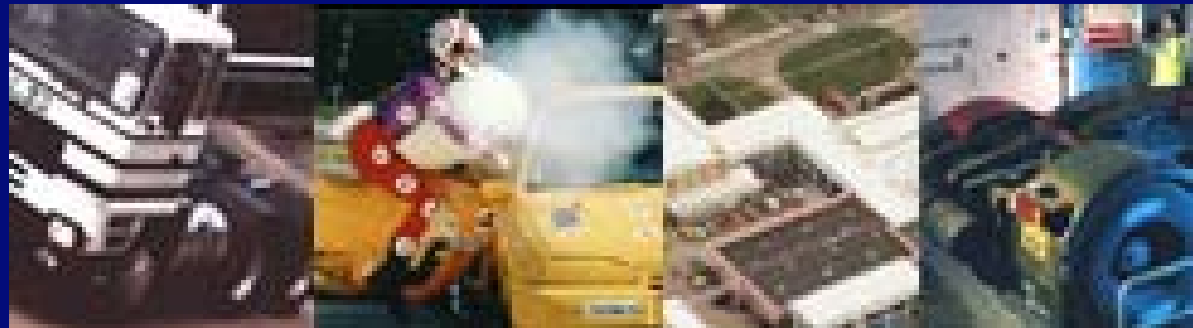


# EVALUATION OF ITS SAFETY AND USABILITY

Contribution of Procedural, Design and Performance Standards



Alan Stevens  
TRL

# Methodologies to Evaluate ITS Safety and Usability

## Objectives of HUMANIST (TF E):

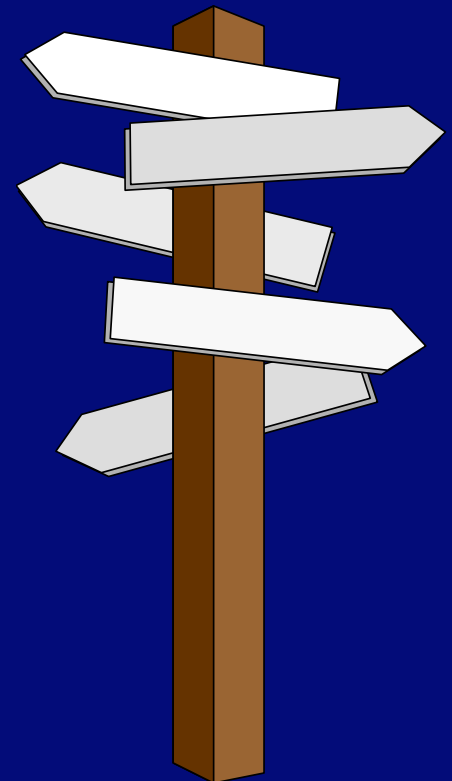
- To identify and categorise existing and proposed methods for usability and safety evaluation of ITS
- To identify the advantages, disadvantages, range of application and effectiveness of the various methods
- To develop and publish a summary matrix of the different methods

# Contribution from Transport Human Factors Standards

- Document agreements
- Consensus over methods, tools metrics and acceptable limits

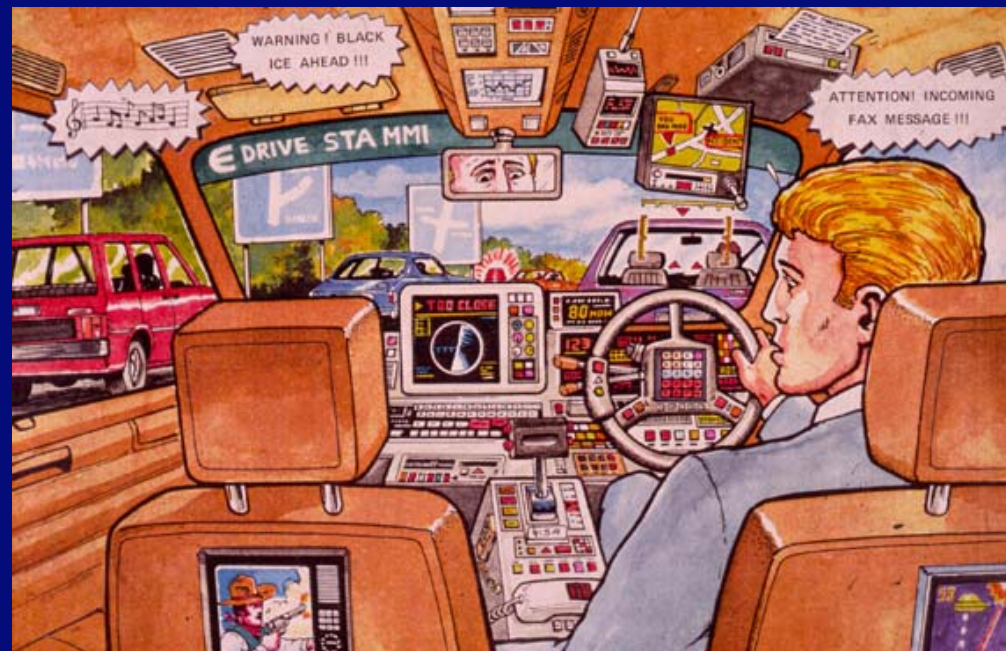
## TYPES OF STANDARD

- Procedural
- Design
- Performance



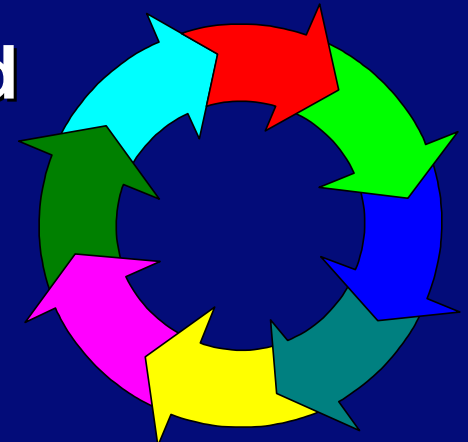
# ISO TC 22 SC 13 “Ergonomics”

- WG3 Controls and telltales
- WG5 Symbols
- WG7 Hand Reach and R&H point
- **WG8 TICS On board - Man Machine Interface**



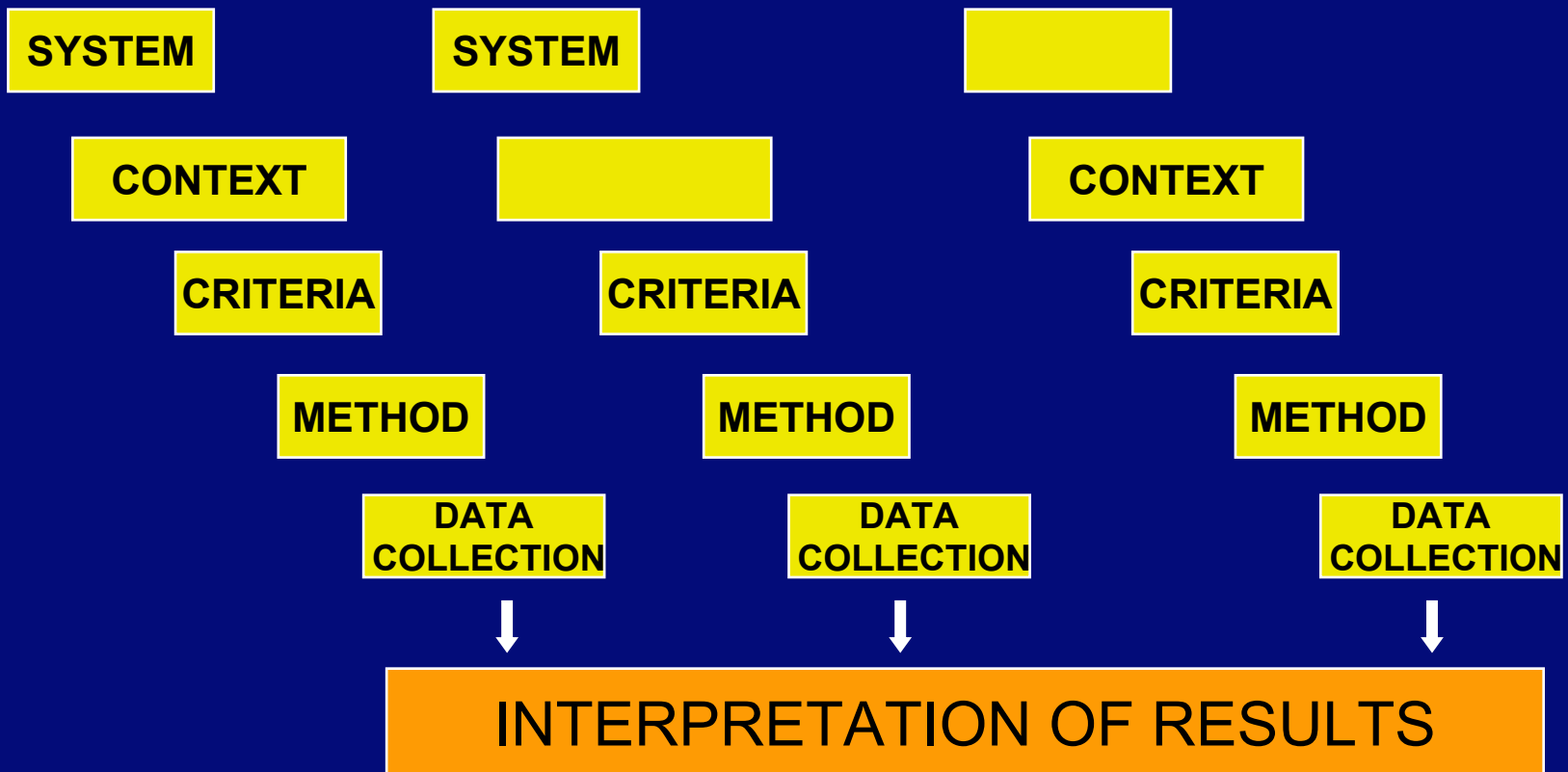
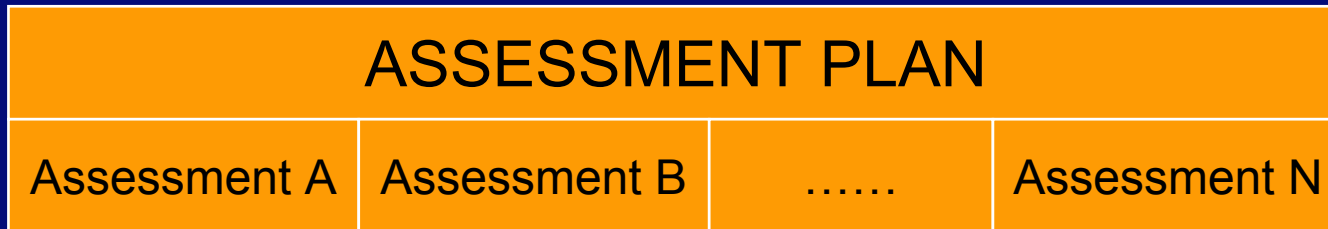
# Procedural Standards

- Concern the process by which something is done
- May say little about what is actually done within the process
- Examples are ISO 9000 and ISO/TS 16949
- May be externally audited



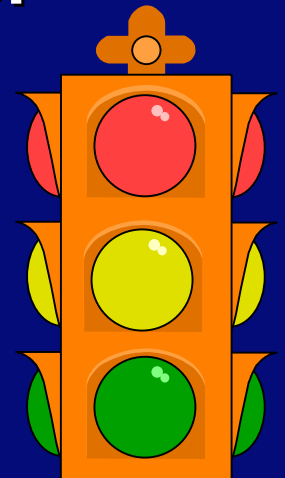
# Suitability for use

BS EN ISO 17287



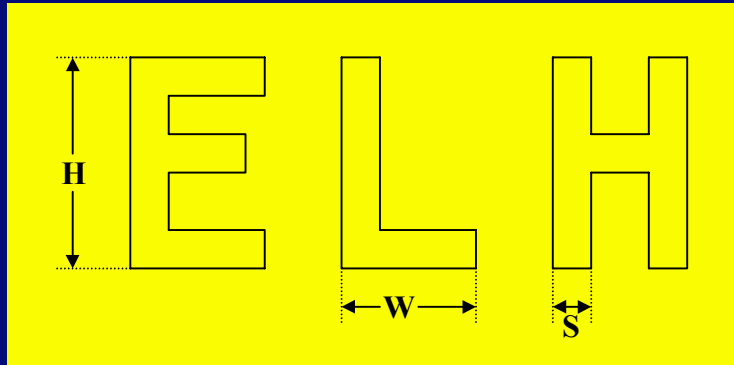
# Design Standards

- **Specify principles and features appropriate to a product**
- **May contain options**
- **Minimum criteria**
- **Example is gearshift pattern for passenger vehicles**



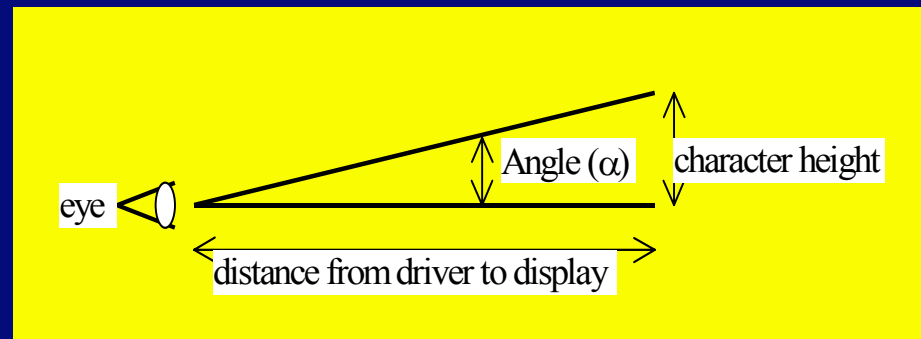
# Visual presentation

# EN ISO 15008



... ratio between the stroke width (S) and character height should be between 1:12.5 and 1:6.25.

... recommended that character height is at least 24'.



With a visual angle of 20' at a normal reading distance in a vehicle (700mm) the minimum character height would be 4 mm.

# Auditory presentation

FDIS 15006-1

“The signal level is a matter of balancing the listener comfort against message audibility”

. . . usually this can be achieved if the signal exceeds the ambient noise by 15 dB or more (Sorkin, 1987). However, to avoid a startle response, the signal should not exceed ambient noise by more than 25dB (Edworthy, 1994).



... in most circumstances between 50dB(A) and 90dB(A) is suitable. Higher than 90dB(A) should be avoided.

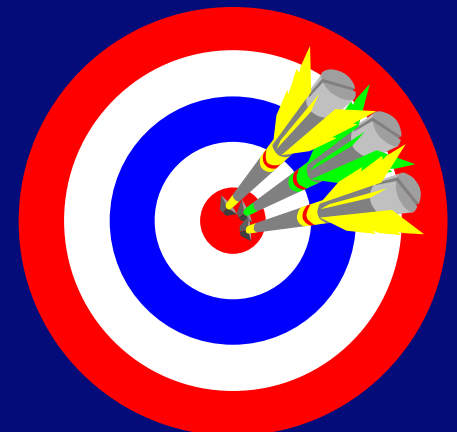
# Other Design Standards

- Dialogue management EN ISO 15005
- Message priority TR 16951
- Driver Warnings Preliminary
  
- Guidelines for designers
- European Statement of Principles
- AAM Design guidelines and assessment criteria



# Performance Standards

- **Specification of equipment performance (e.g. acceleration of at least  $0.4\text{m/s}^2$ )**
- **Specification of human performance**
- **Specification of design criteria based on human performance (e.g. reach envelopes)**
- **“what” rather than “how”**



# Performance Standards for Measuring Driver Distraction

- Visual behaviour BS EN ISO 15007 + TS
- Distraction/Occlusion NWI
- Lane Change Task Preliminary



Distraction depends on three components:

- Visual demand (quantity) ← Property of system
- Interruptability ←
- Driver behaviour ← Property of driver

# Distraction/Occlusion (NWI)

- **Standardising a protocol to measure allocation of driver's visual attention between the road scene and in-vehicle displays**
- **Measures information quantity (visual demand)**
- **Also aims to identify tasks that are interruptable**
  
- **CD expected during 2004**
- **An “Acceptable Performance” criterion could be based on this protocol**



# Lane Change Task (PWI)



- Car driving “game” involving changing lanes
- Laboratory, simulator, complete vehicle
- Protocol measures reduction in driving performance when there is a secondary distraction task
- Again, has potential to support an “Acceptable Performance” criterion

