CENTRO RICERCHE FIAT

Designing and measuring the vehicle cockpit quality perception

Automotive Interiors Expo 2011

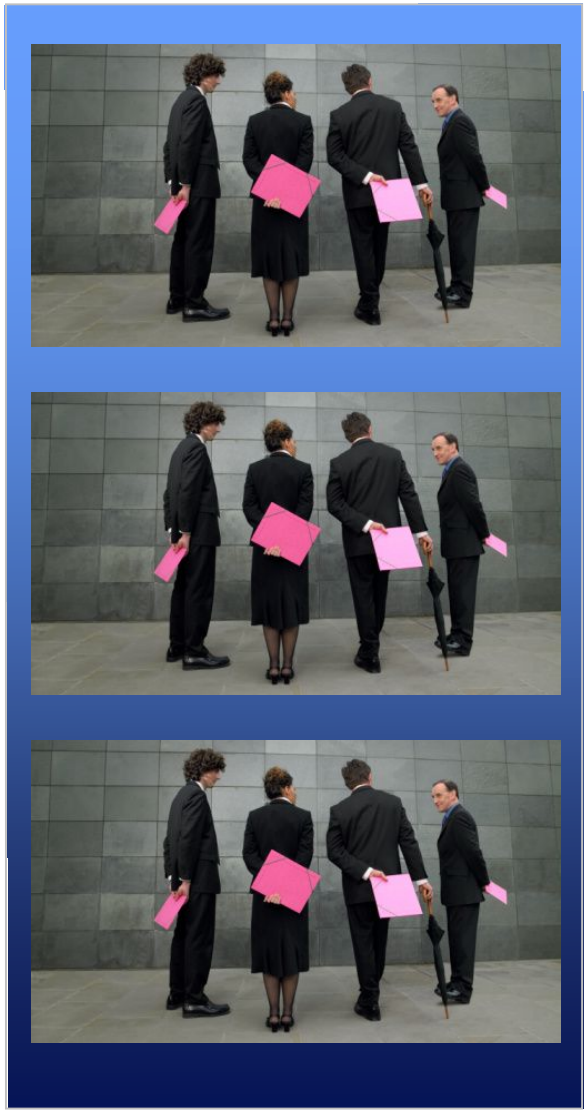
Cristina Randazzo
User Interaction
Product & Quality Perception

FIAT
SOCIETÀ PER AZIONI

AGENDA

- **Why do we design and measure perceived quality?**
- **What is PQ?**
- **Innovative instruments to measure vehicle interiors PQ**
- **Examples of application in automotive field**

Why Quality Perception?



It is fundamental to be able to **assess and predict** interior QP for having and managing a cost target.

QP will constitute the **competitive value**, the difference, compared to competitors

QP helps in creating **personalization** that it can be sold!

QP helps in **technical choices**.

Why Perceived Quality is more and more important?

CENTRO RICERCHE FIAT

What is Quality Perception?

CENTRO RICERCHE FIAT

Quality

PERFORMANCES

~~AVOID~~ NEGATIVENESS

(Warranty of functionalities. No failures)

Quality

PERCEPTION

build positiveness

Product Quality

CENTRO RICERCHE FIAT

QUALITY

PERCEIVED QUALITY

Identify Customer Car Profile dimensions and priority between them

OBJECTIVE QUALITY

SENSORIAL ANALYSIS

Identify project dimensions, by means of instrument measurement and sensorial objective dimensions

Quality Perception CRF Instruments

Checklist contains
smart box
measurements
summarized
into
touch index

Who uses Interiors Perceived Quality Checklist

CL can be used by

- design department people
- style department people
- product department people
- VOC
- brands…

Everybody who needs to try to have an interior global vision in terms of perception (not functionality or technical specs)

What is Interiors Perceived Quality Checklist

CENTRO RICERCHE FIAT

CL is an instrument that helps in observing interiors, both of proper products either of Competitors, in an OBJECTIVE way.

The output of CL is a synthetic objectivation of interiors by means of numerical criteria (the most part of) based on Customer's subjective evaluation.

Comparison can be carried out both on full interior, either on singular aspect/component.

When use Interiors Perceived Quality Checklist

CL can be used

•at very early project stage, to benchmark Competitors

•during development phase, to monitor improvements

•during product life, to consider the effects that new trends or Customers' needs could have on final product

Where use Interiors Perceived Quality Checklist

CENTRO RICERCHE FIAT

Better if into a vehicle…

Better if it is real, but several aspects can be evaluated on CAD maths too!

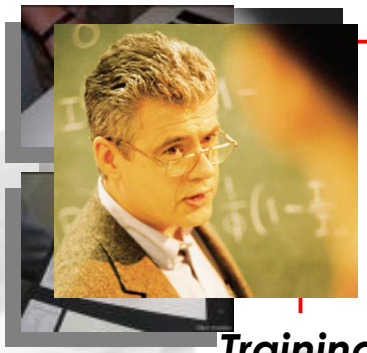
Why use Interiors Perceived Quality Checklist

Interiors are becoming more and more important and relevant for users, especially when customers spend full day into the vehicle/truck/tractor… and they show more and more interest in good quality and interior care.

For that reason, new materials, new smart solutions and new component impact can be shortly evaluated in a STANDARD way;

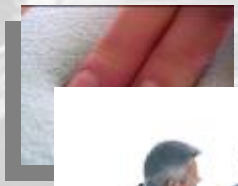
this helps in doing comparison of different interiors but always measured with the same meter.

Expert panel



Training

Panel must be continuosly UPDATED



Sensorial Evaluation

Training Procedure of Sensorial Analysis

Panel of Experts

Smart Box: Instrument for Sensorial Measurement

CENTRO RICERCHE FIAT

Each adjective has a physical sample that describes it.

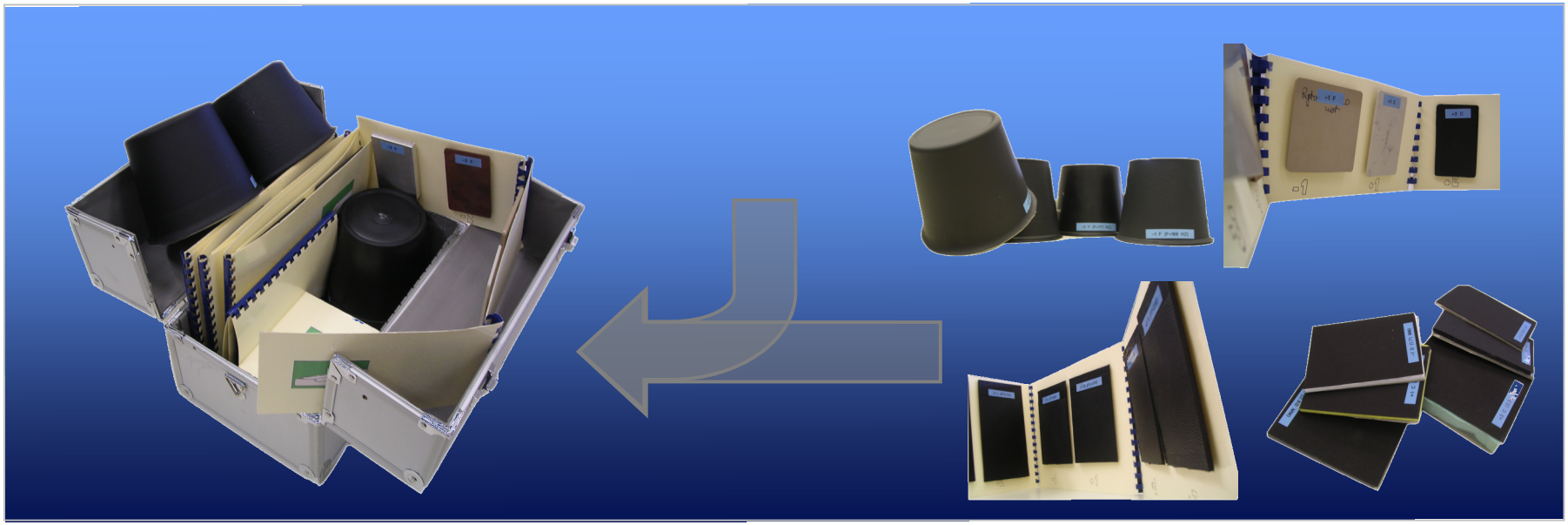
The sample is used to train, test and update the panel of experts.

Evaluation scale

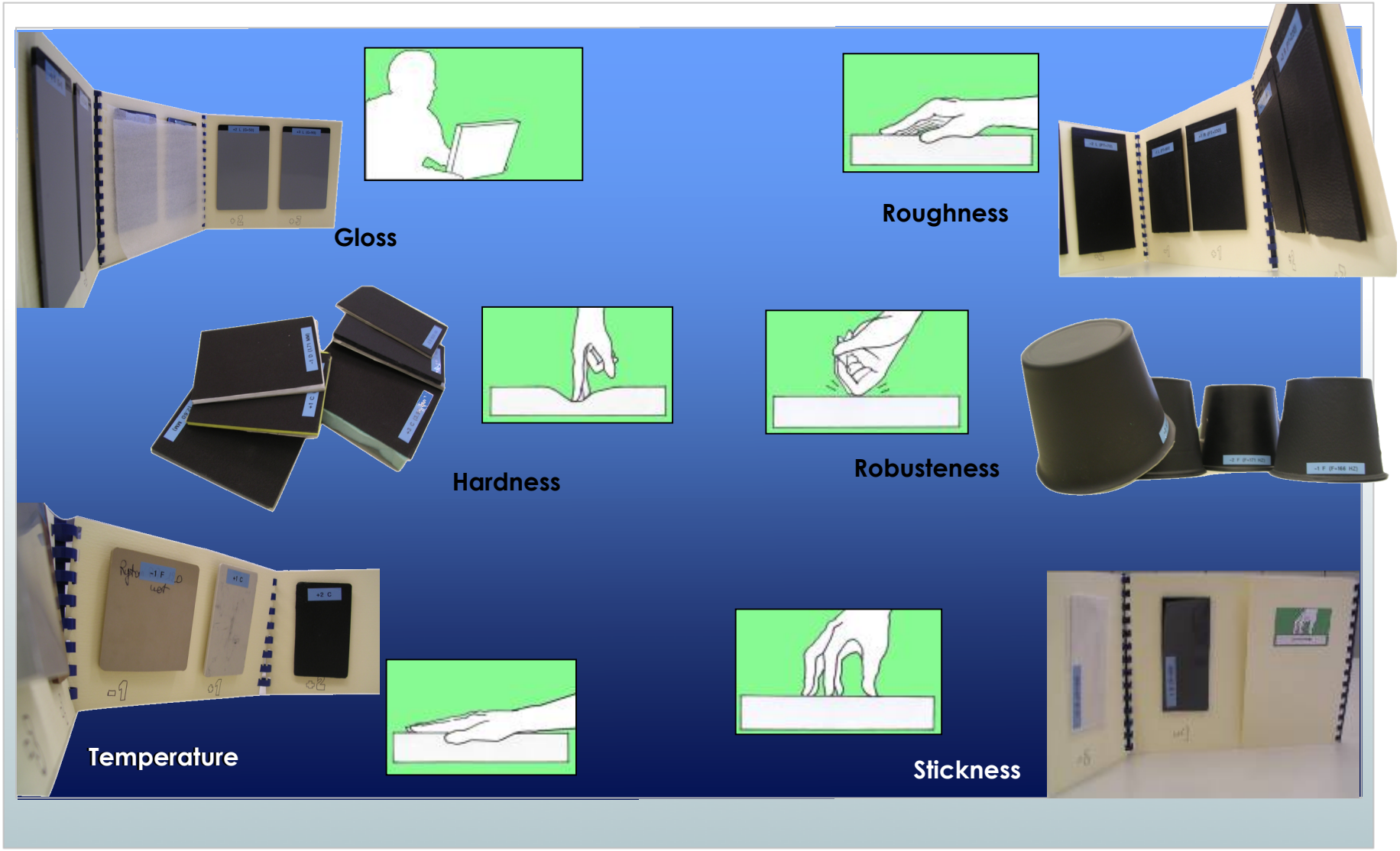
-3 -2 -1 +1 +2 +3

Correspondence between each value and each standard sample

STANDARD SAMPLES



Evaluated dimensions



CHECKLIST
TOUCH QUALITY INDEX (plastics)

CENTRO RICERCHE FIAT

MATERIAL INTERIORS QUALITY VISUAL CHARACTERISTICS	MATERIAL GLOSS-OPACITY
	MATERIAL SURFACE GRAIN
MATERIAL INTERIORS QUALITY : TACTILE CHARACTERISTICS	SMOOTH-ROUGH
	SOFT-HARD
	SLIDING-STICKNESS / GRIP

Visual index = f (*gloss; grain*)

Touch index = f (*grain; softness*)

Touch and visual quality index for plastic materials has been developed for rigid (or almost), black or dark grey samples.

Rates are expressed in **SAE scale (1 to 10)** and while

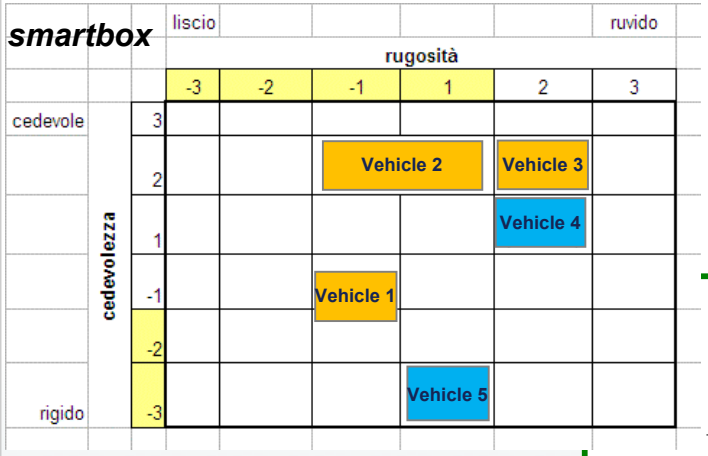
RATE = α* roughness + β*softness, where α << β

when materials are rigid, rate can show *very small* improvement for roughness changes.

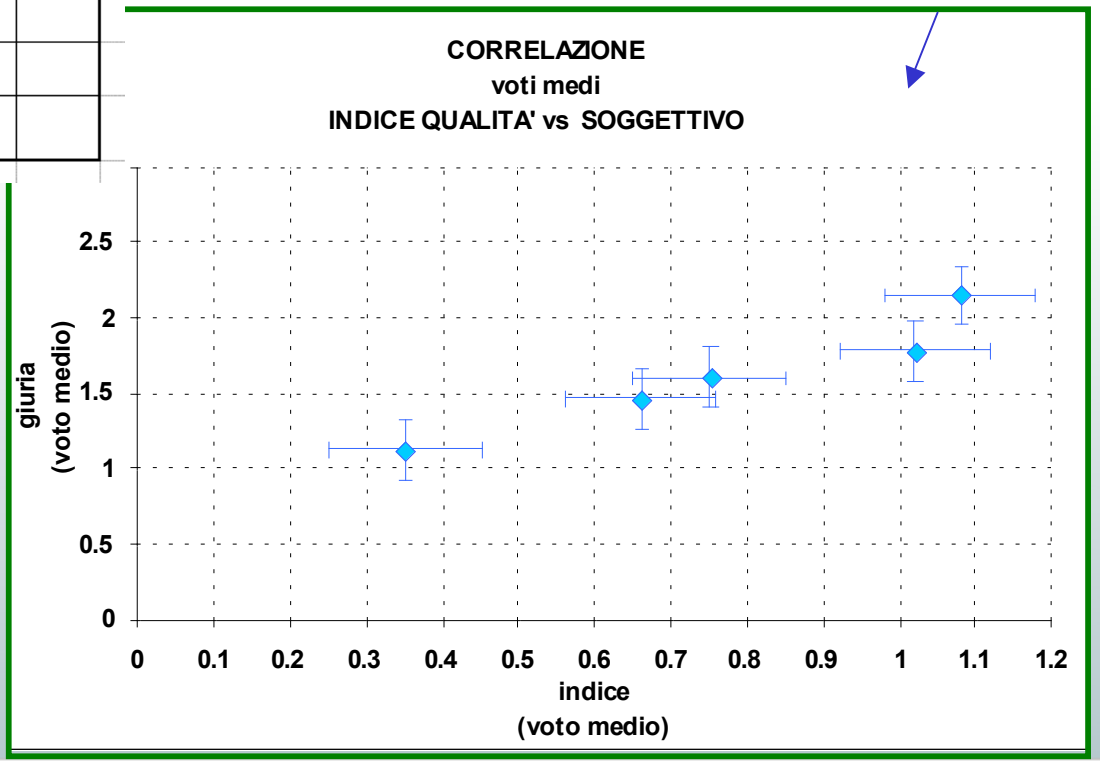
Rates must be used as comparative values when are out of validity domain.

COCKPIT – material touch pleasantness
Correlation between Touch index vs Voice of Customers

CENTRO RICERCHE FIAT

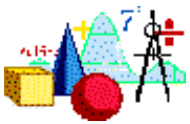


		(scala originale)	campione *ridotto*	tutti
CEDEVOLEZZA	RUGOSITA	VOTO MEDIO INDICE	VOTO MEDIO GIURIA	
+2	-1/+1	1.08	2.15	2.14
+2	2	1.02	1.78	1.44
-1	-1	0.75	1.61	1.58
-2/-1	-1	0.66	1.47	1.60
-3	+1	0.35	1.13	1.34



CHECKLIST
TOUCH QUALITY INDEX (plastics)

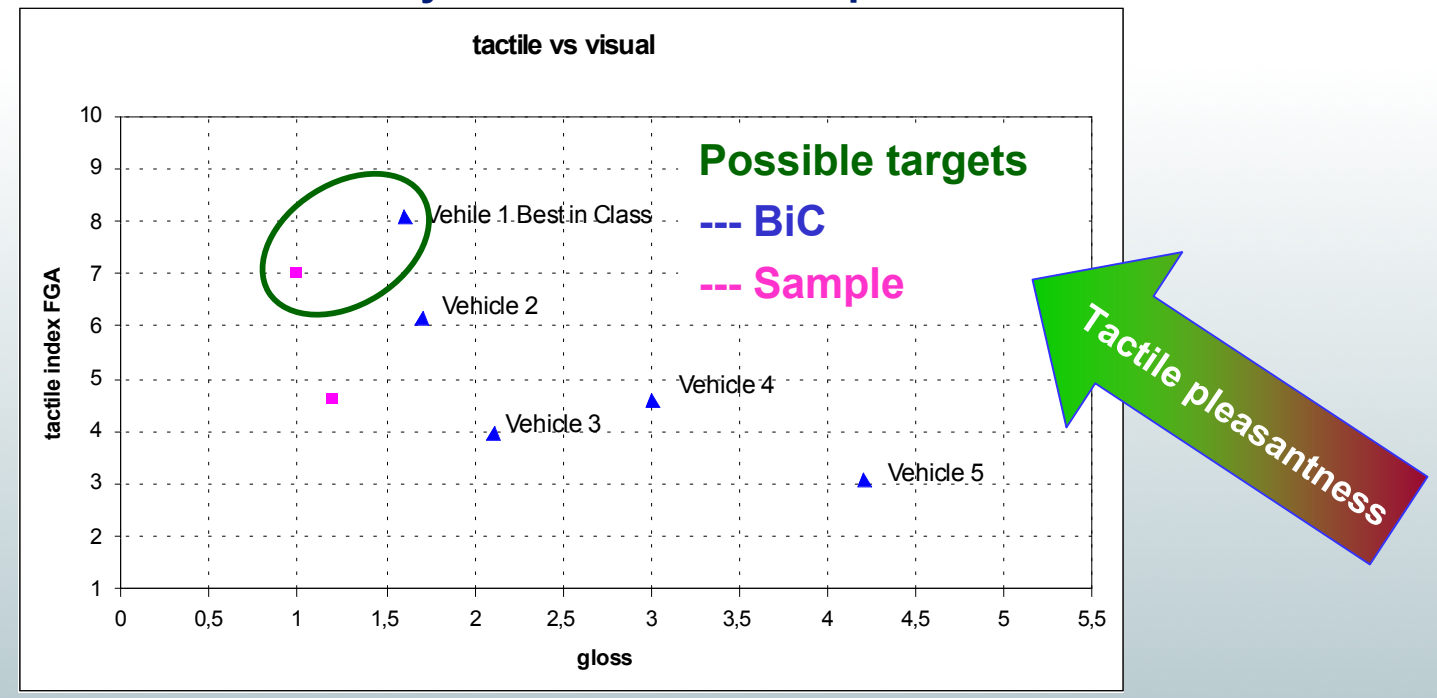
MATERIAL INTERIORS QUALITY VISUAL CHARACTERISTICS	MATERIAL GLOSS-OPACITY
	MATERIAL SURFACE GRAIN
MATERIAL INTERIORS QUALITY : TACTILE CHARACTERISTICS	SMOOTH-ROUGH
	SOFT-HARD
	SLIDING-STICKNESS / GRIP



Visual index = f (*gloss; grain*)

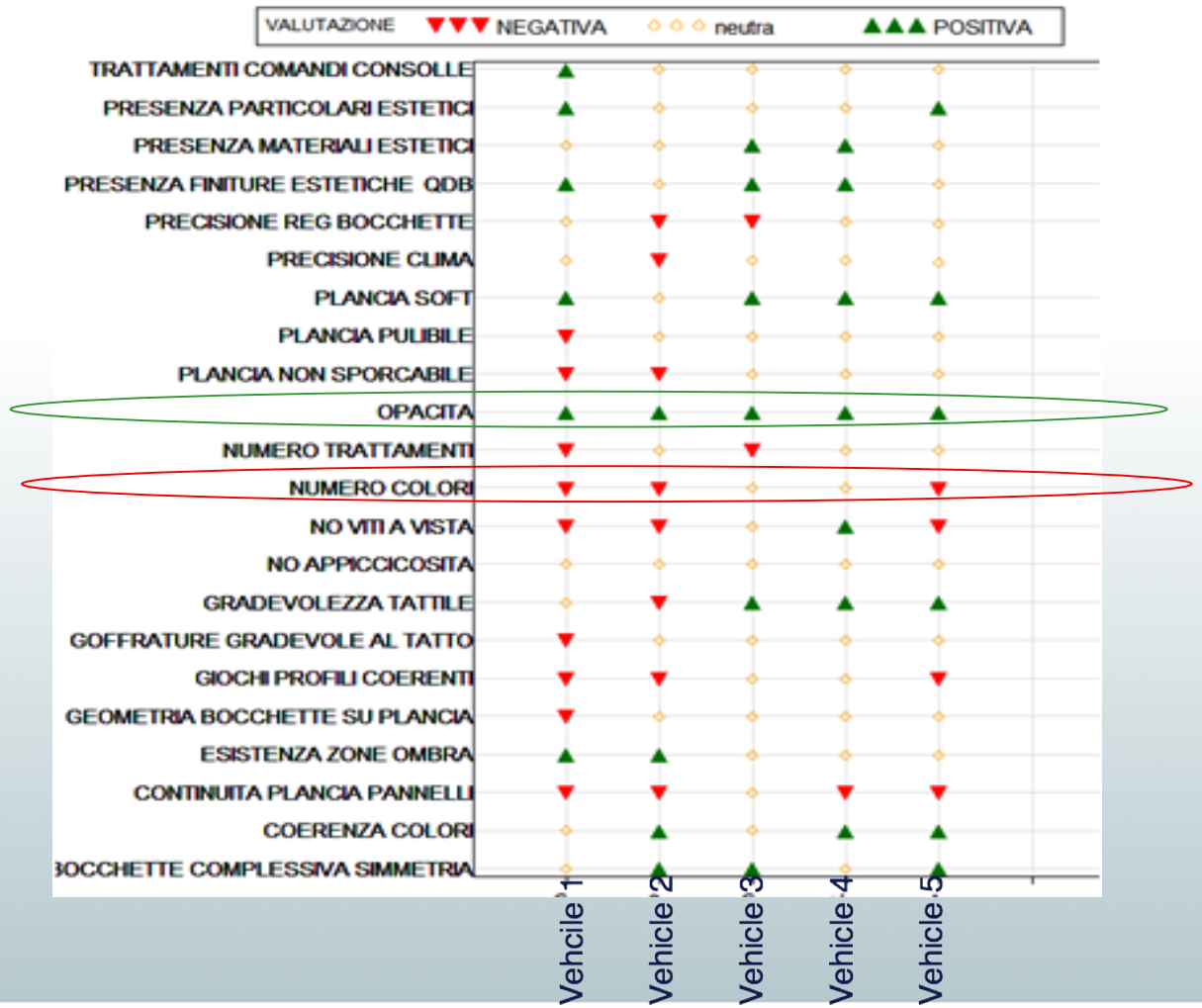
Touch index = f (*grain; softness;stickness*)

Use of Touch Quality Index for material specifications



CHECKLIST OUTPUT

1- Benchmark + strenghtness or weakness aspects



CHECKLIST OUTPUT
2- Material/Component specifications and targets

	COCKPIT		
	VEHICLE 1	VEHICLE 2	VEHICLE 3
GLOSS SENSORIAL EVALUATION MAT(-3) / SHINY(+3)	-1	-2	1
CHECKLIST criteria IF sensorial evaluation -3,-2 , mark +1 IF sensorial evaluation -1,+1 , mark 0 IF sensorial evaluation +2,+3 , mark -1			
Instrumental measurement	3,7	1,8	4

subjective dimension -VOC	*QP* *mouvement quality MANUAL devices*
Checklist item	OPENING FLUIDITY
Evaluation criteria	if fluid, +1 if doesn't bounce, 0 if bounces, -1
VEHICLE 1	1
	it opens slightly and fluid (constant speed)
VEHICLE 2	-1
	it bounces

Gloss ≤ 1.8 ± 0.2

Data are related to HCV

Use of a damped opening

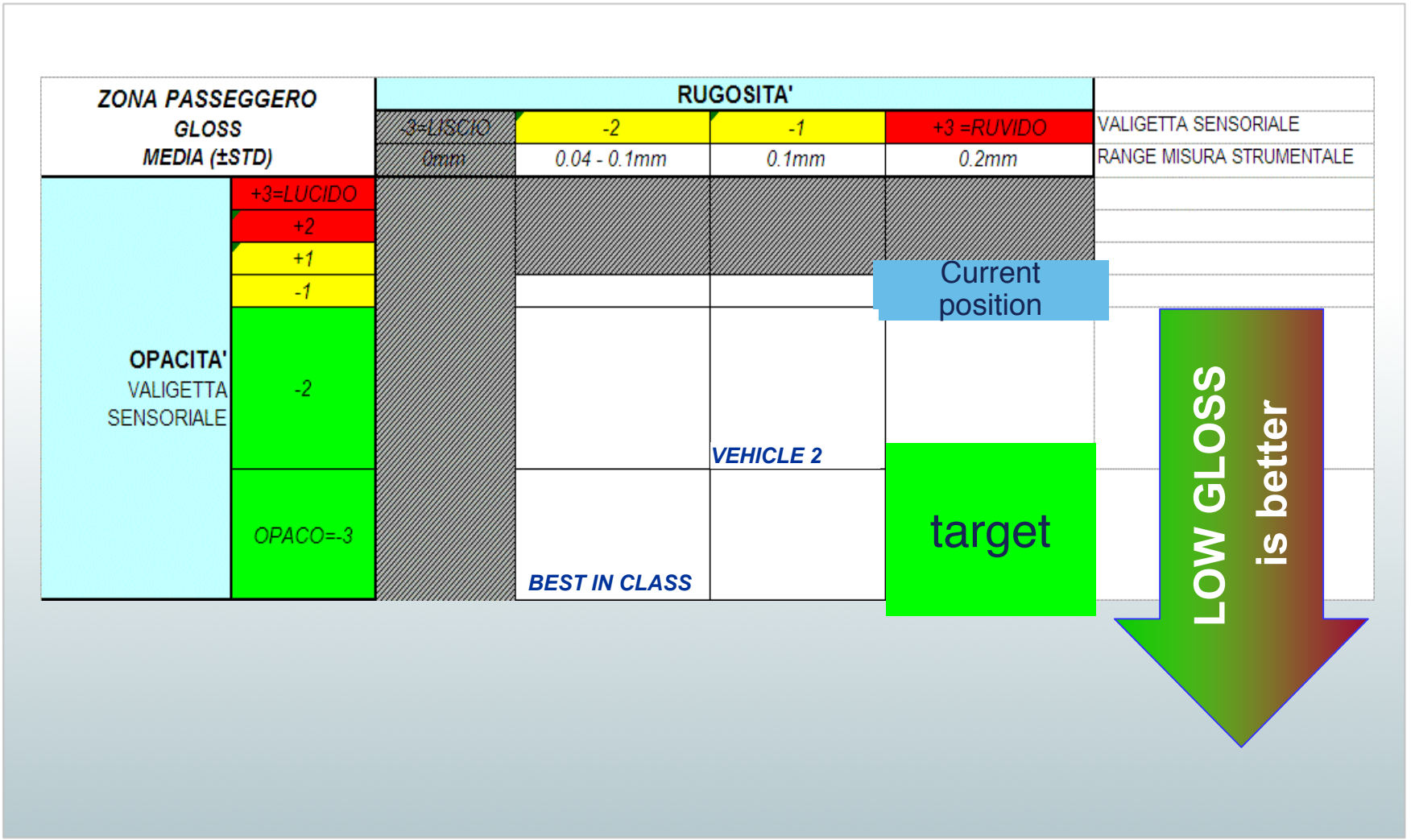
CHECKLIST OUTPUT

2- Material/Component specifications and targets

		RUGOSITA'			
		-3=LISCIO 0mm	-2	-1	+3 =RUVIDO
	+3 =CEDEVOLE				
	2				
	1				
CEDEVOLEZZA VALIGETTA SENSORIALE	-1	4,6	8.1 (***BEST IN CLASS***	7.7	6.2 (***VEHICLE 1***)
	-2		6.5	target	4.6
	-3 =RIGIDA		5	4.6 (***VEHICLE 2***)	Current position

Tactile pleasantness

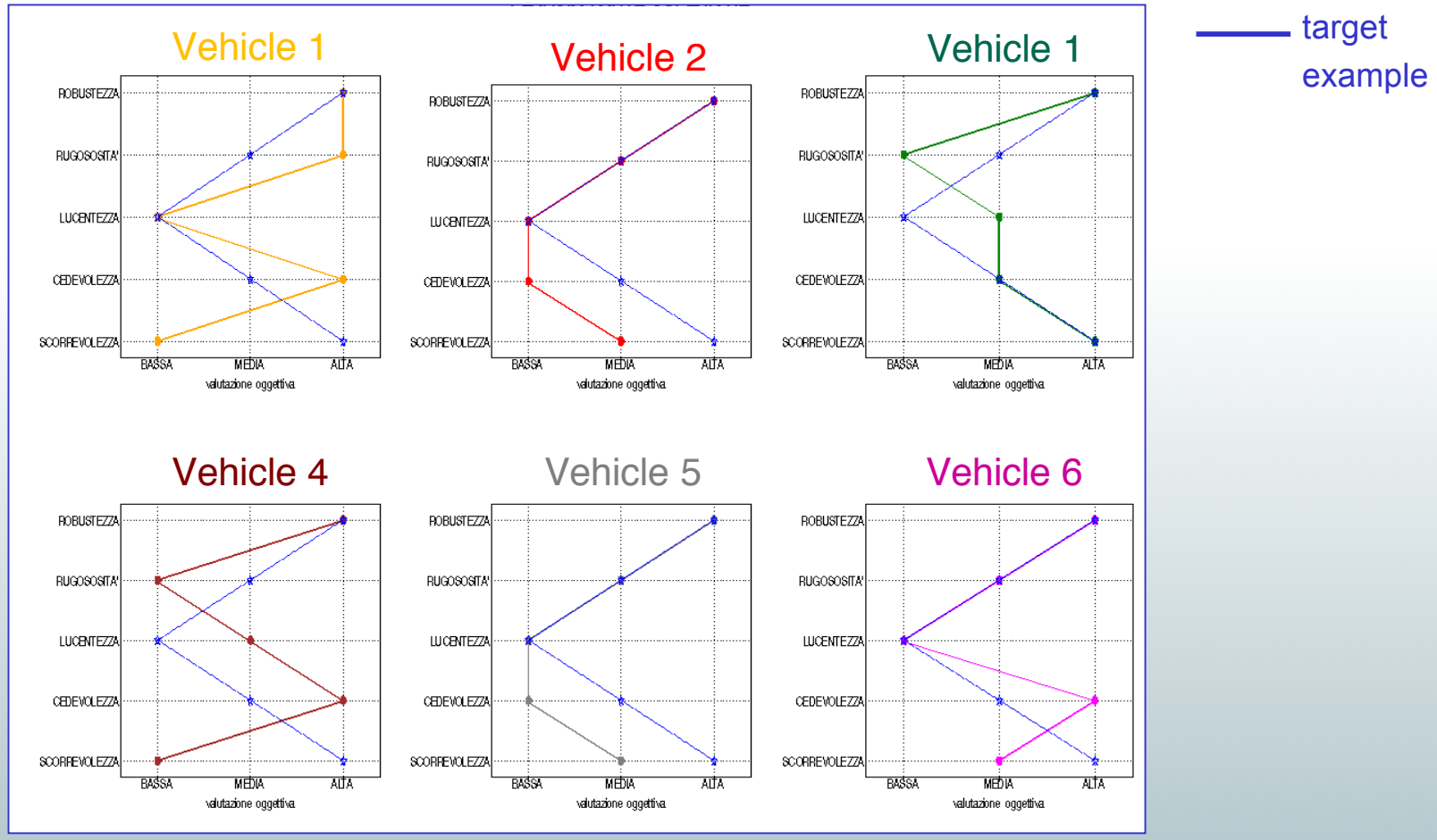
CHECKLIST OUTPUT
2- Material/Component specifications and targets



CHECKLIST OUTPUT
3- Preliminary BCMK @ car Exhibition

CENTRO RICERCHE FIAT

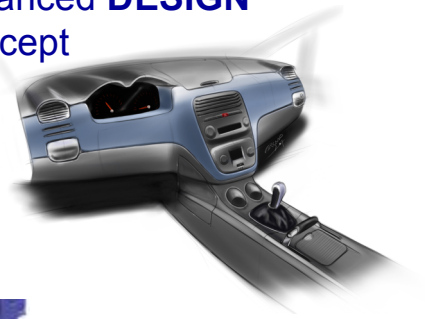
Cockpit sensorial profiles

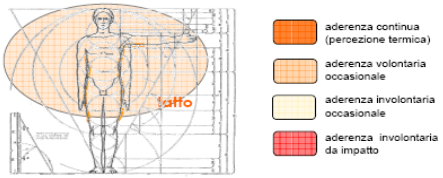


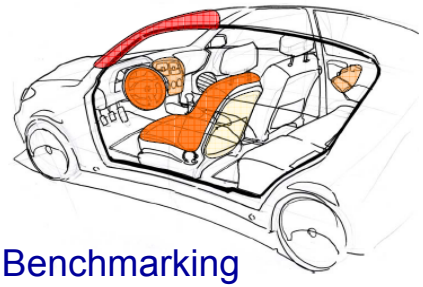
Application of Perceived Quality
Case study: dashboard

CENTRO RICERCHE FIAT

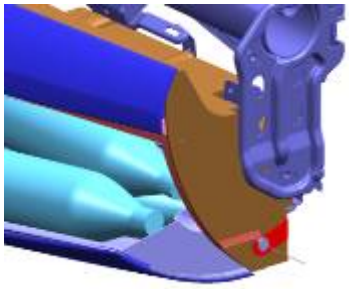
Advanced **DESIGN** Concept



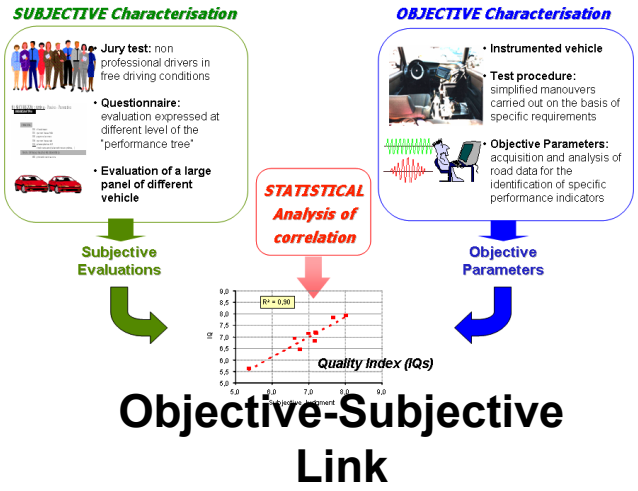




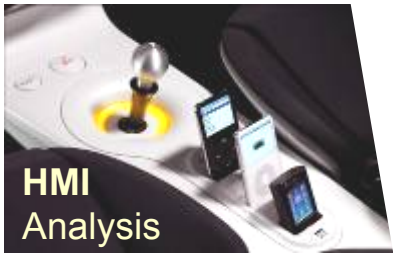
Benchmarking **MATERIALS**



STORAGE Analysis



Objective-Subjective Link



HMI Analysis

CONCEPT Analysis

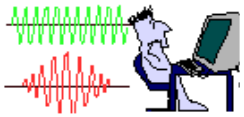
PQ - Methodology for Objective Representation

CENTRO RICERCHE FIAT

SUBJECTIVE Characterisation

- **Jury test:** ranking & rating about different aspects investigated
- **Questionnaire:** evaluation expressed at different level of the "performance tree"
- **Evaluation** of a panel of different vehicles

OBJECTIVE Characterisation

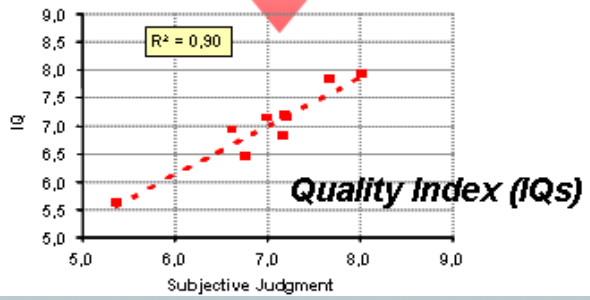


- **Objective Parameters:** acquisition and analysis of data for the identification of specific performance indicators
- **Test Procedure:** instrumental measurement and objective description (CK List)

STATISTICAL Analysis of correlation

Subjective Evaluations

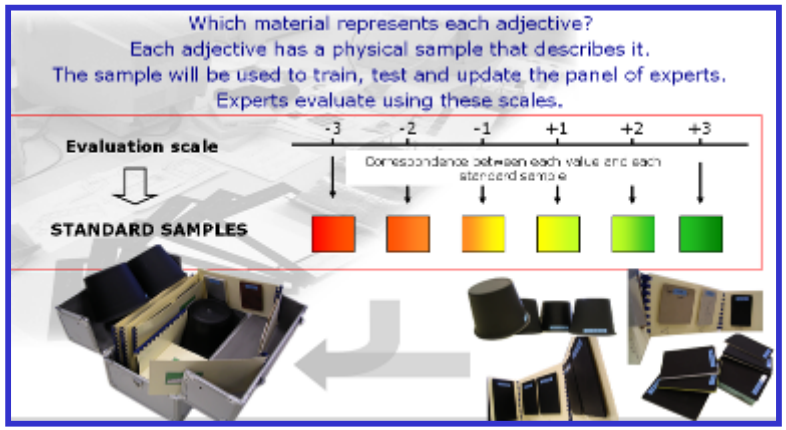
Objective Parameters



Quality Index (IQs)

OBJECTIVE PARAMETERS

CENTRO RICERCHE FIAT



COLD - WARM

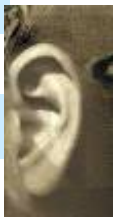
ROUGH - SMOOTH

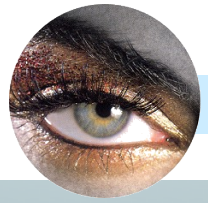
HARD - SOFT

ADHESIVE – SLIDING

MultiSensorial Analysis

RESISTANT- FRAGILE

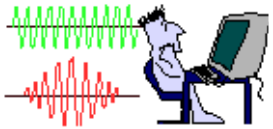




OPAQUE - GLOSSY

OBJECTIVE Characterisation

- **Objective Parameters:** acquisition and analysis of data for the identification of specific performance indicators



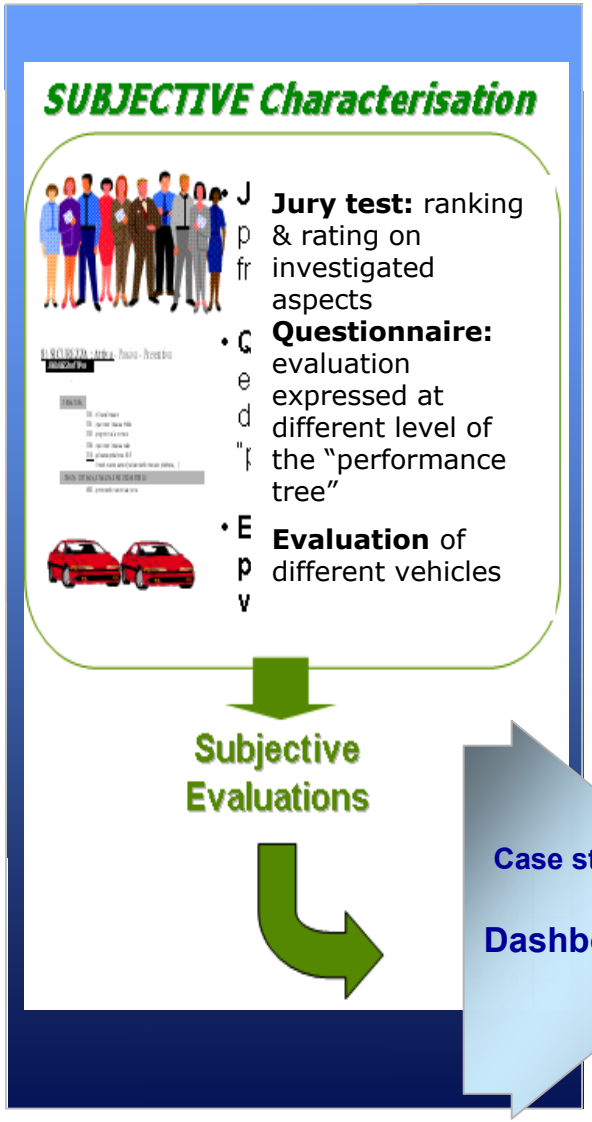
- **Test Procedure:** instrumental measurement and objective description (CK List)

Objective Parameters

Case study:

Dashboard

Subjective Analysis



Subjective analysis

- 30 owners indicate their perception of quality/lack of quality
- Test in static conditions (on board, as memory stimulus)

TARGET:

- Identification of critical points & complaining

Subjective analysis – "First Impact" – B segment customers

- 40 customers of B type vehicle (profile corresponding to client target)
- Comparative tests vs Best Competitors

TARGET:

- Identification of guide-lines (which competitor fit the best to customer's needs?)

Conclusions

Perceived quality

..is the footprint…

….for each development path!

CENTRO RICERCHE FIAT

THANK YOU FOR LISTENING...