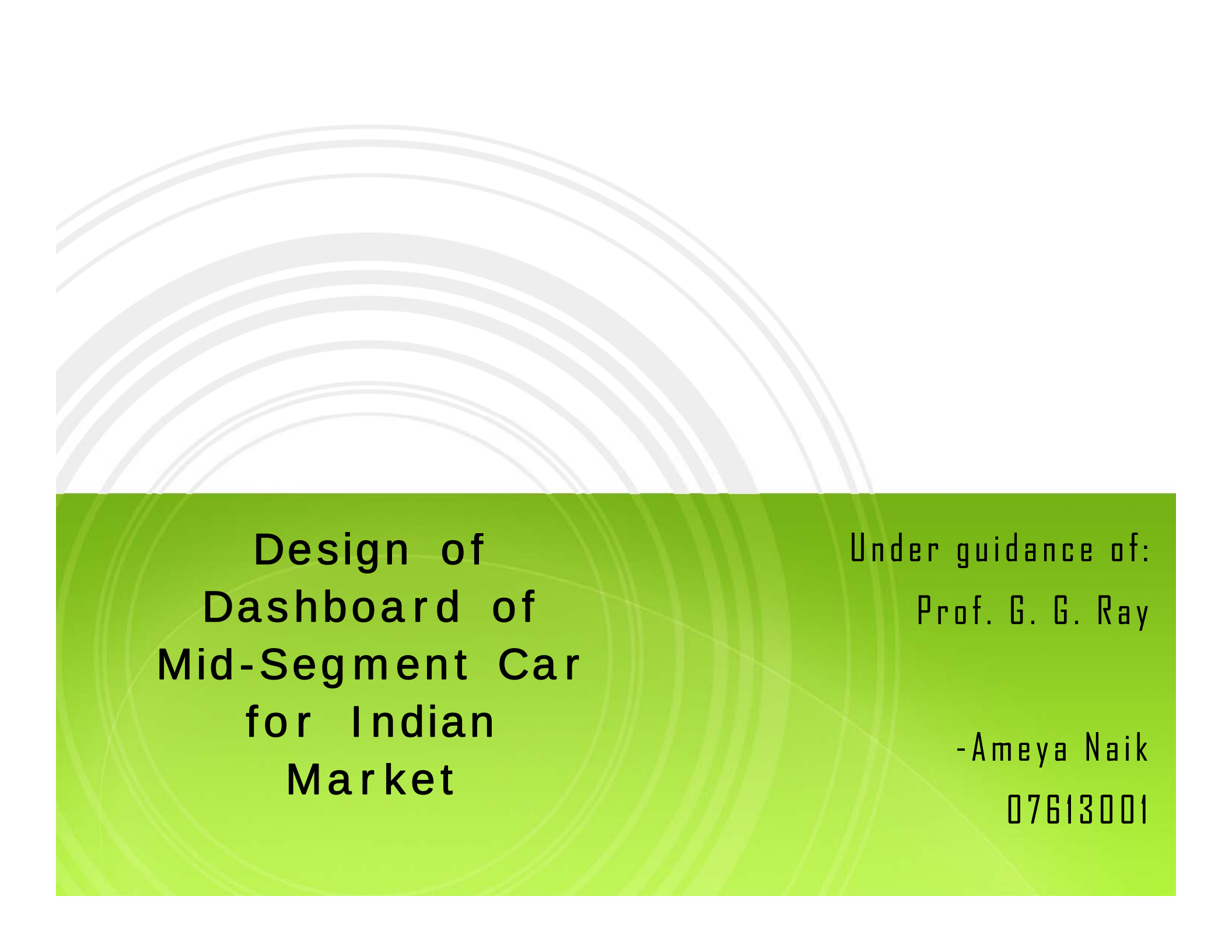




Design of Dashboard of Mid-Segment Car for Indian Market

Under guidance of:
Prof. G. G. Ray

-Ameya Naik
07613001

aim of the project

Design the dashboard of a mid-segment car for Indian market from point of view of **enhancing the user-interaction** and **usability** of the dashboard by **understanding the current user requirements**

definition

- Dashboard of a car (hatchback or sedan)
 - Steering wheel and steering column
 - Instrument cluster
 - Center console
 - Co-driver side dashboard
- Mid-segment (Rs. 4-6 lakh base model price)
- For Indian market

project scope & limitations

- Issues related to cognitive aspect of information transfer
- The utility requirements of the dashboard for the concerned market segment based on ergonomic requirements.
- The project does not attempt to address the issues related to aesthetics and manufacturing of the dashboard as well as the problems concerning to external visibility.

design approach

Design a dashboard for mid-segment car for Indian market to enhance its usability by **simplifying the communication** between the vehicle and its user thereby **reducing the cognitive load while driving** the vehicle.

methodology

Market Trends & Analysis

User survey

Ergonomic
dimensional
calculation

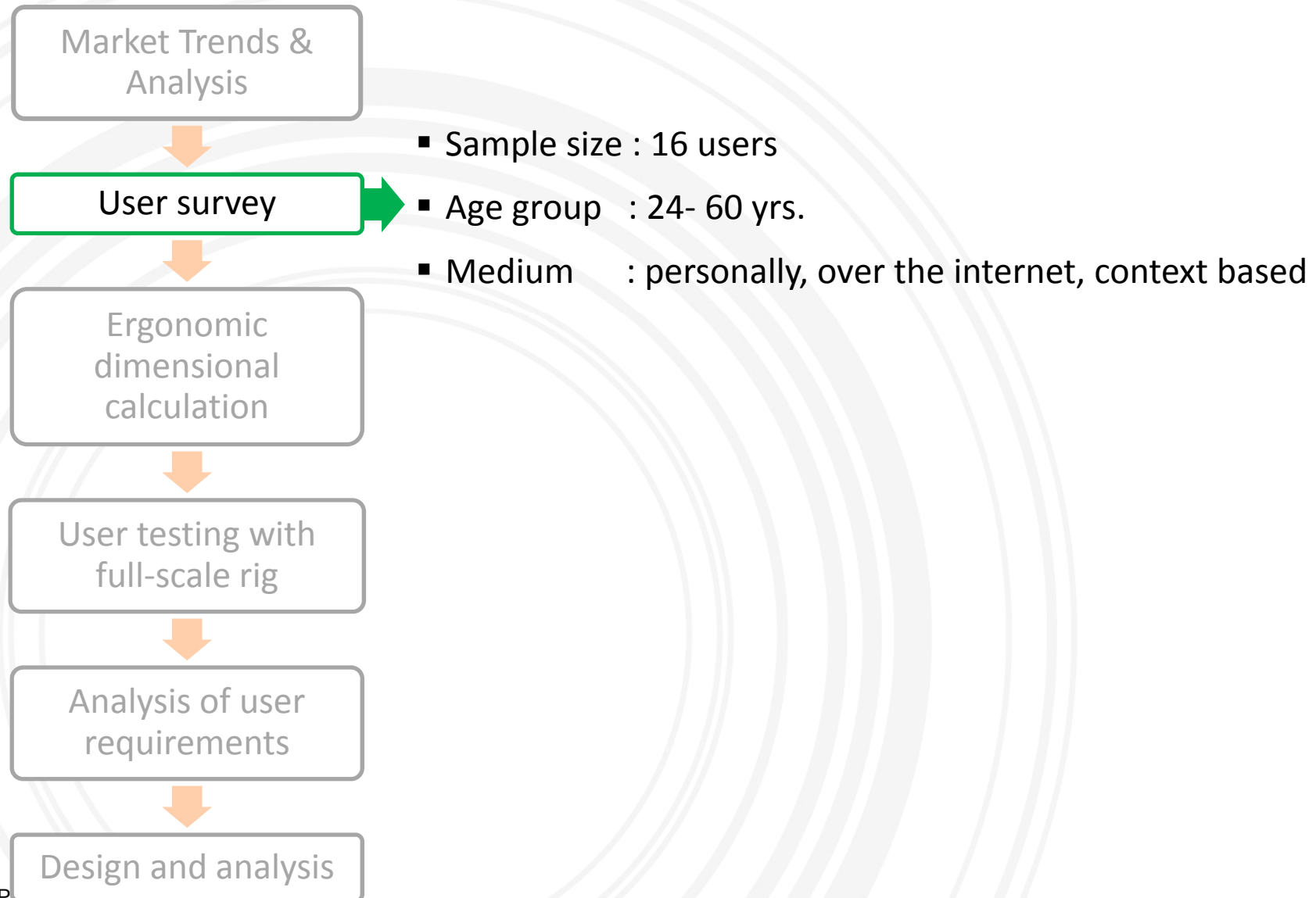
User testing with
full-scale rig

Analysis of user
requirements

Design and analysis



methodology



methodology

Market Trends & Analysis

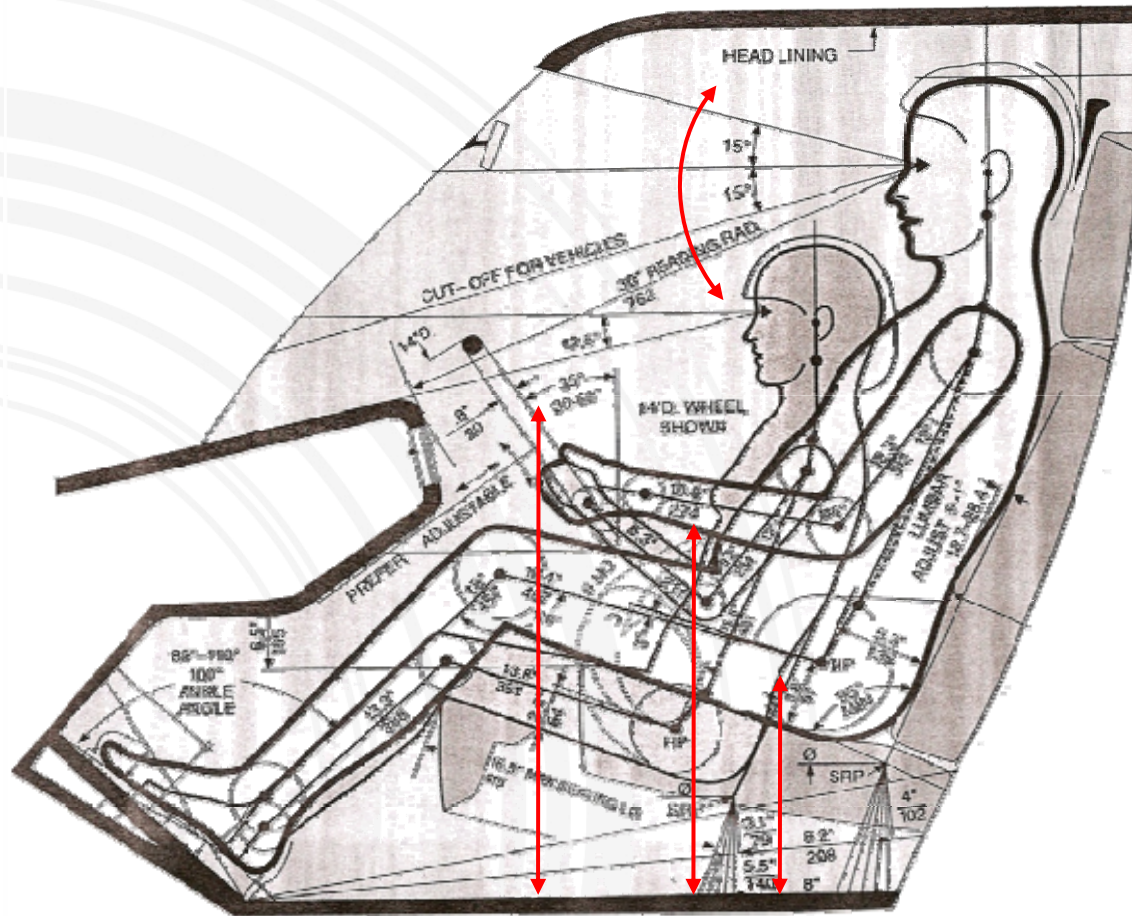
User survey

Ergonomic dimensional calculation

User testing with full-scale rig

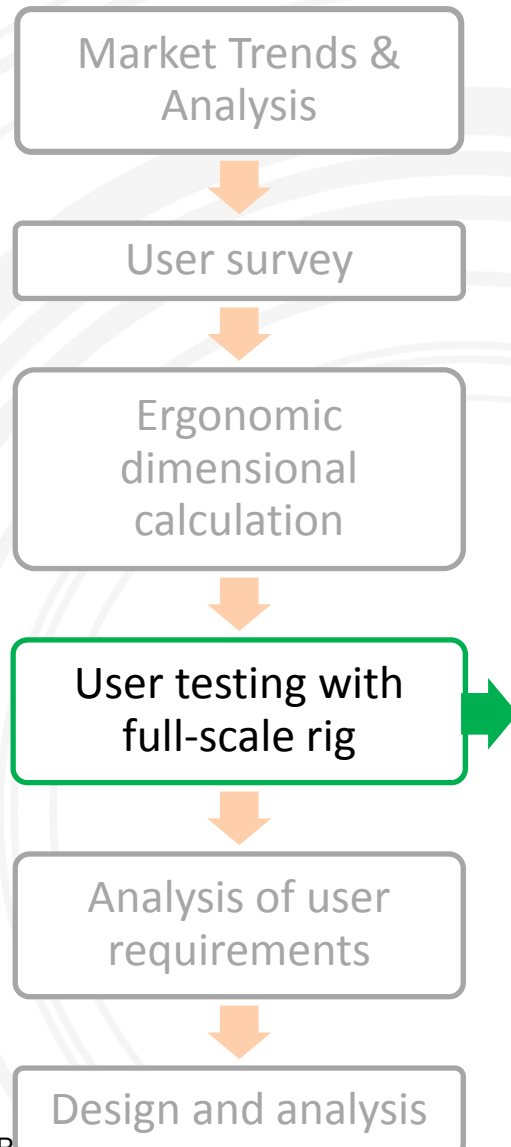
Analysis of user requirements

Design and analysis



- Dashboard height : 705 mm
- Lower part of dashboard: 450 mm
- Seat height : 245 mm

methodology



- Sample size : 4 users

methodology

Market Trends & Analysis

User survey

Ergonomic dimensional calculation

User testing with full-scale rig

Analysis of user requirements

Design and analysis



methodology

Market Trends & Analysis

User survey

Ergonomic dimensional calculation

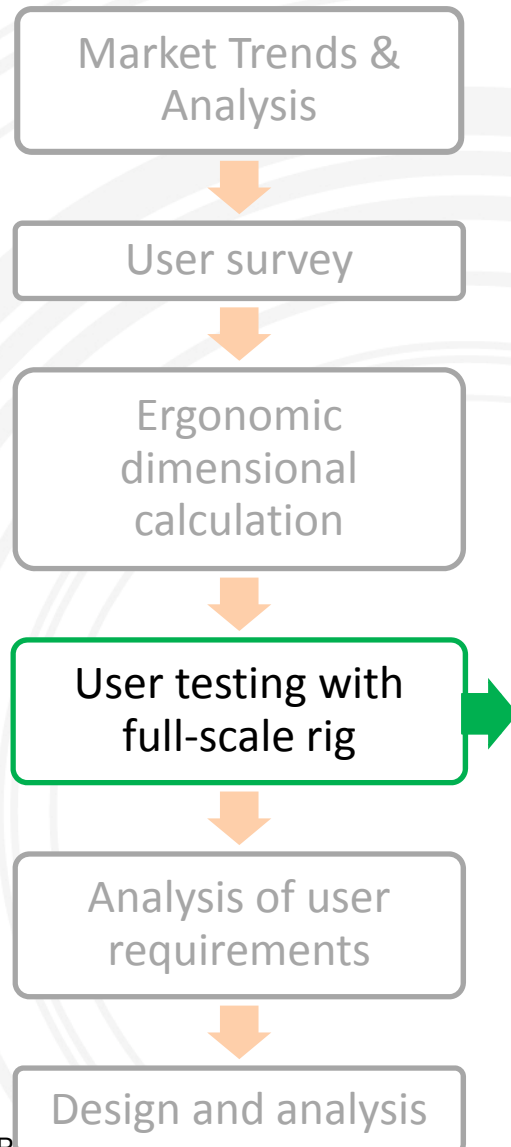
User testing with full-scale rig

Analysis of user requirements

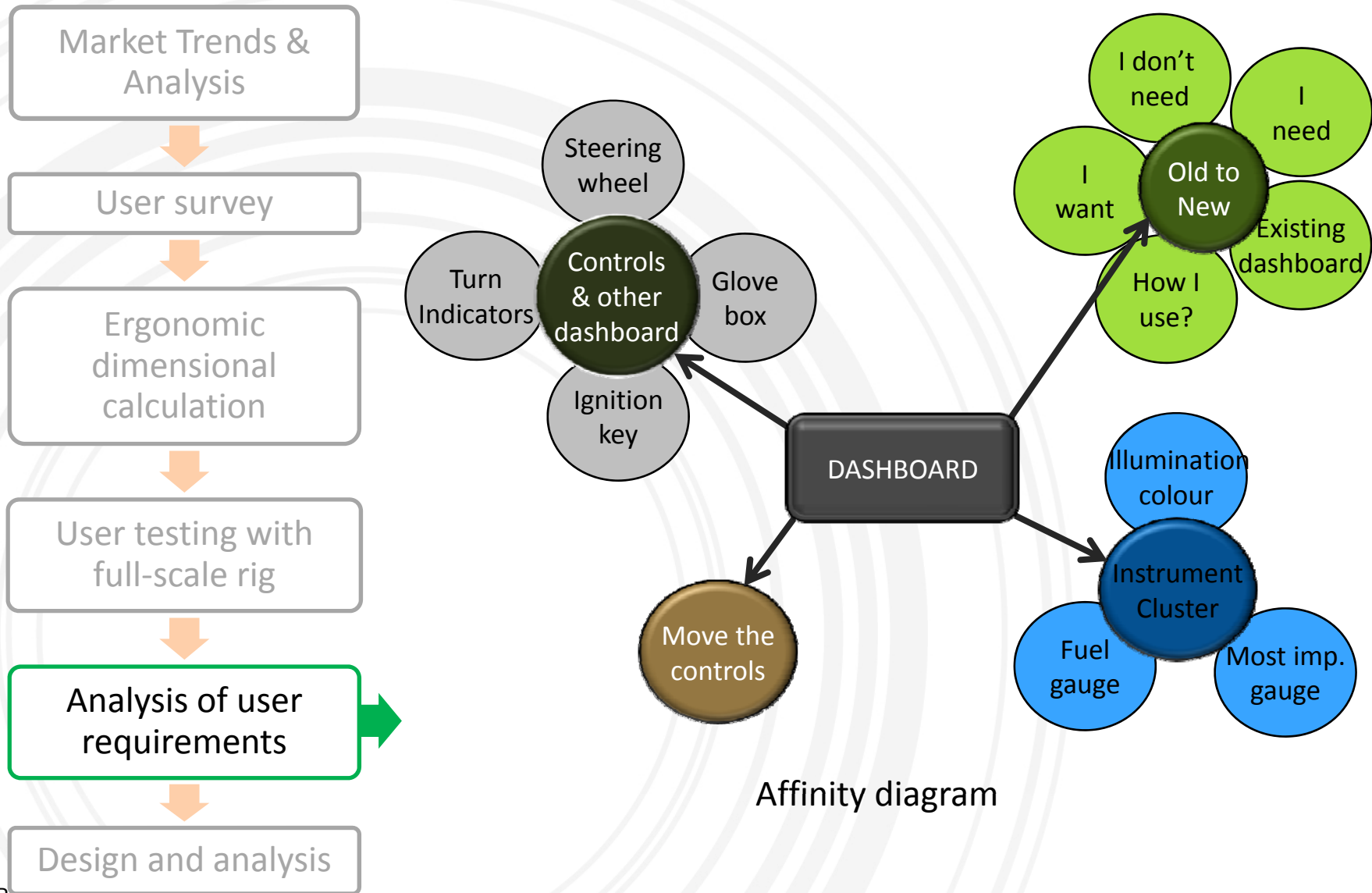
Design and analysis



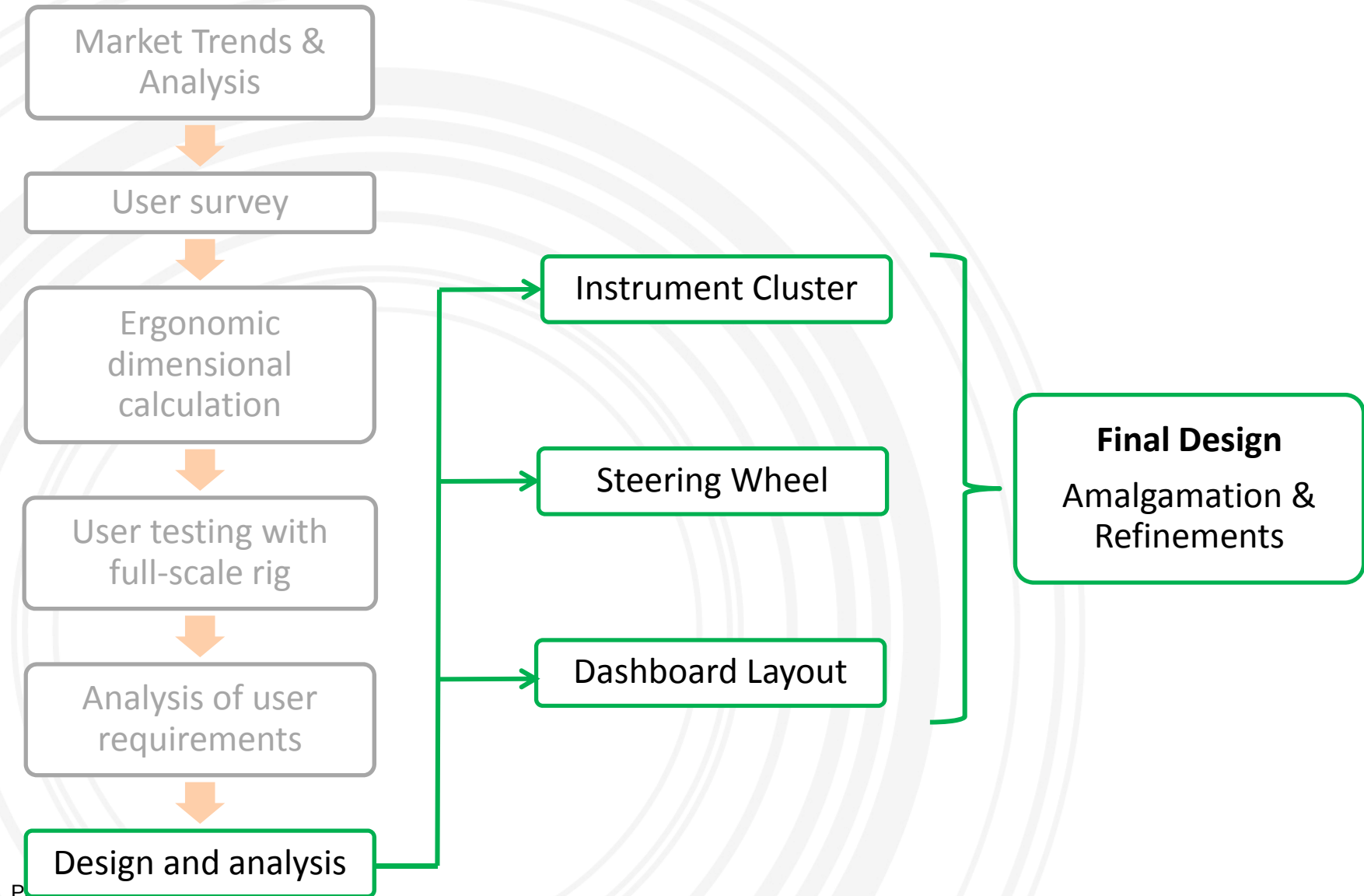
methodology

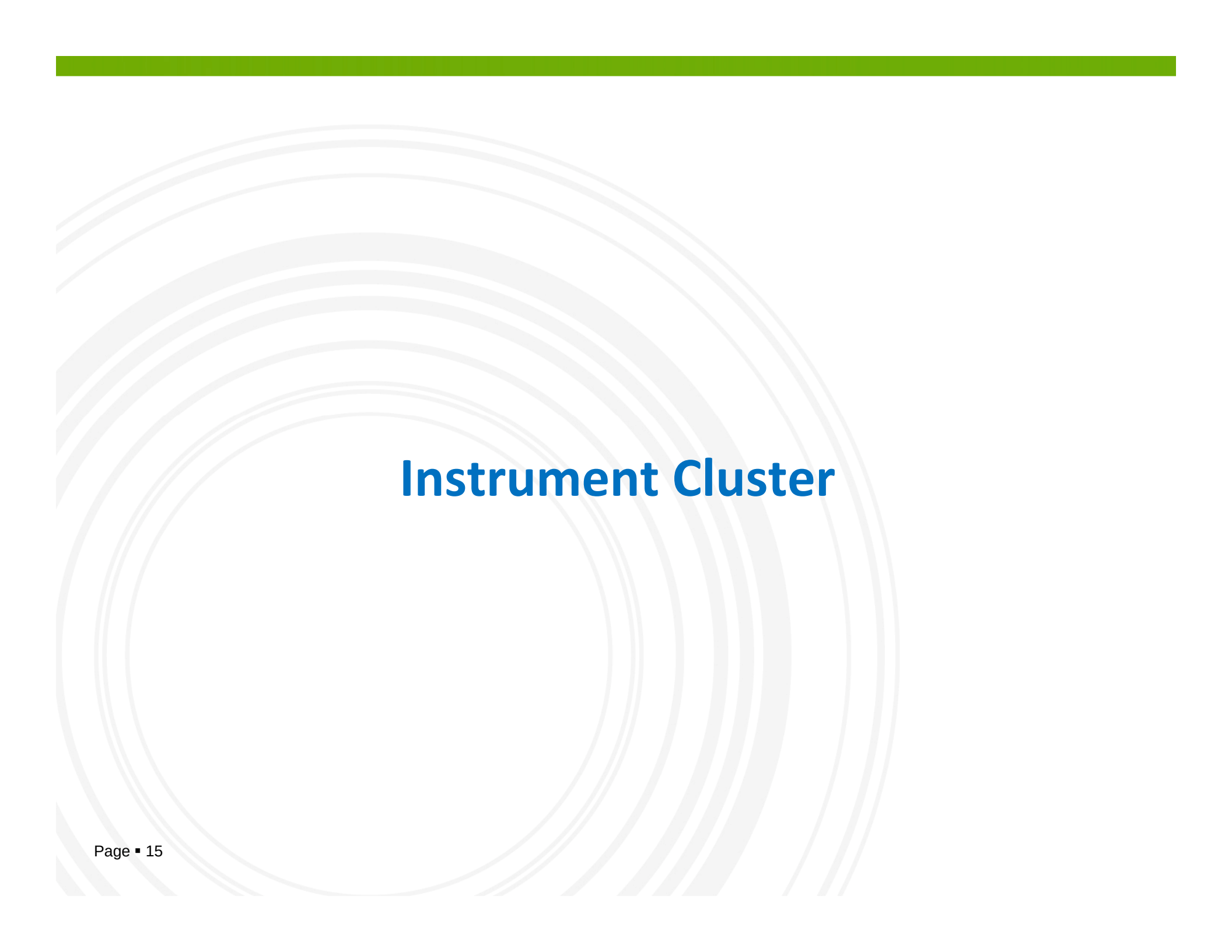


methodology



methodology



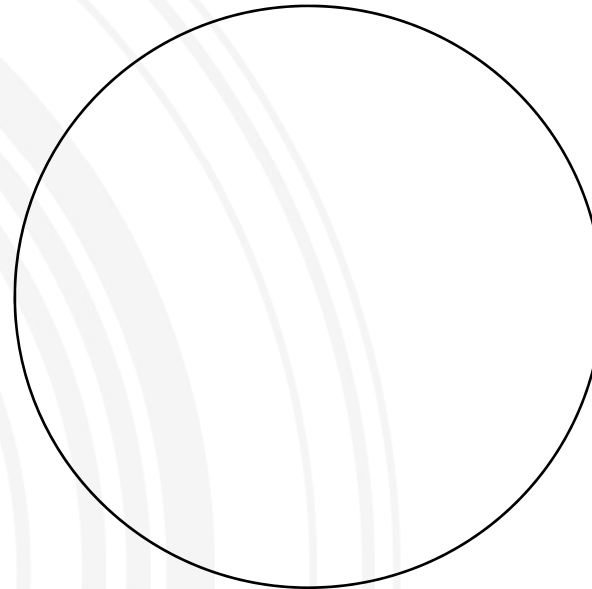
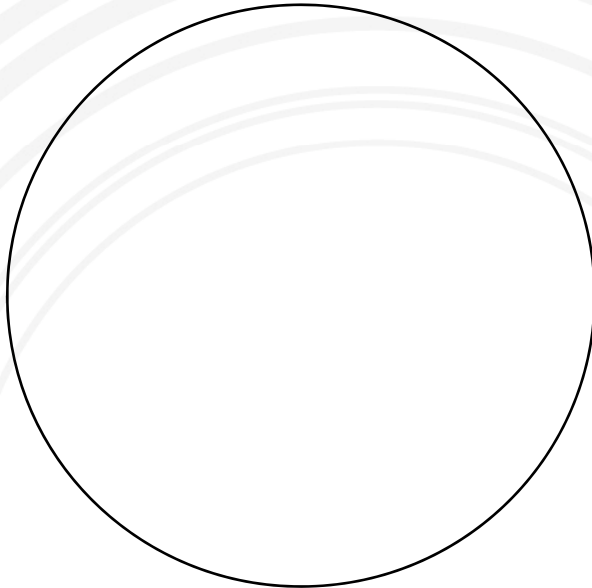


Instrument Cluster

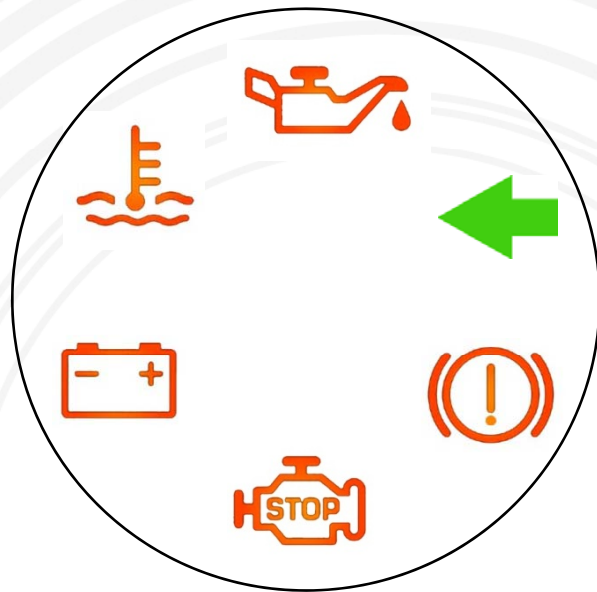
analysis of gauges

Gauge	Type	Remark
Speedometer	Critical	Needs to convey approx value within range
Tachometer	Critical	Need not convey quantitative value
Odometer	Non-critical	Needs to convey exact value
Fuel gauge	Semi-Critical	While driving needs to convey very approx value, but should provide enough info. when needed
Temp. gauge	Critical	Should not provide quantitative value, should warn well in advance of danger
Trip meter	Non-critical	Should convey exact value besides Odometer

analysis of signals



analysis of signals

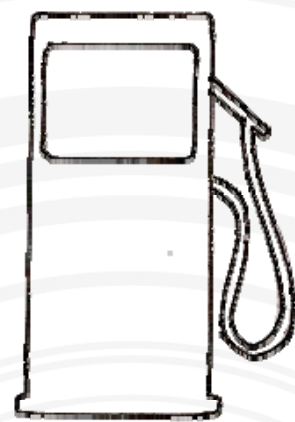


Hazard

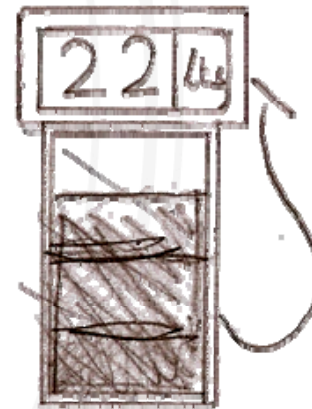
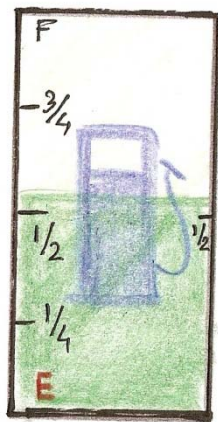


Indications

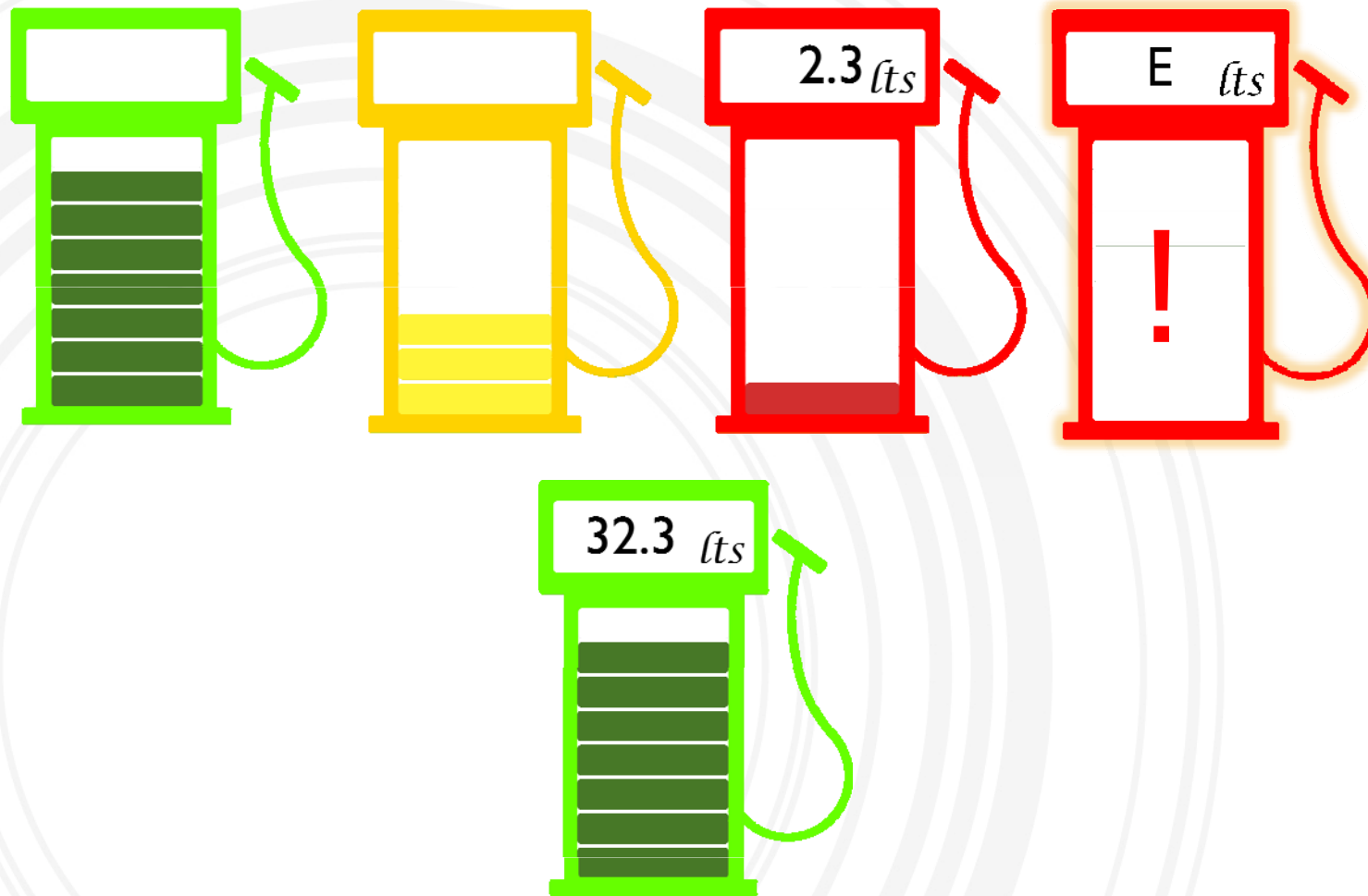
fuel gauge



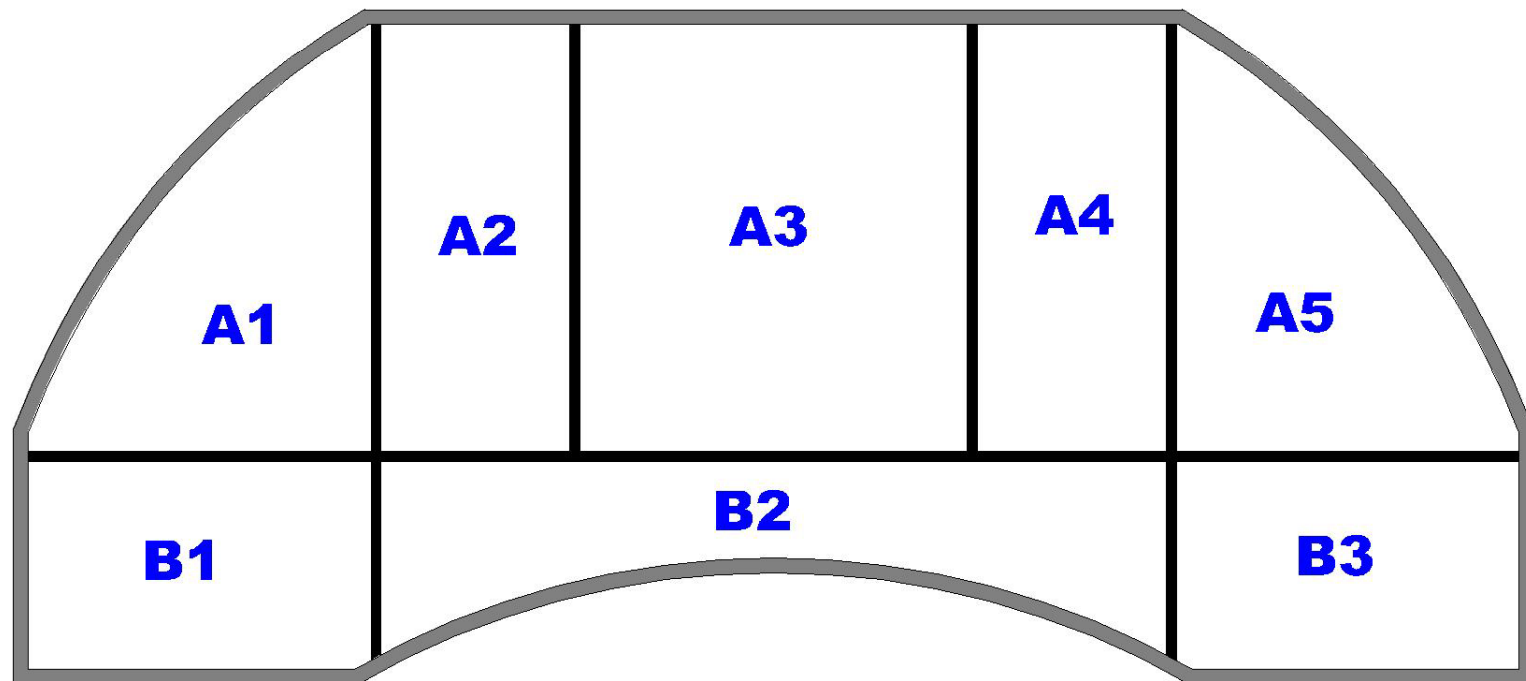
Existing



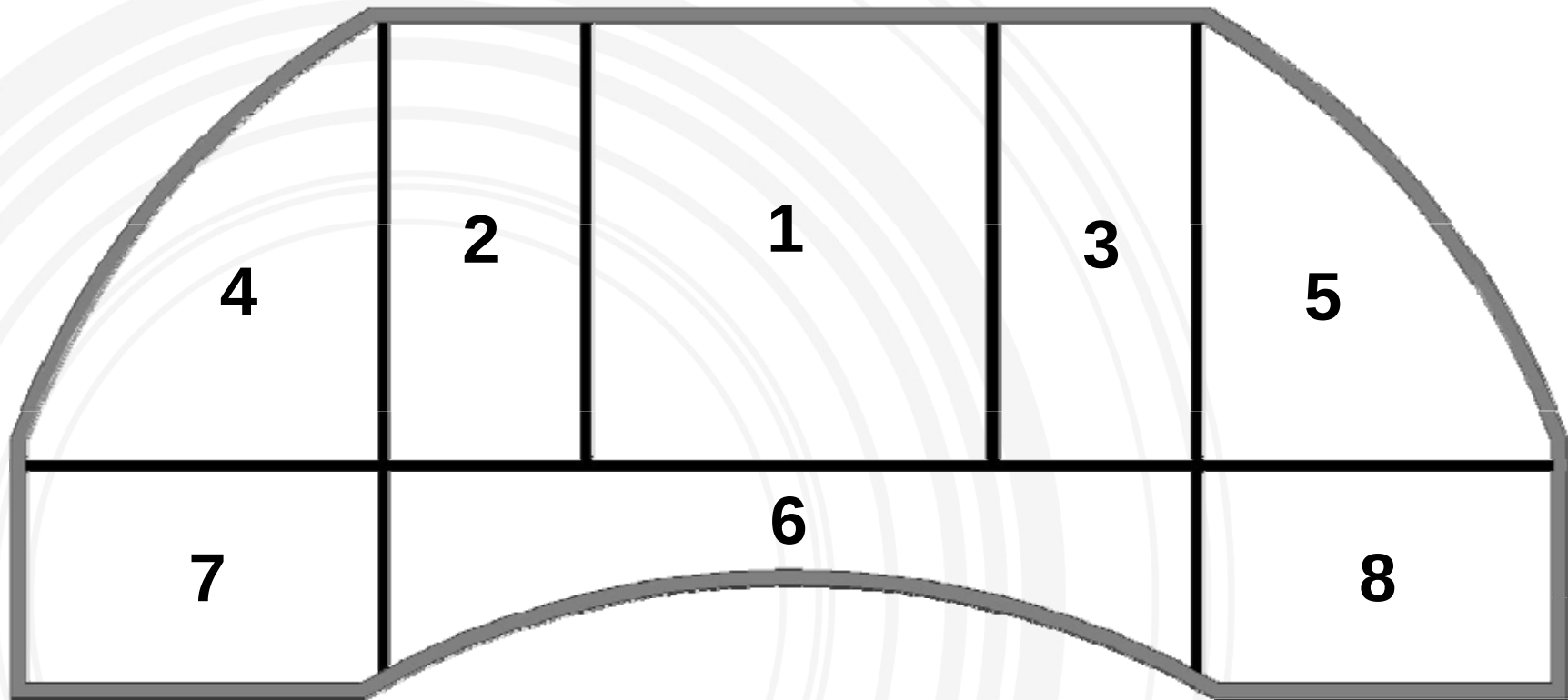
fuel gauge



priority zones



priority zones



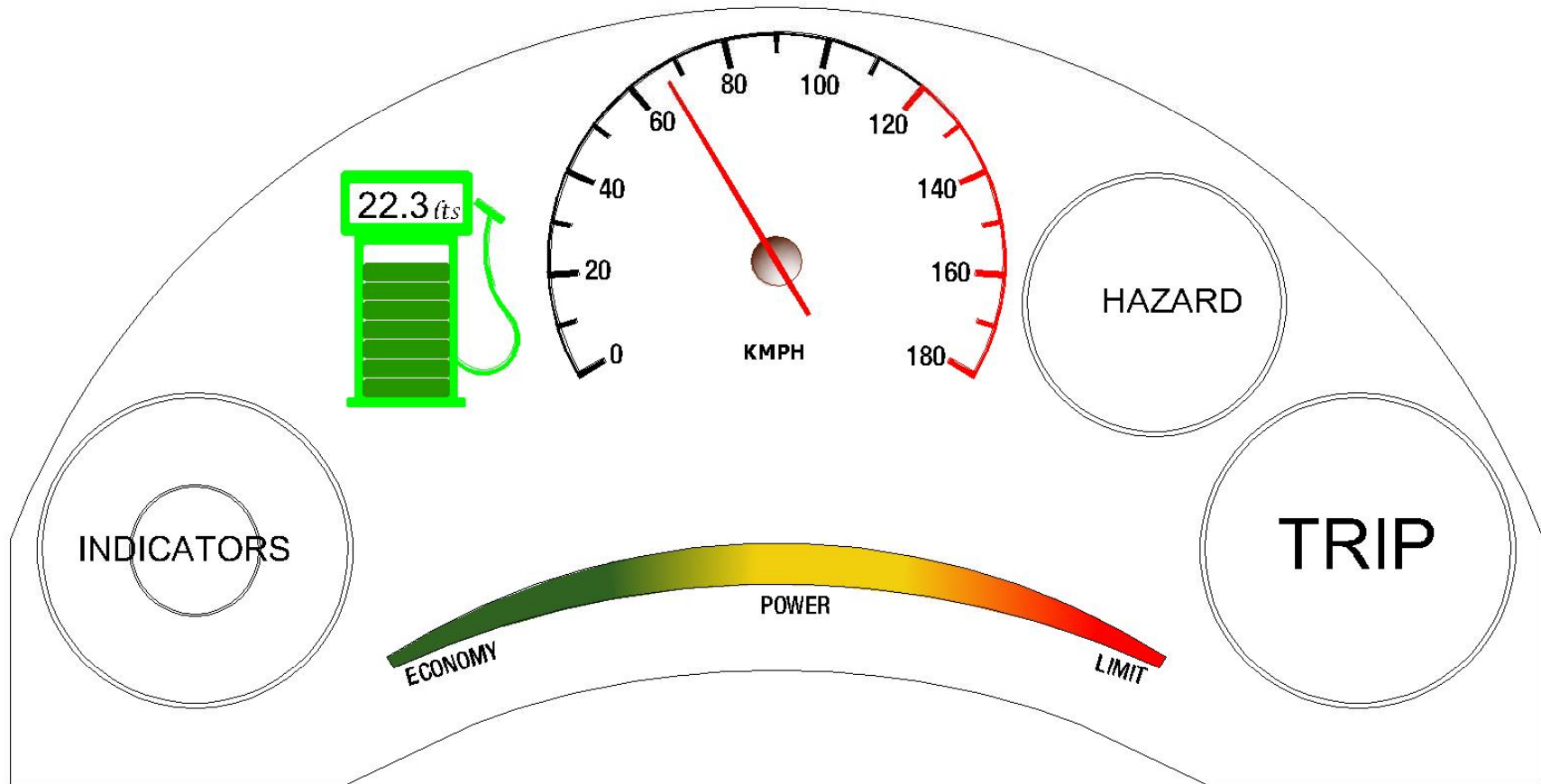
sample size:31

gauge ranking

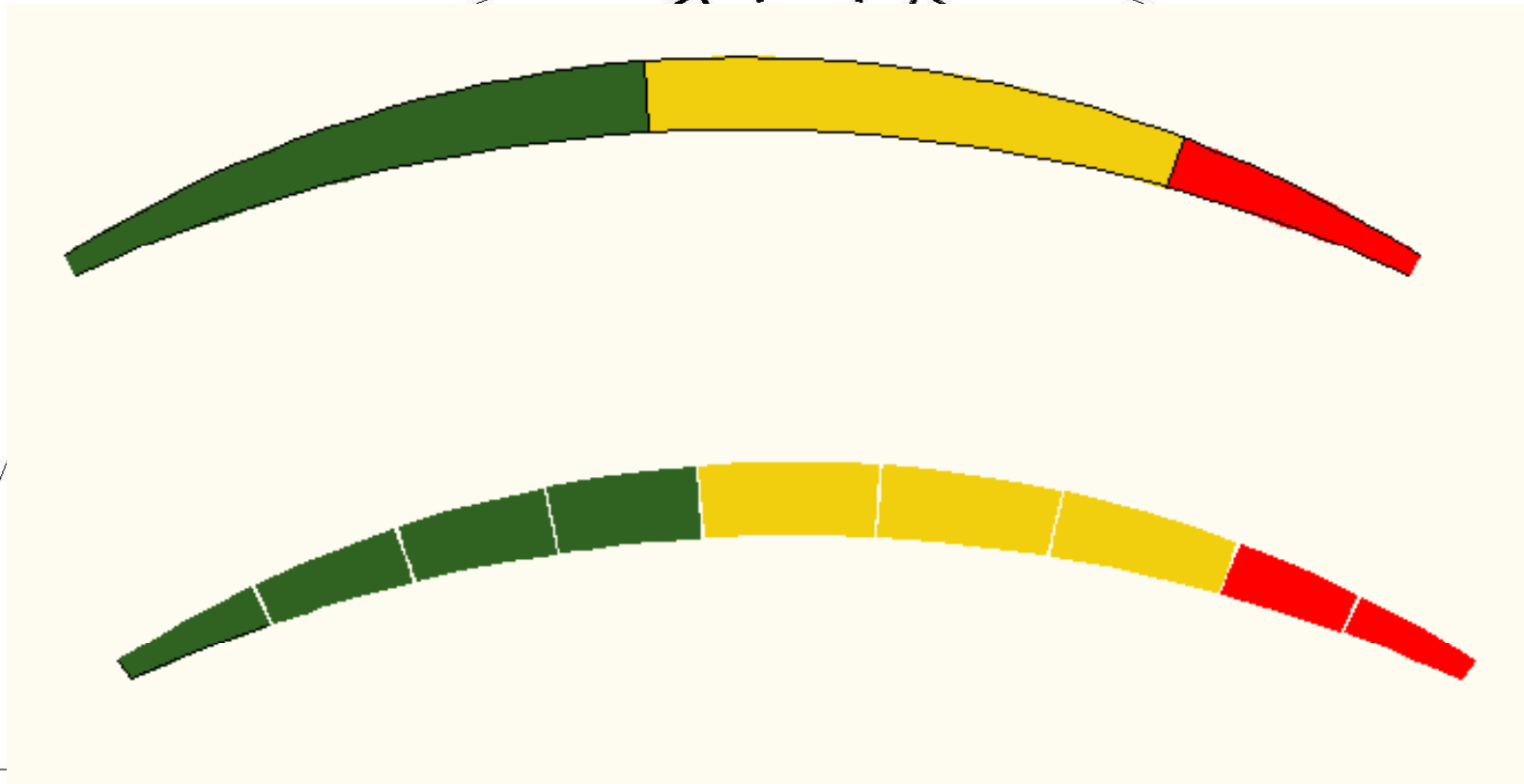
1. Speedometer
2. Fuel gauge
3. Odometer
4. Tachometer
5. Trip meter

Sample size : $16 + 3 + 9 = 28$

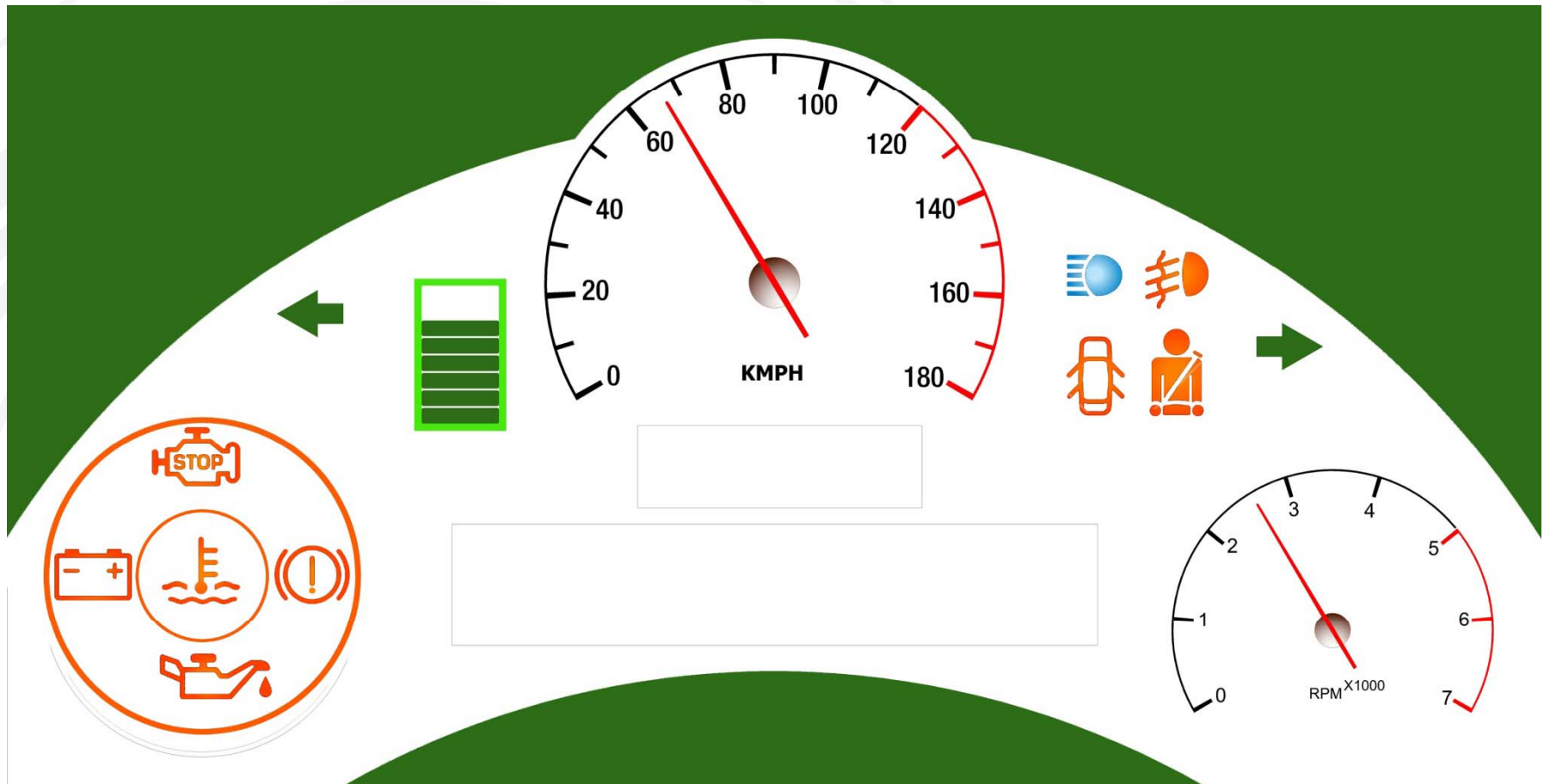
instrument cluster (IC) iteration 1



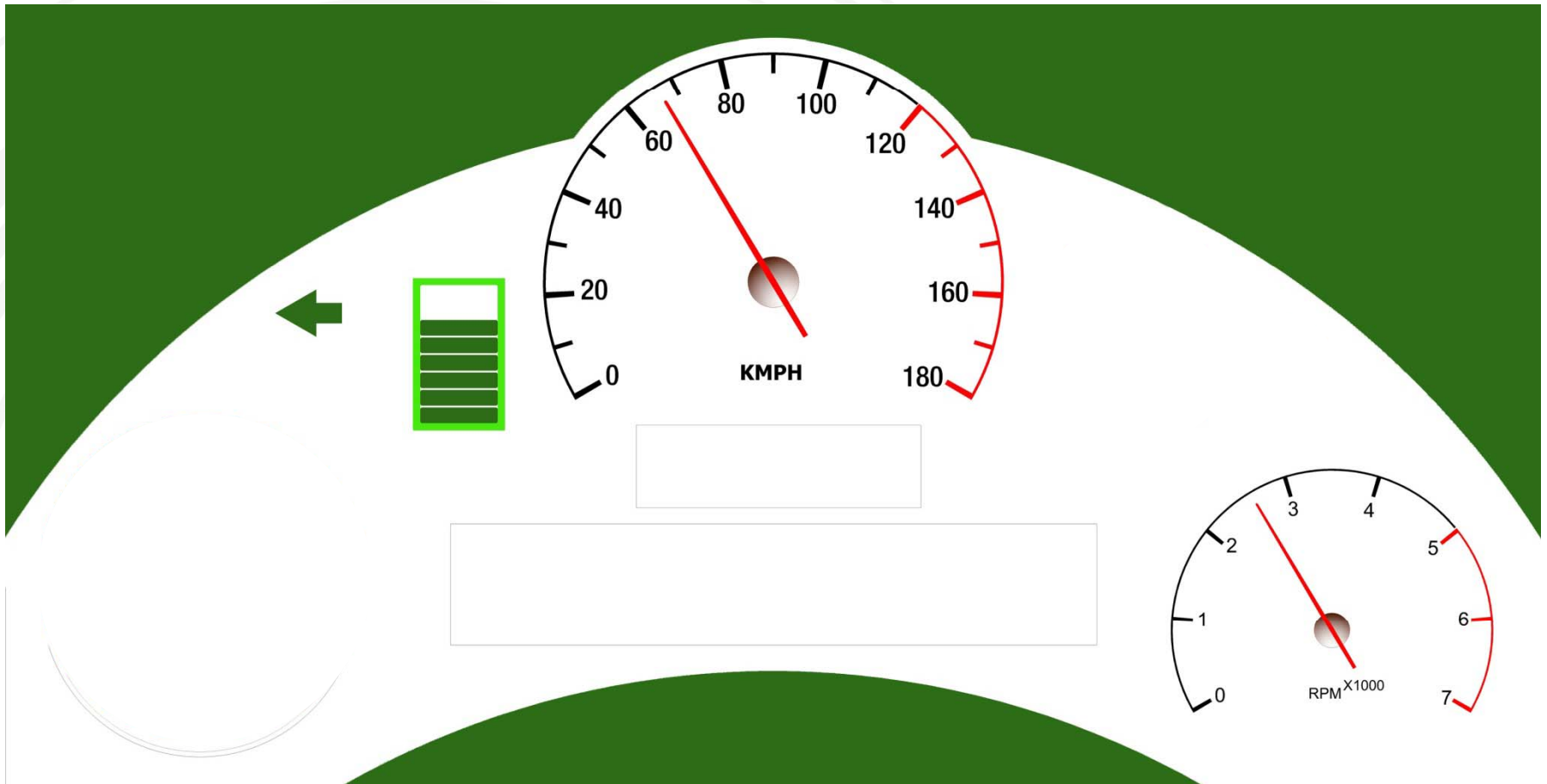
instrument cluster (IC) iteration 1



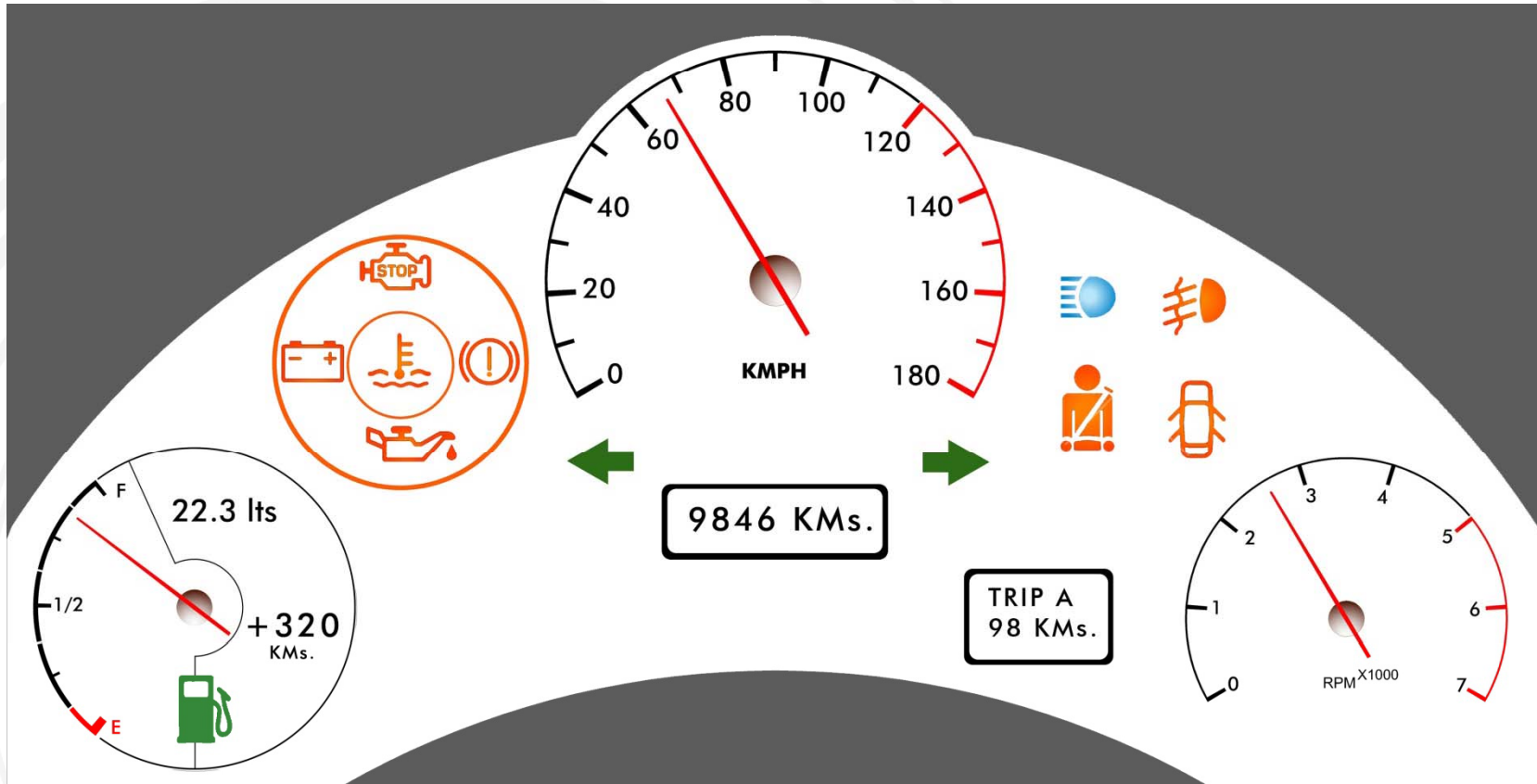
instrument cluster (IC) iteration 2



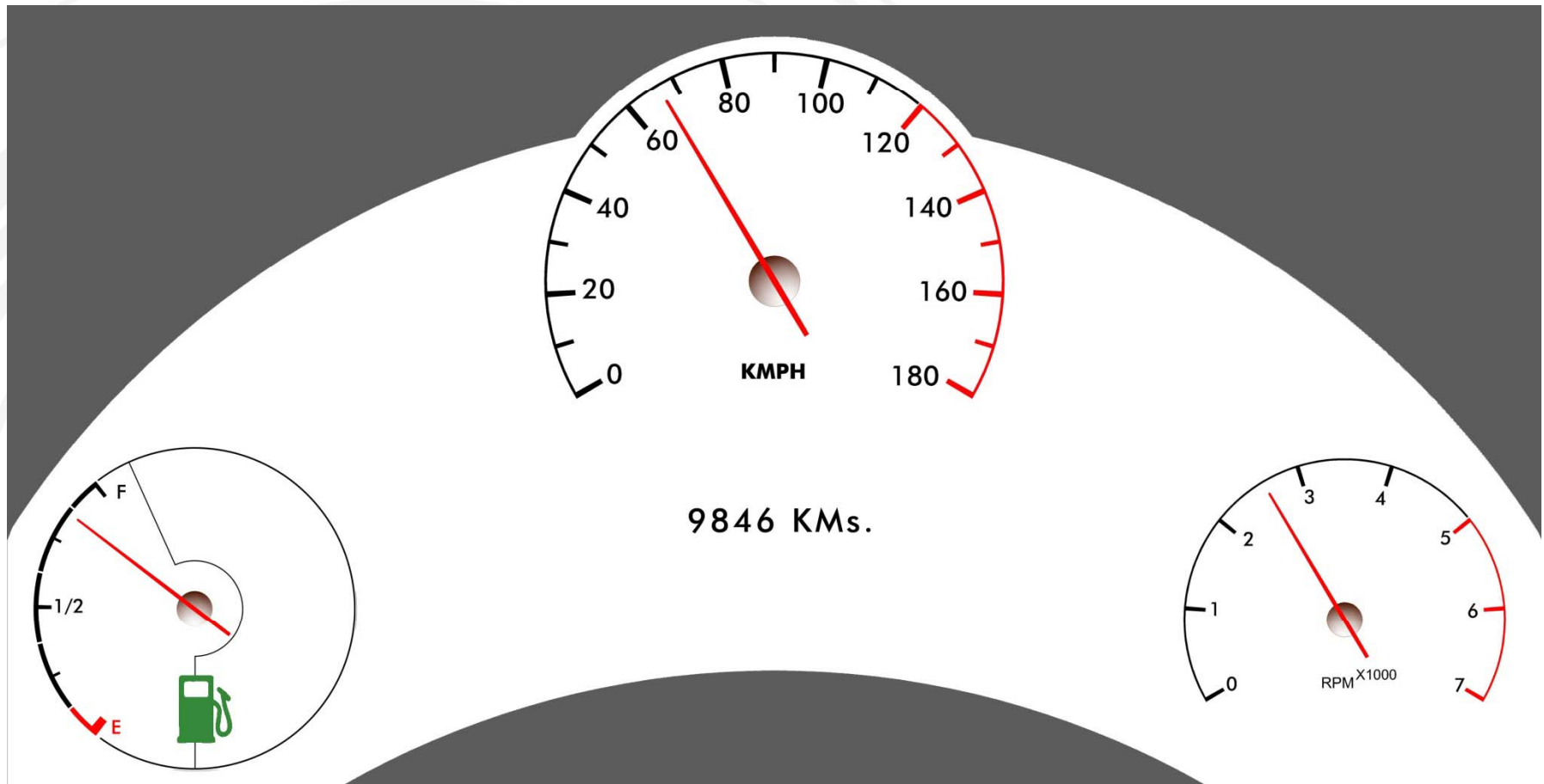
instrument cluster (IC) iteration 2



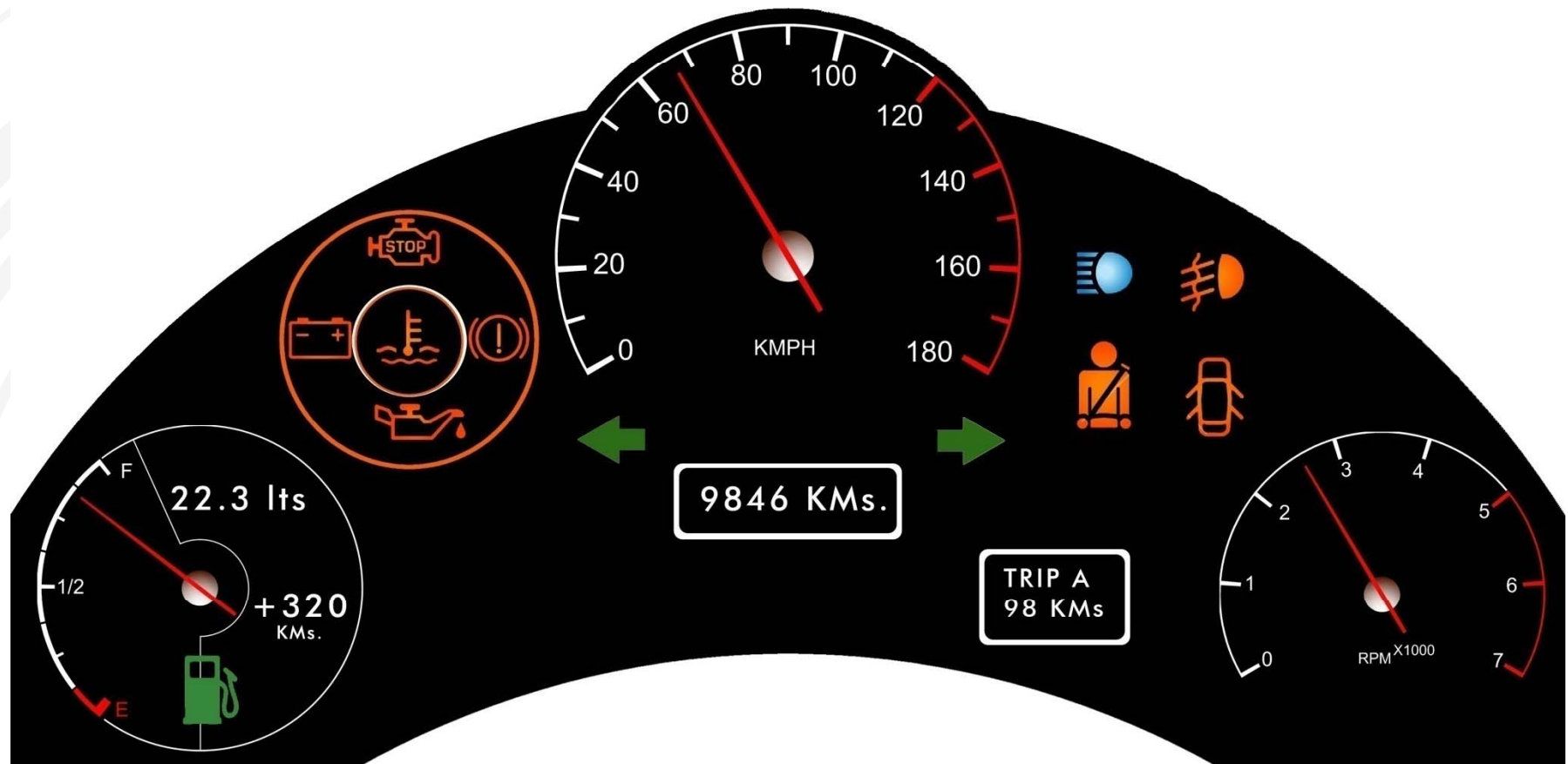
instrument cluster (IC) iteration 3



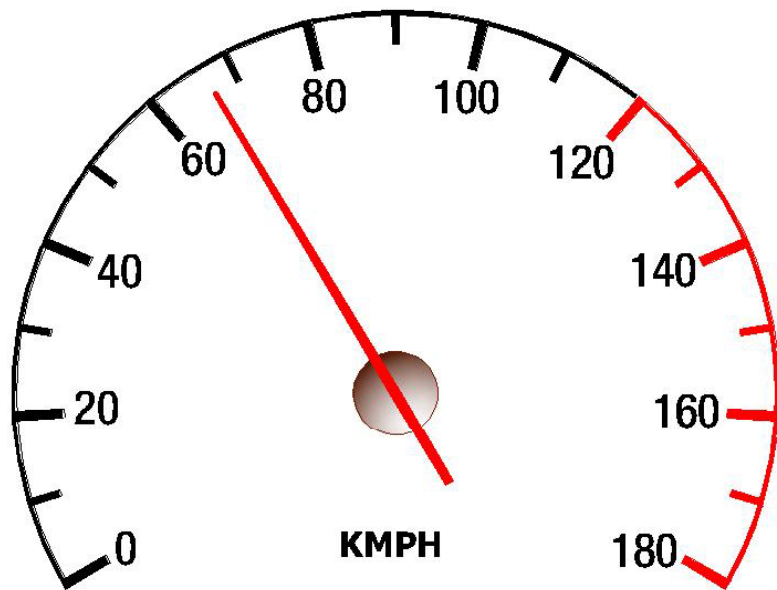
instrument cluster (IC) iteration 3



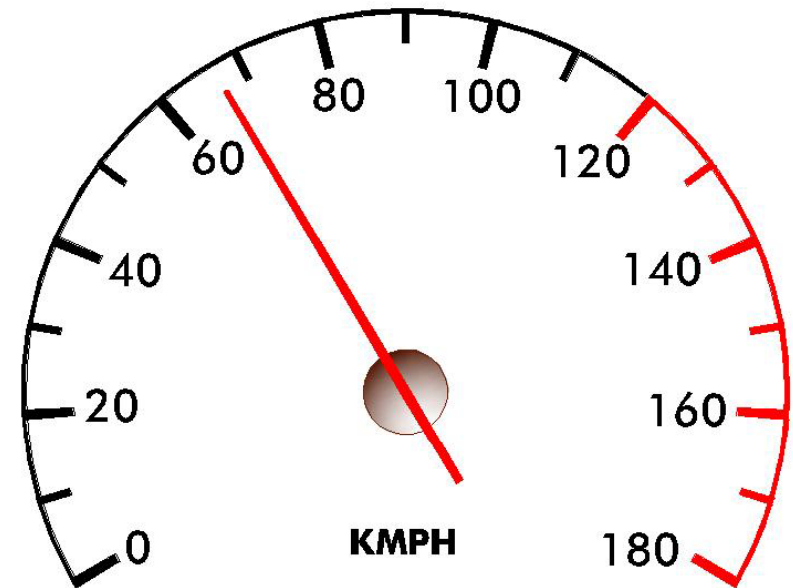
instrument cluster (IC) iteration 3



instrument cluster (IC) iteration 3 refinement

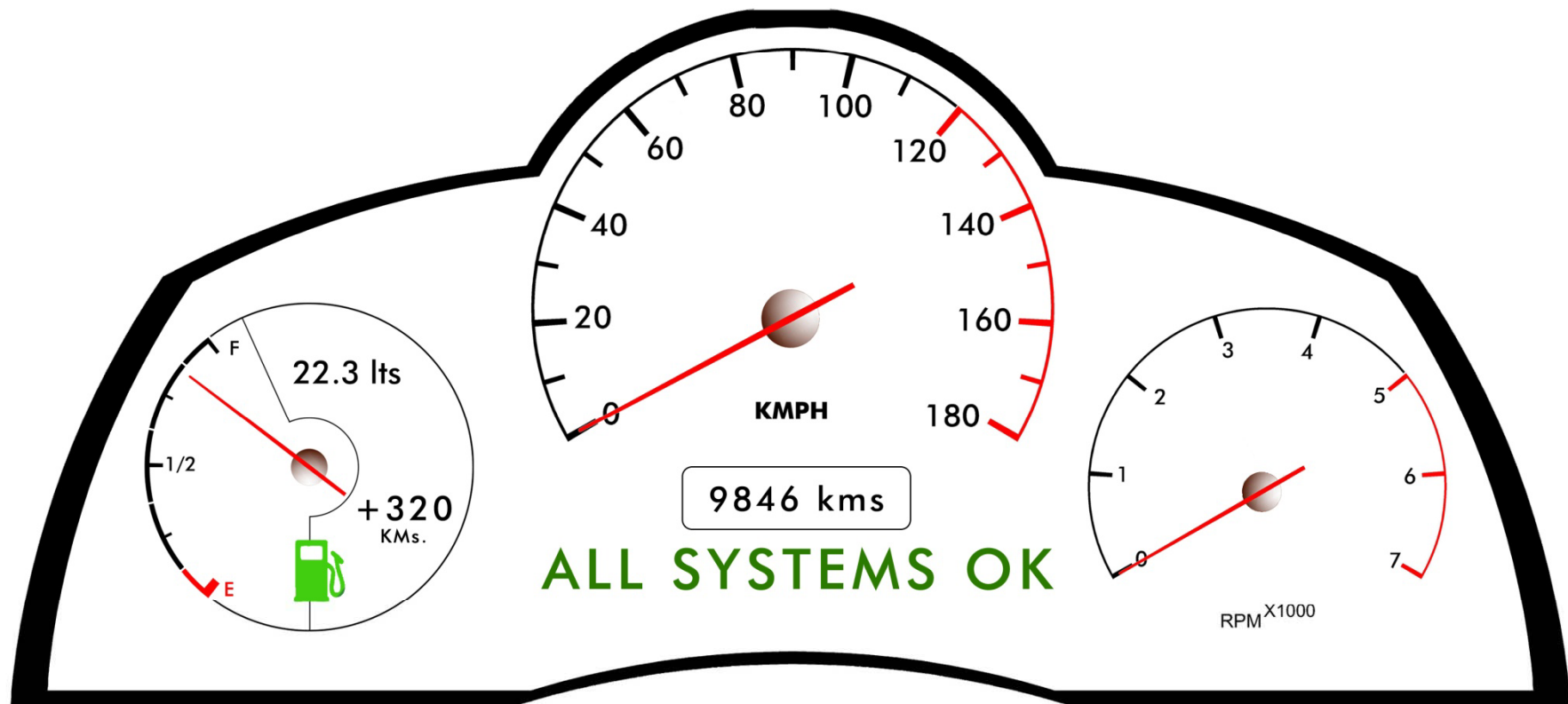


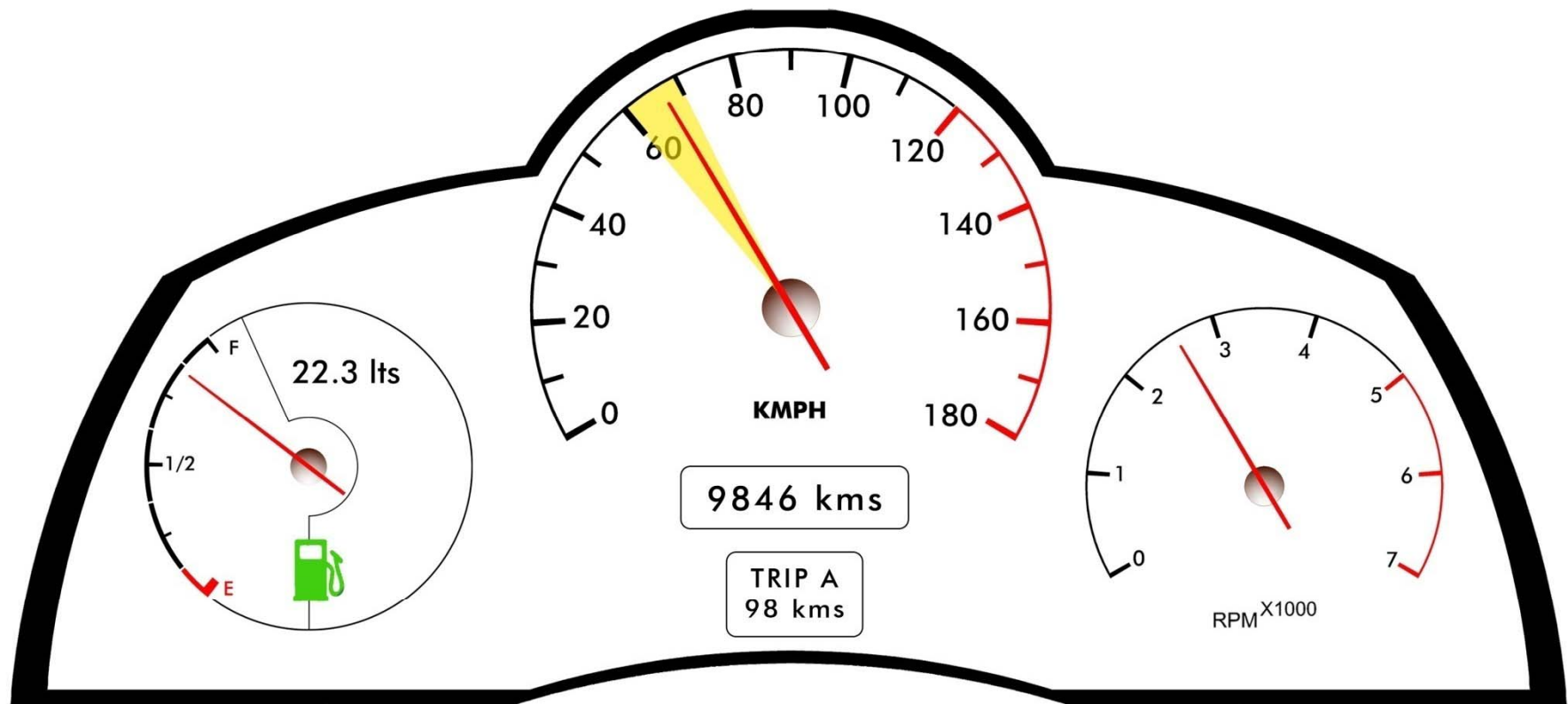
Helvetica

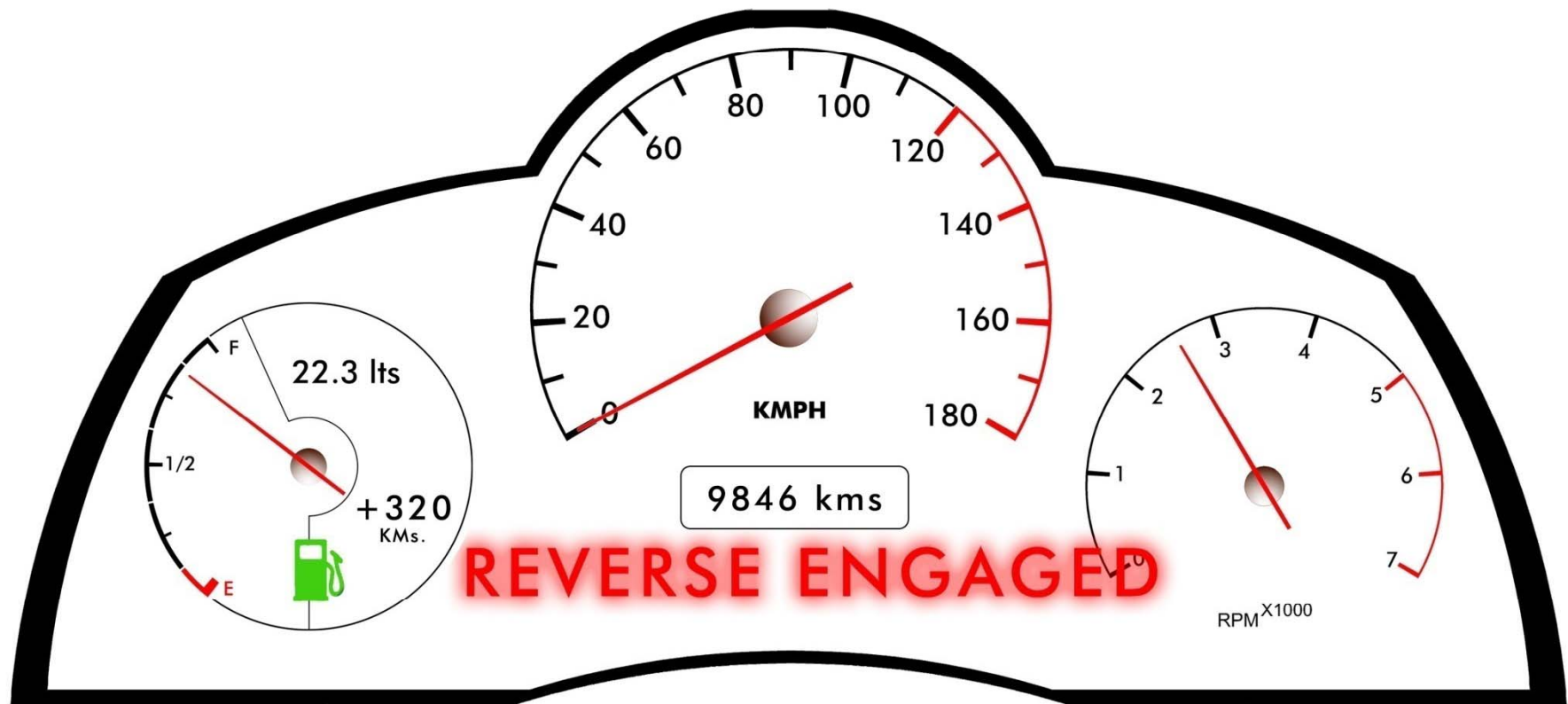


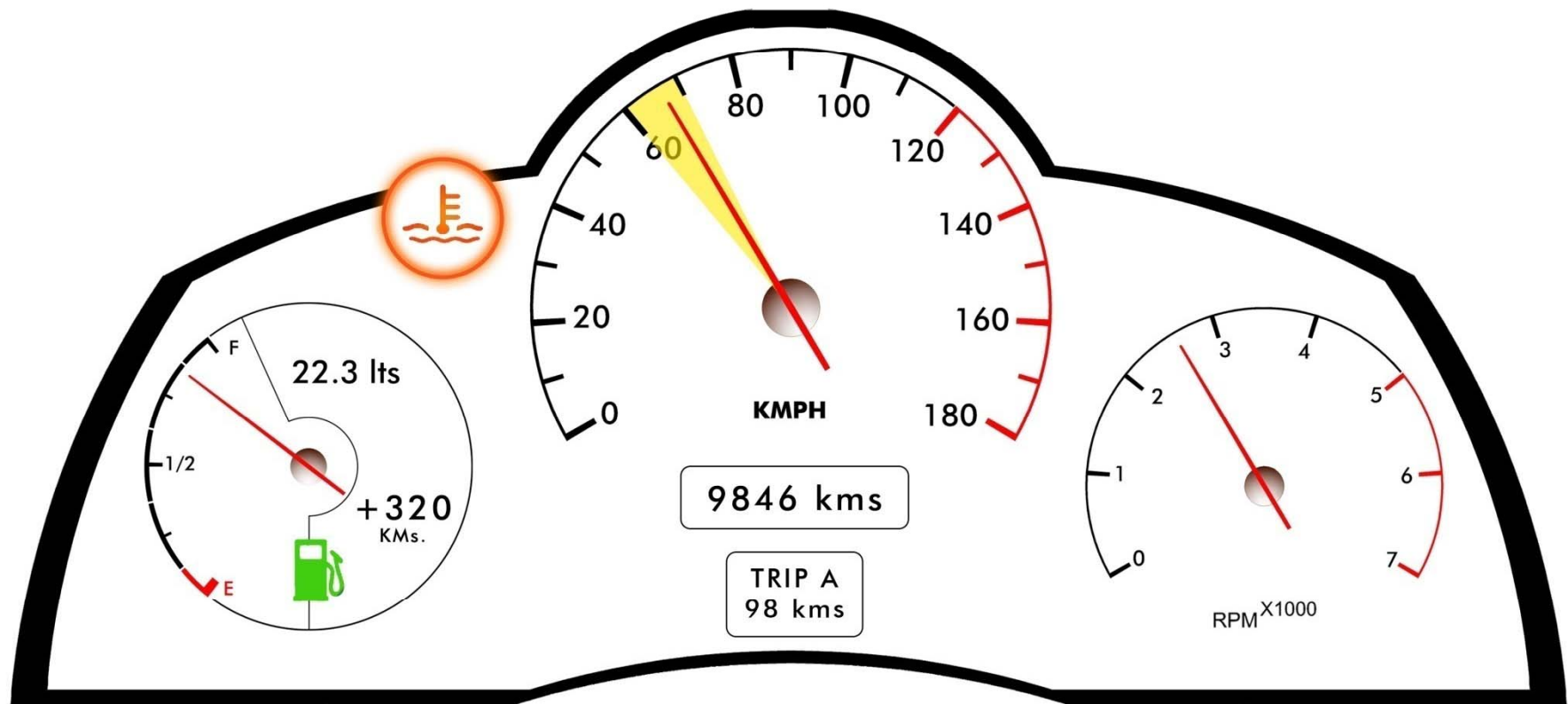
Futura

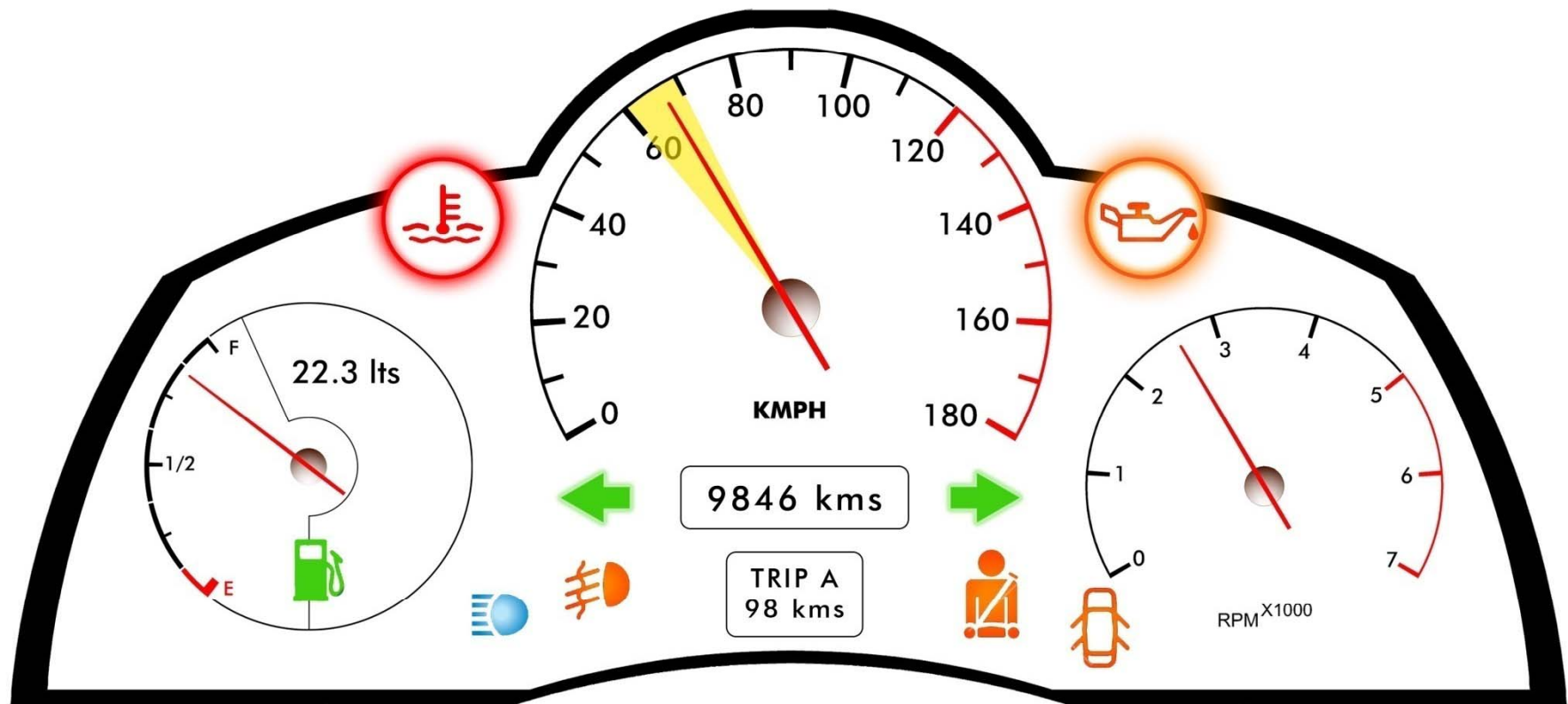
instrument cluster (IC) final

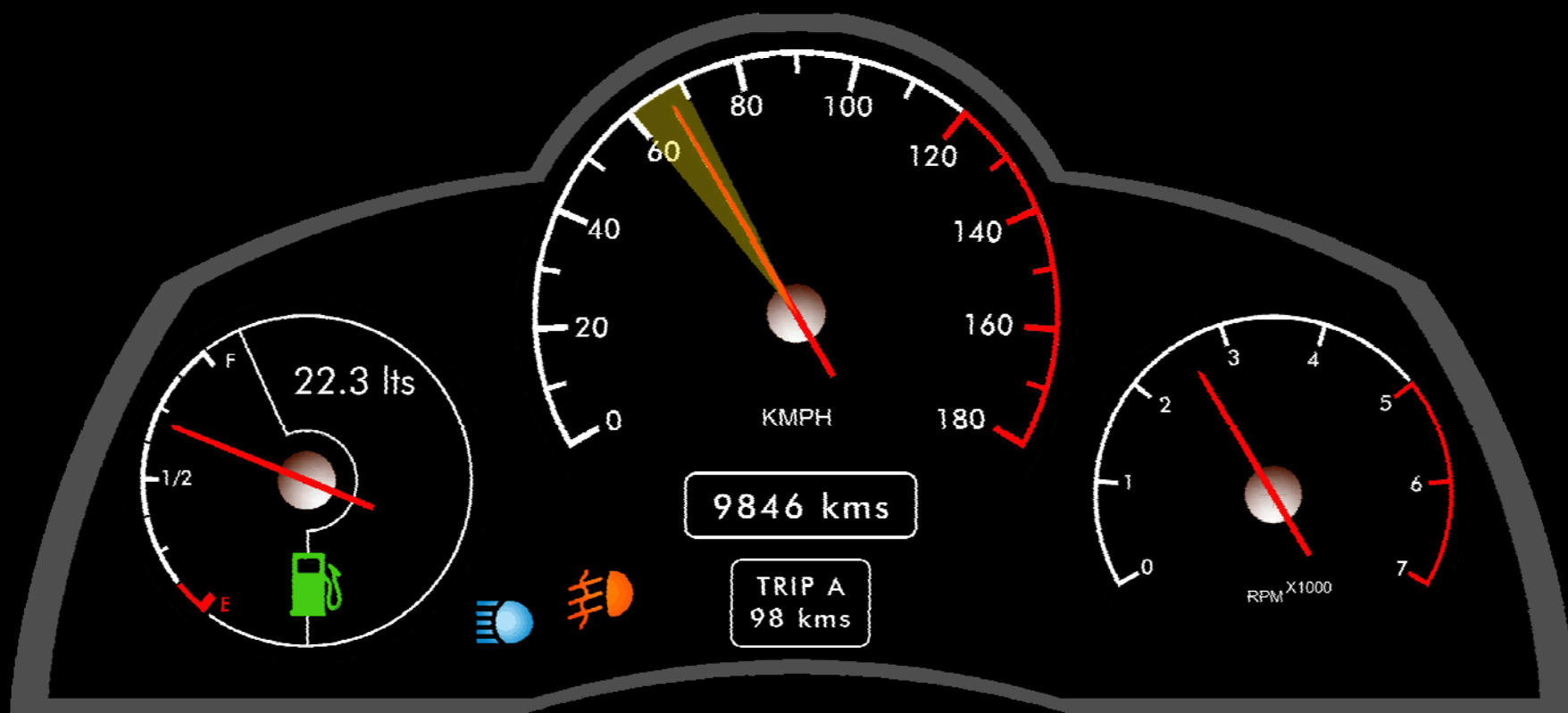


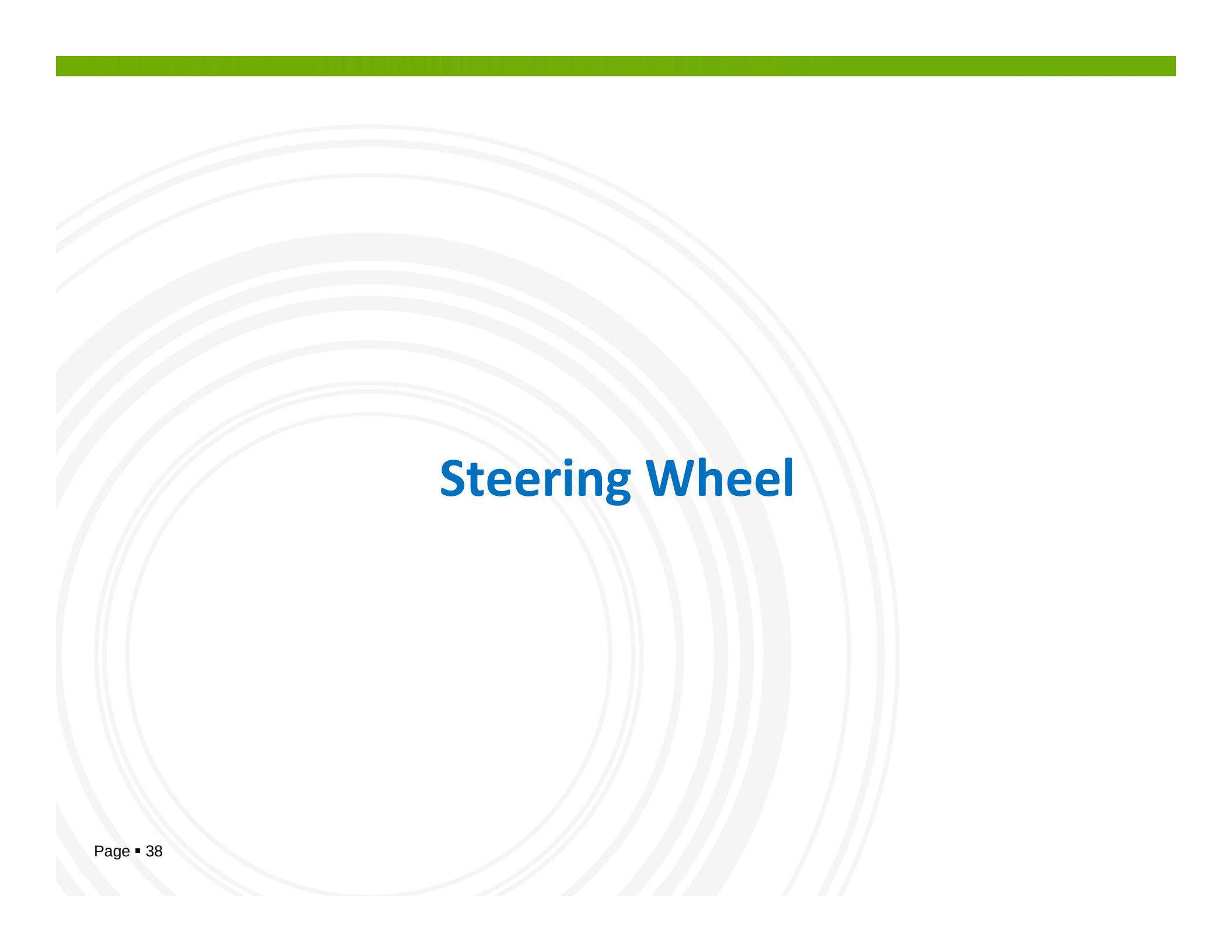










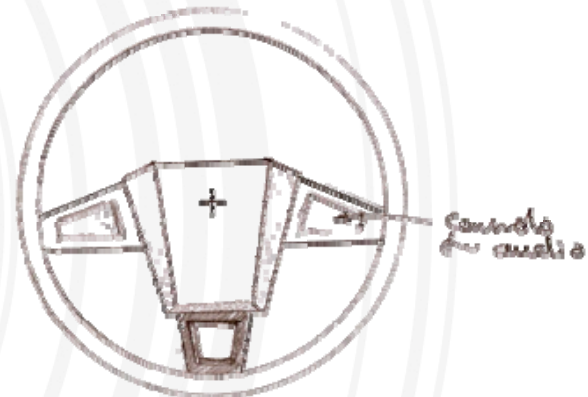
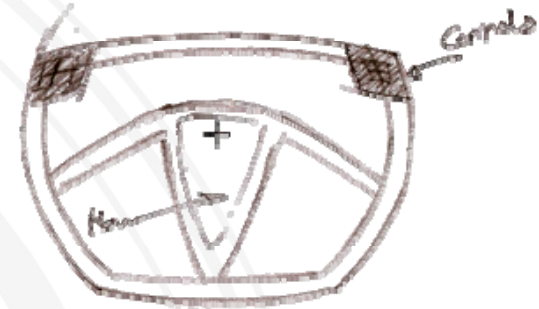
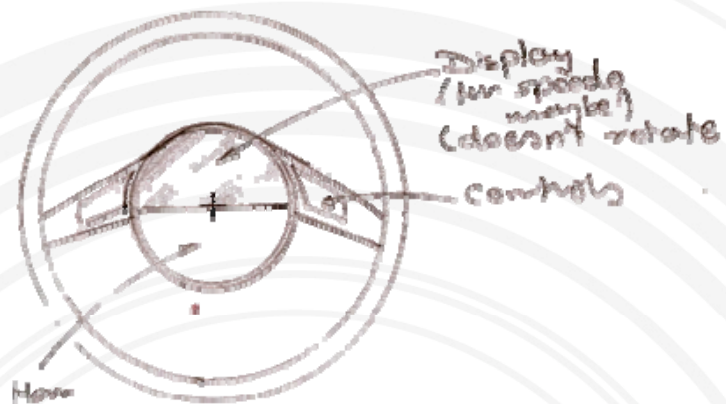


Steering Wheel

existing controls

- Horn
- Turn indicators
- Headlamp controls
- Wiper controls
- Audio controls

steering wheel cluster 1



steering wheel concept 1

Turn
indicator
controls

Touch
sensitive TFT
display

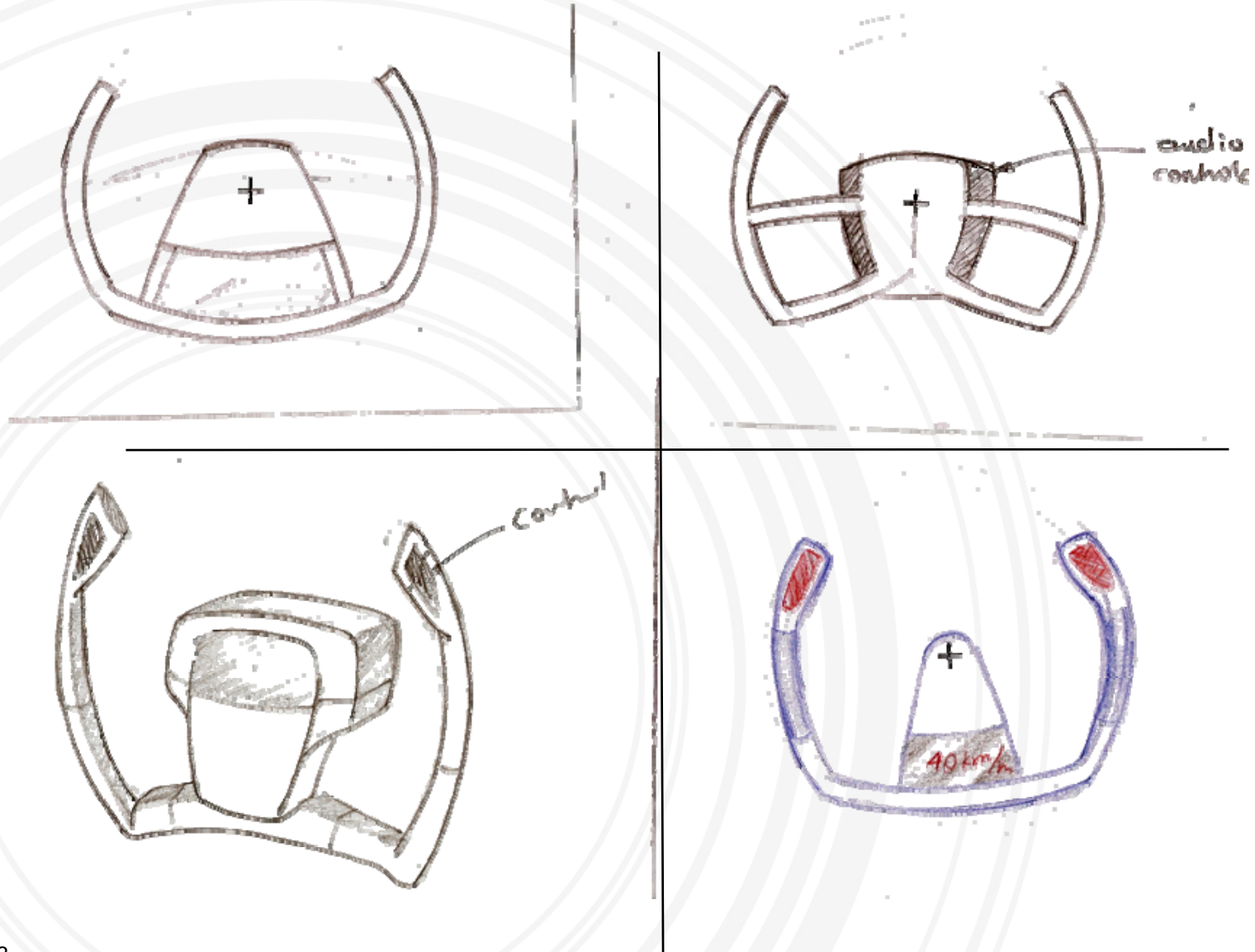
Additional space
for controls
buttons

Horn and TFT
display do
not rotate

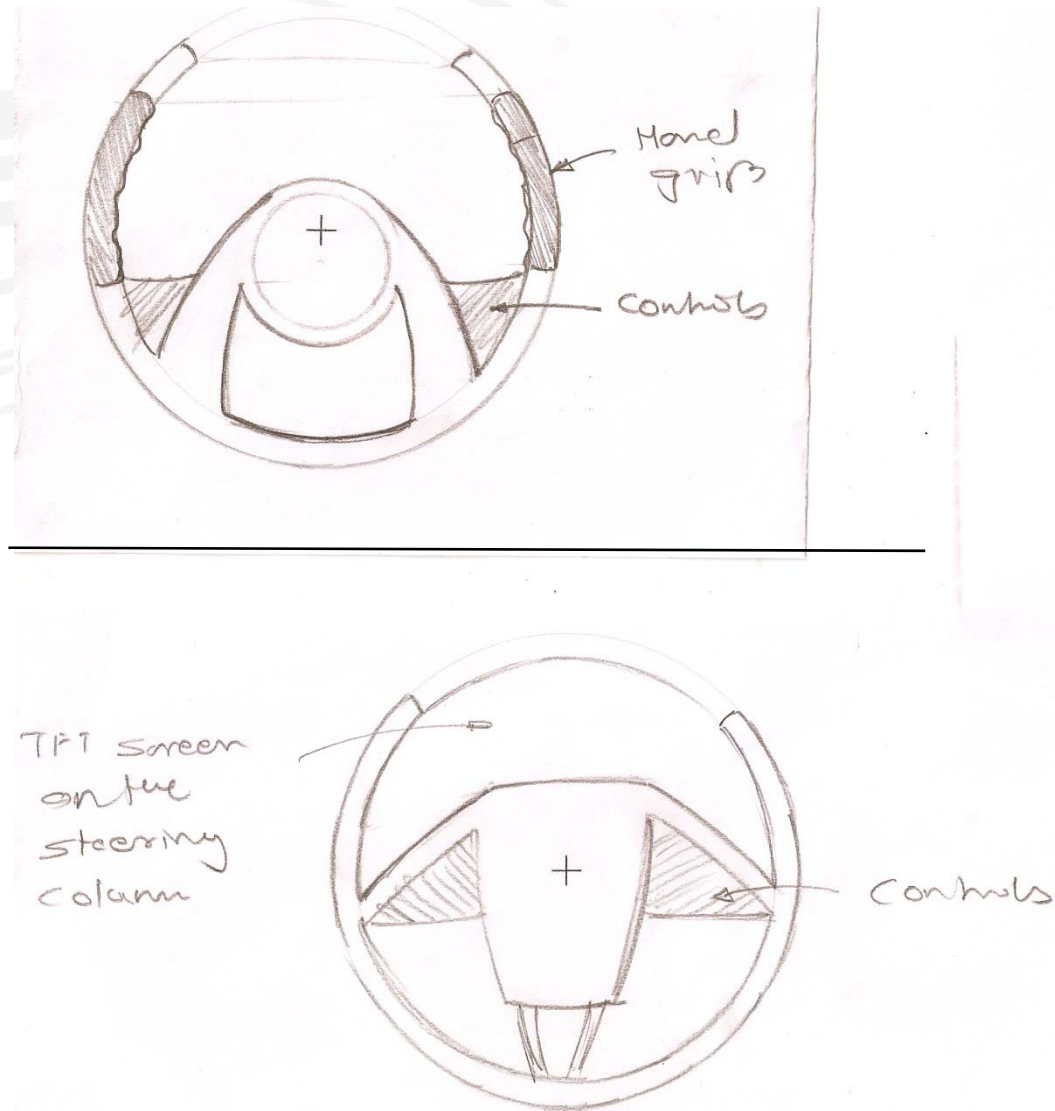
Horn



steering wheel cluster 2



steering wheel cluster 2



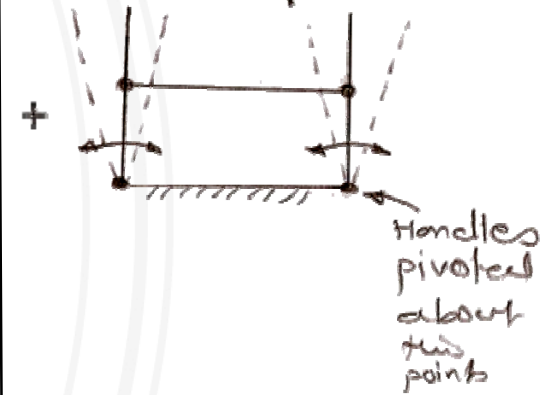
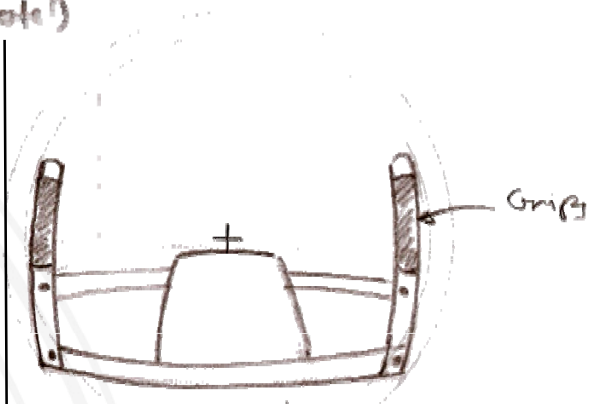
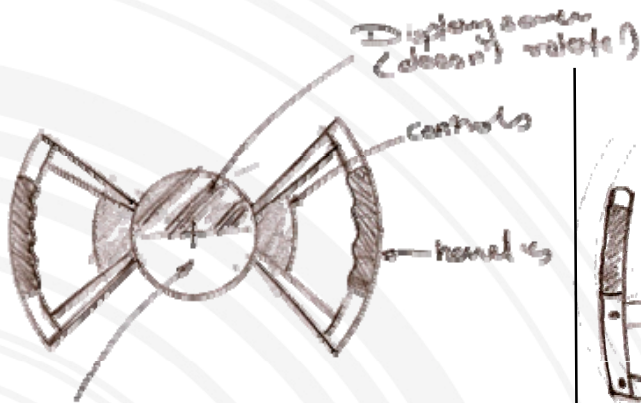
steering wheel concept 2

Turn
indicator
controls

o controls

Horn

steering wheel cluster 3



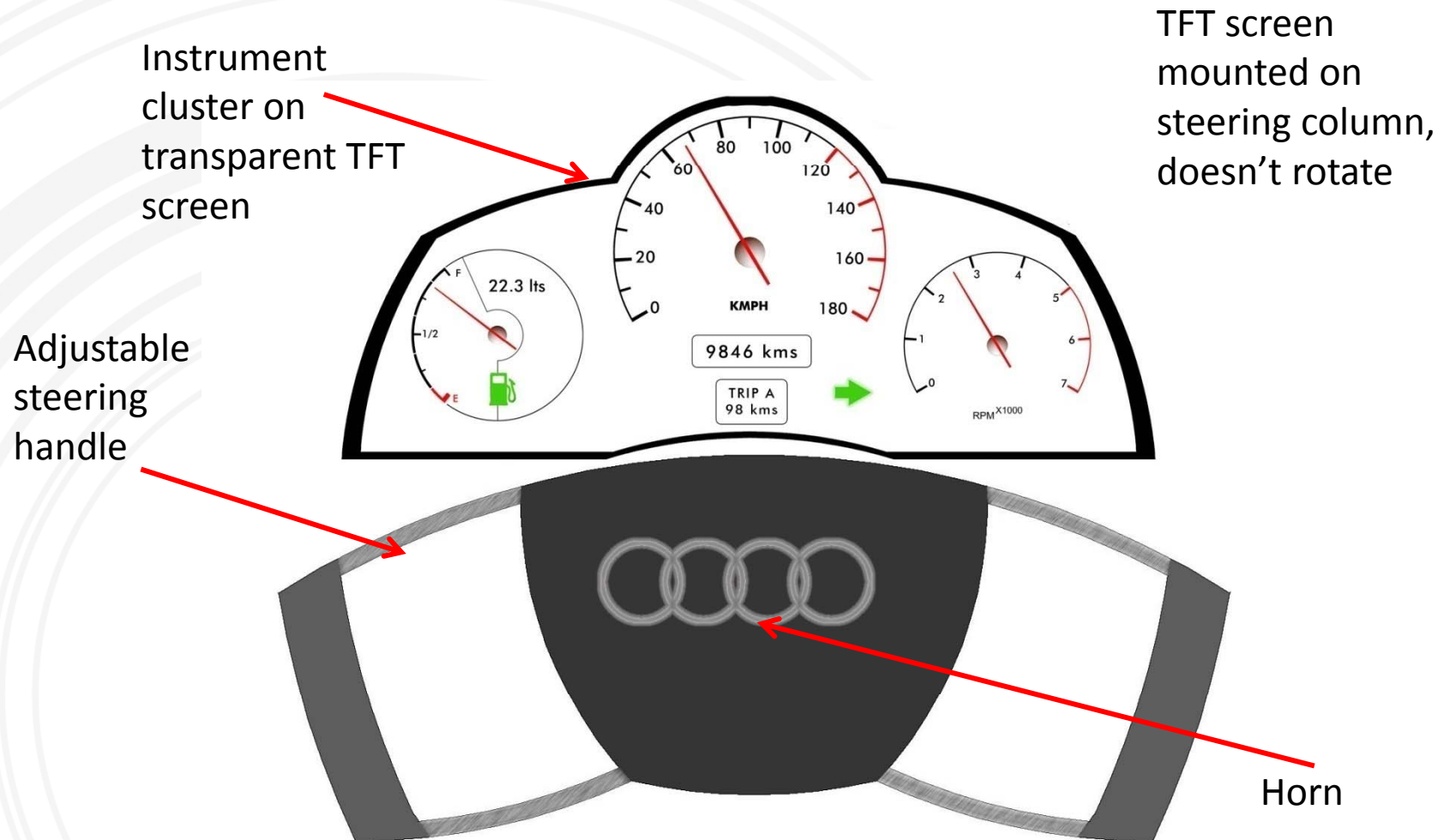
steering wheel concept 3

Adjustable
steering
handle



orn

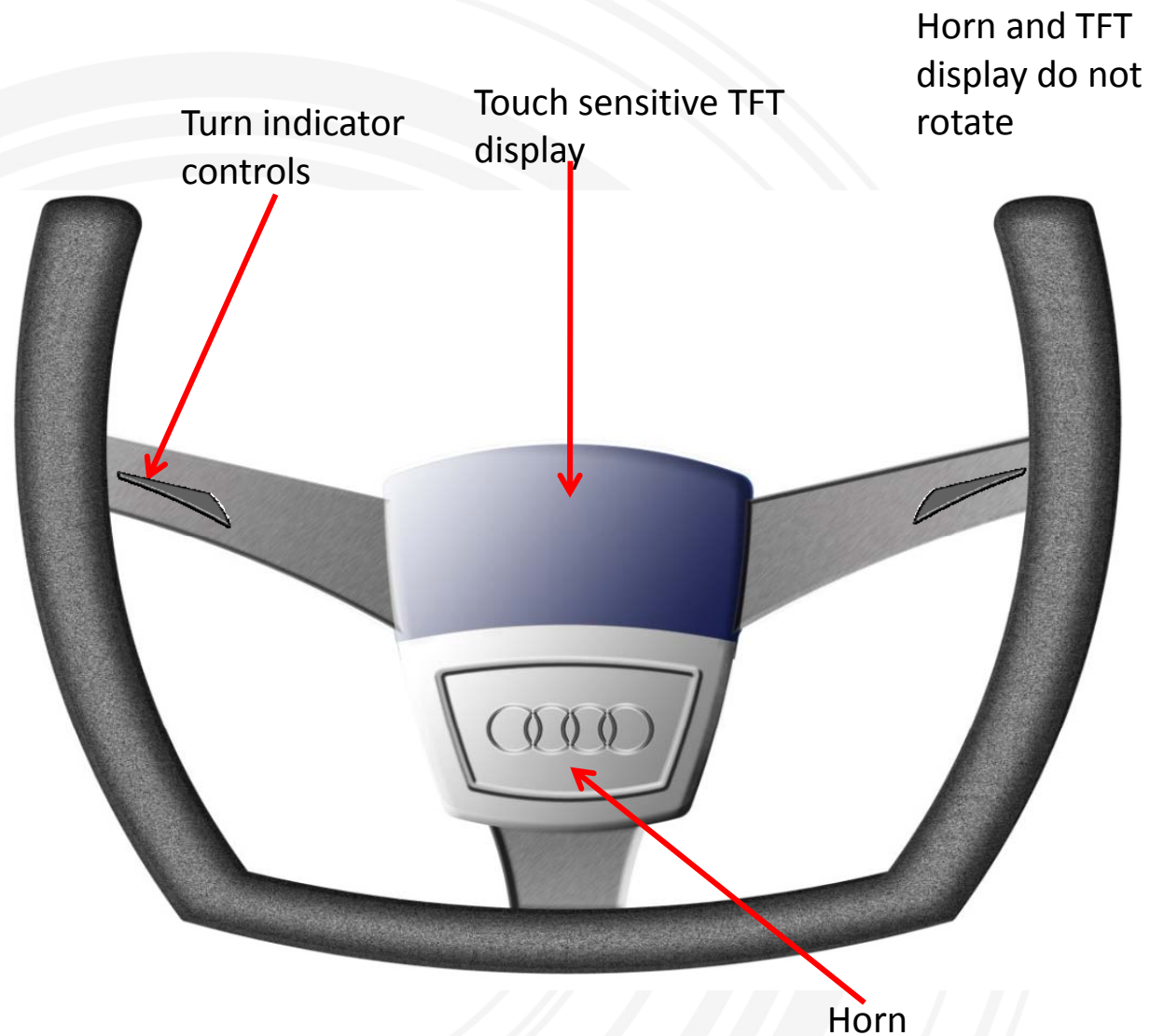
steering wheel concept 3

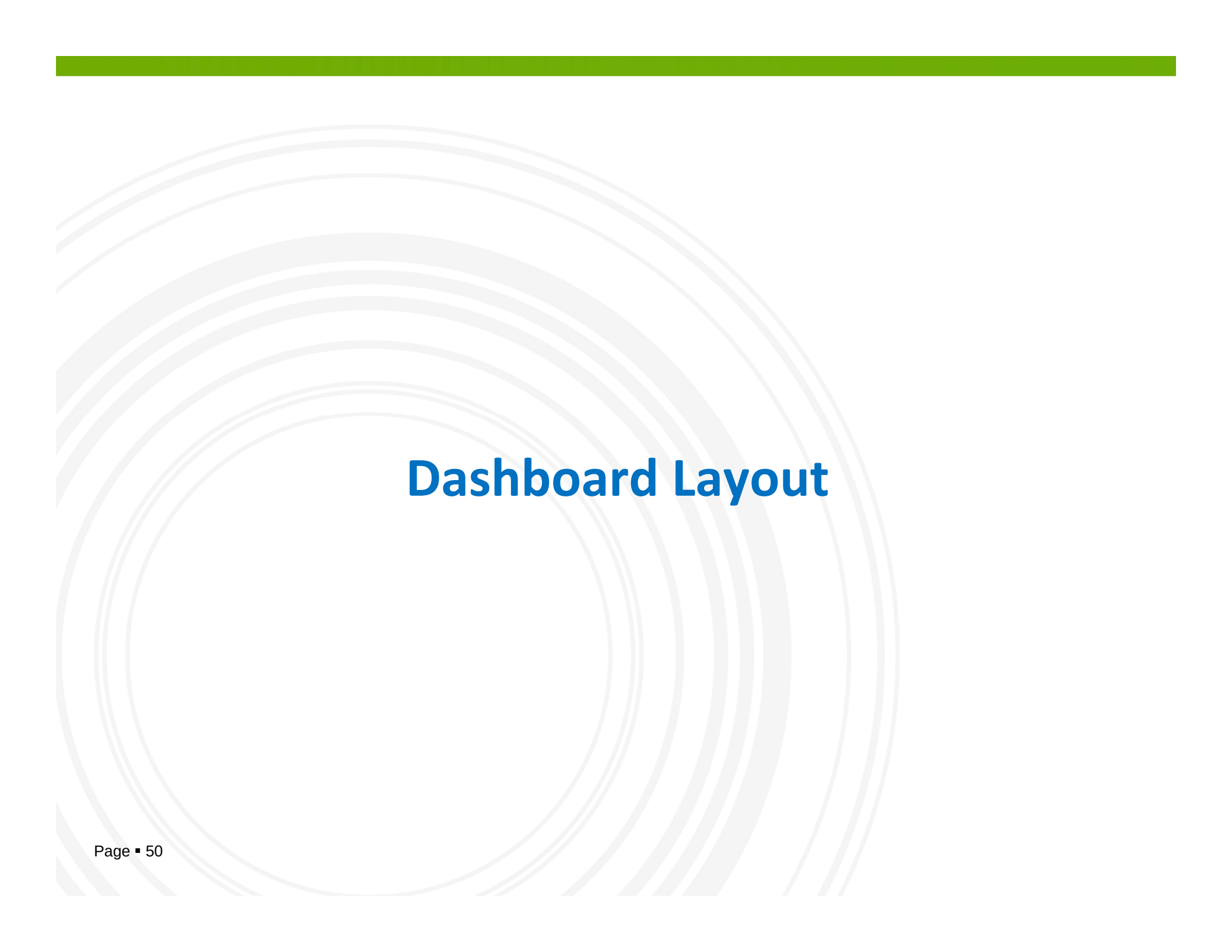


existing controls

Criteria	Concept 1 	Concept 2 	Concept 3 
Comfort due to grip (5)	10	9	7
Comfort due to compactness (4)	7	10	9
Convenience of controls (3)	7	9	6
Adjustability of effective wheel dia. (2)	0	0	8
Innovativeness (1)	8	6	10
Weighted average	107	118	115

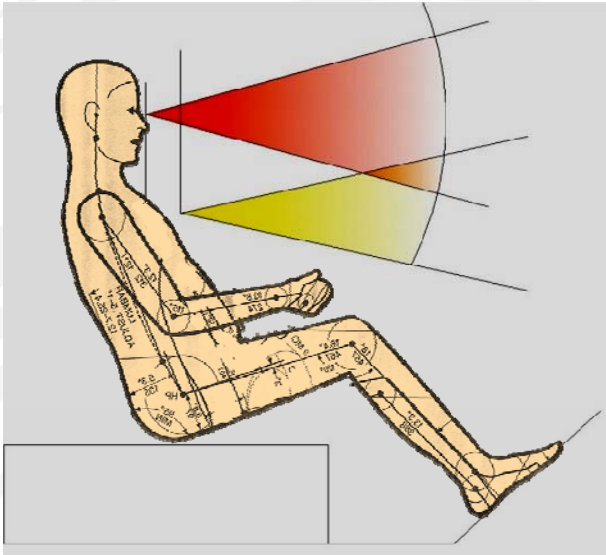
steering wheel concept 3



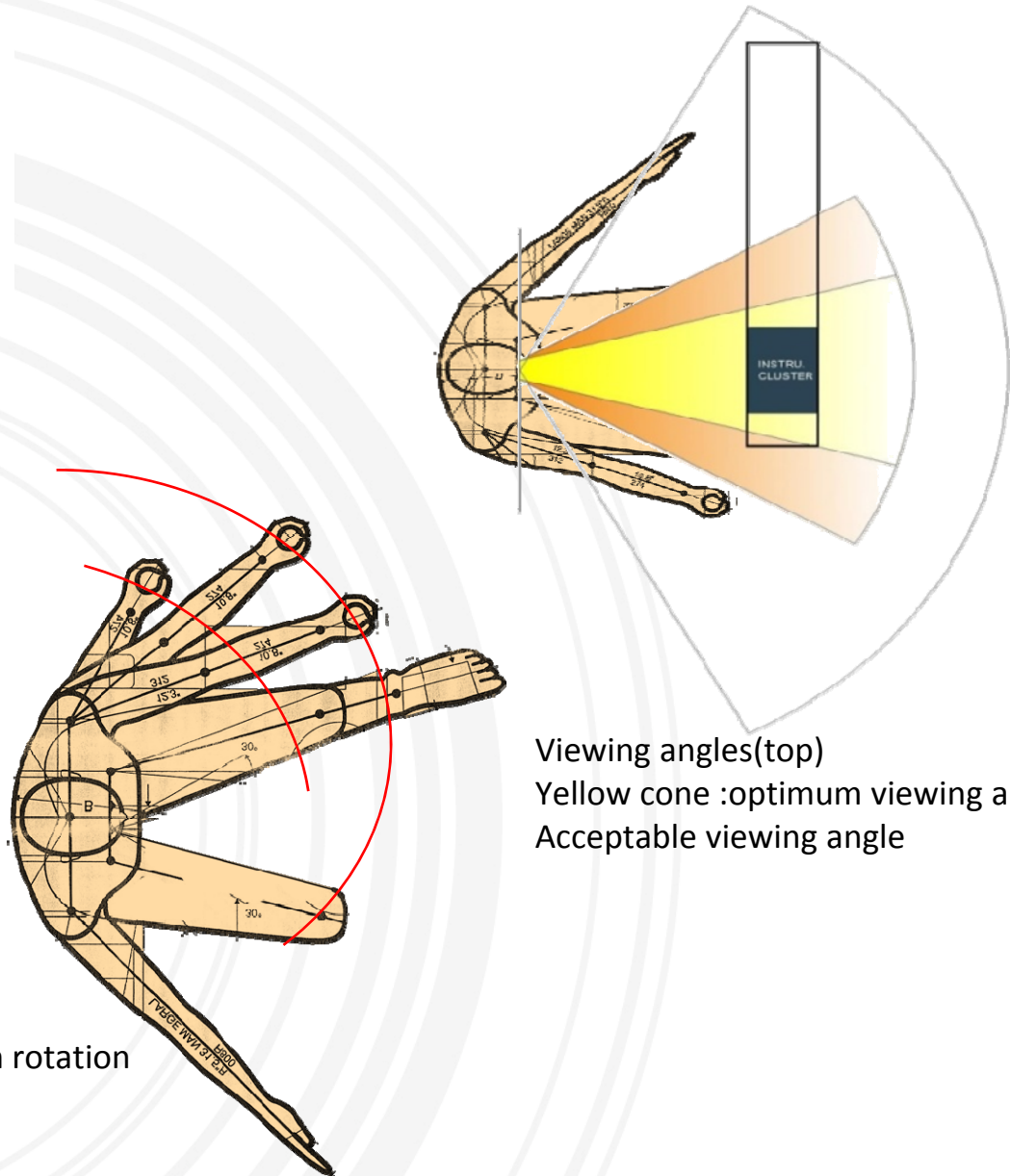


Dashboard Layout

dimensional ergonomics



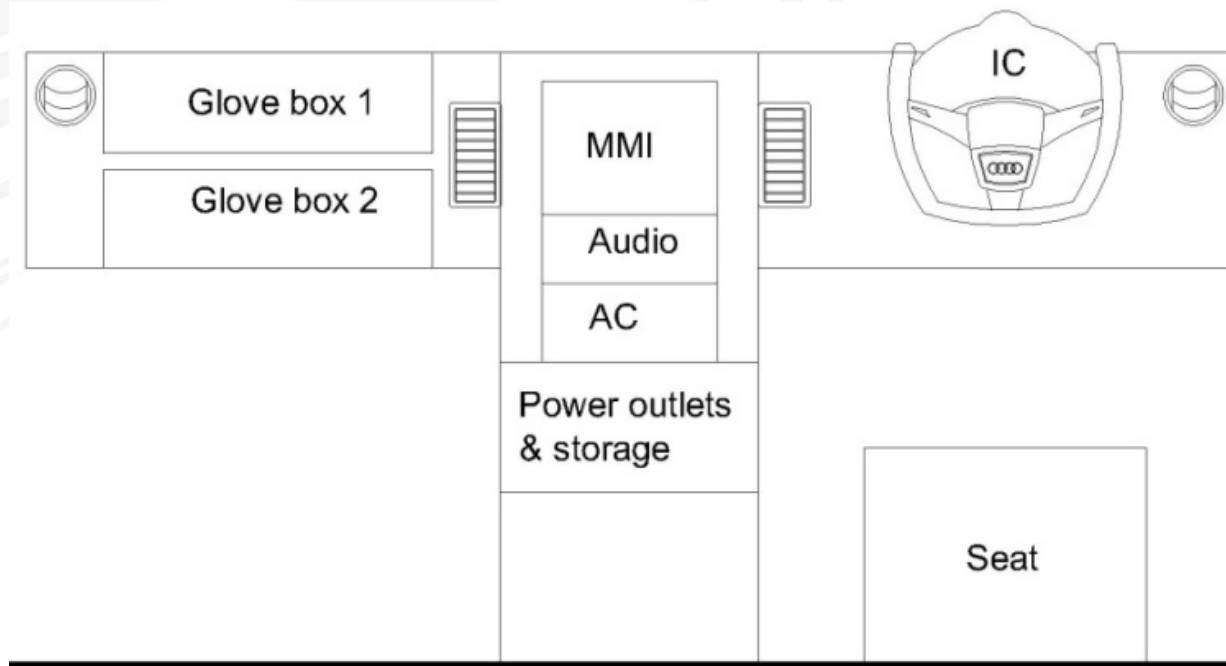
Viewing angles (side) for 95th % ile male and 5th female (Indian)



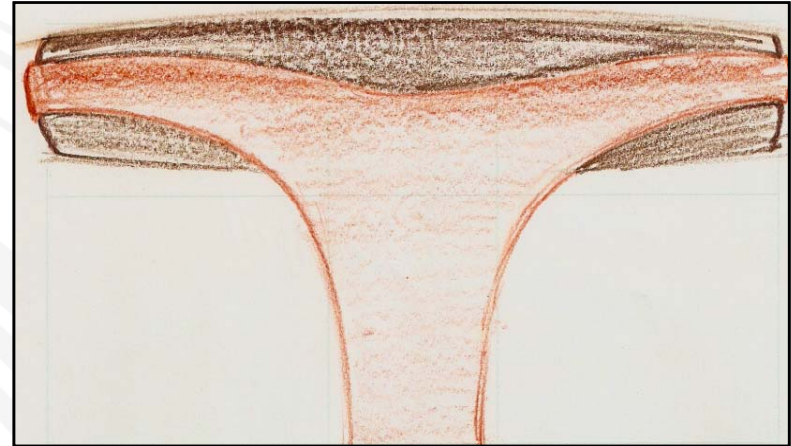
Viewing angles(top)
Yellow cone :optimum viewing angle
Acceptable viewing angle

Arm rotation

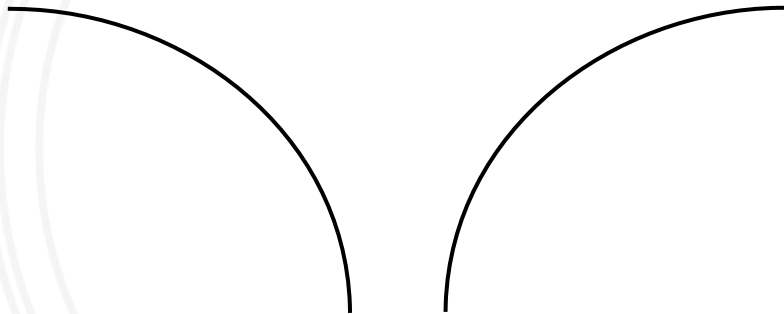
basic layout



basic form



Votes: 9



Basic visual element



Votes: 8

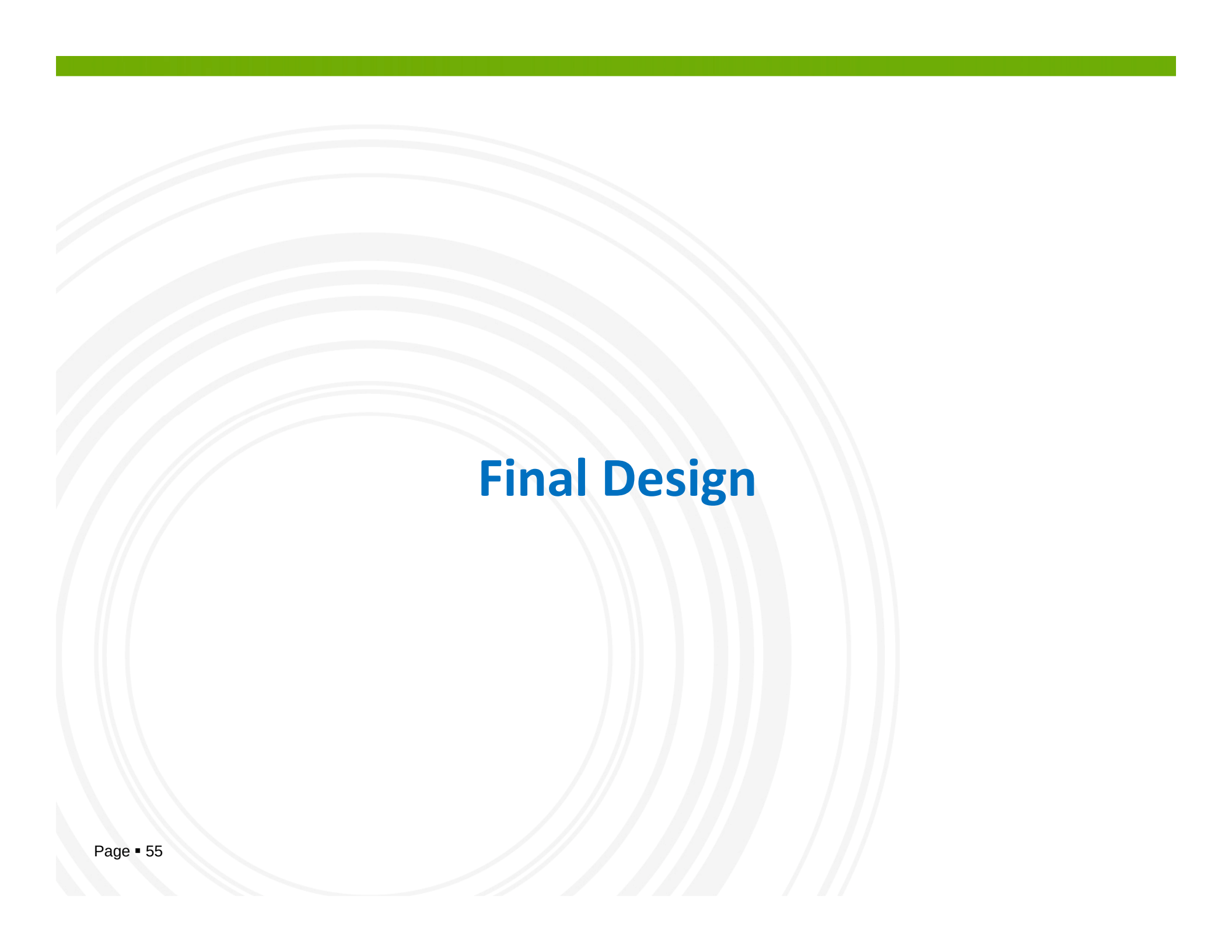
basic form



A sketch with various sub-systems

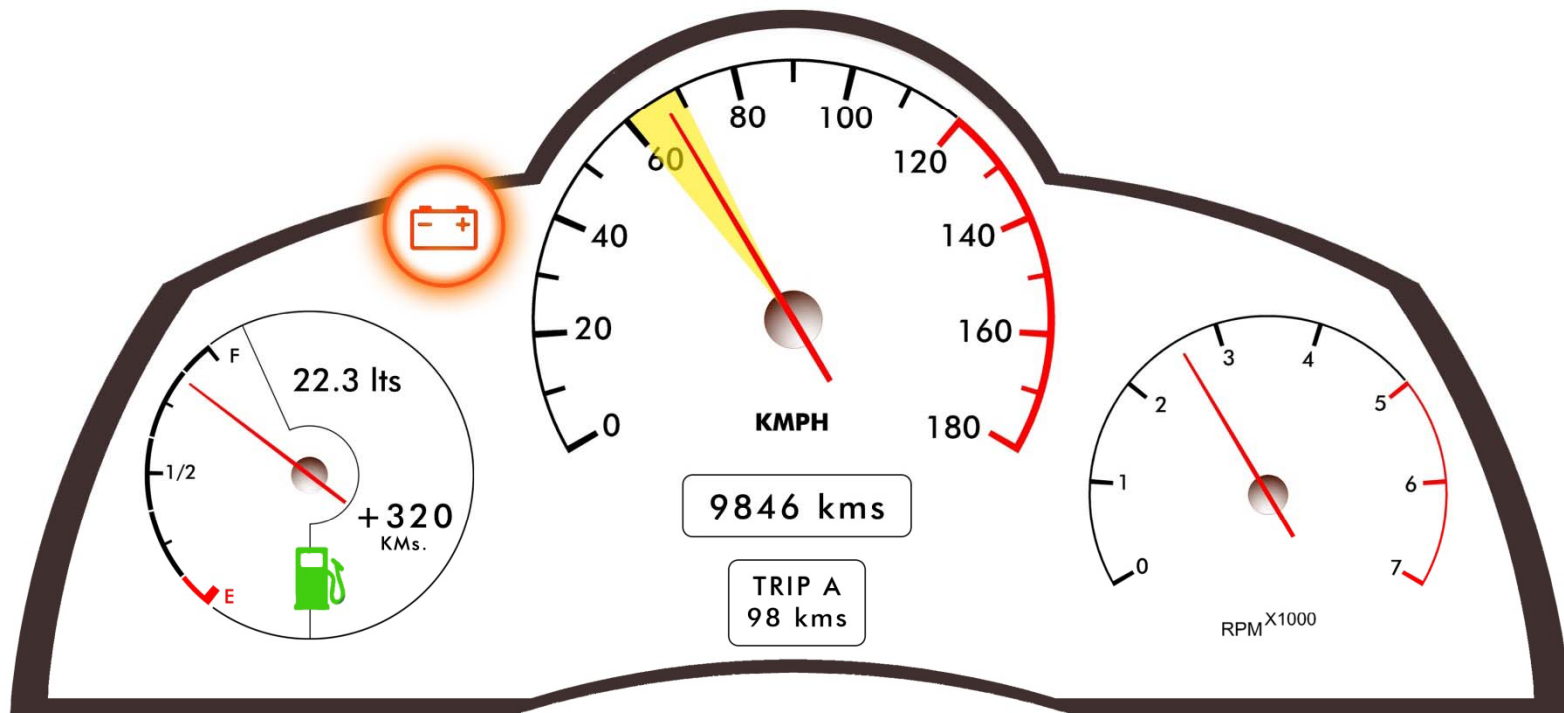


3D CAD model

The background features a series of concentric, light gray circles on the left side, creating a ripple effect. A solid green horizontal bar is positioned at the top of the page.

Final Design

refinements



GPS to display speed limit

final model



- CLO value
- Instrument cluster hood
- Touch sensitive screen on steering wheel
- Semi-automatic gearbox
- Center console angle
- Clock
- Power outlet
- Pop out cup holders
- Tweeter mountings



thank you!!!

Special Thanks to:

Prof. Ramchandran, IDC IIT Bombay

Prof. V. P. Bapat, IDC IIT Bombay

Also Shashidhar & Yohan

references

- Indian anthropometric dimensions – D. chakrabarti
- measure of man & woman – henry drefuss
- human factors design handbook – woodson
- Kodak's ergonomic data for men at work
- Design of Instrument cluster for automobiles -
Malin Rundqvist & Louise Persson- Lulea
University of technology
- www.mini.com
- www.hondacarindia.com
- www.marutisuzukiastar.com
- www.wikipedia.org