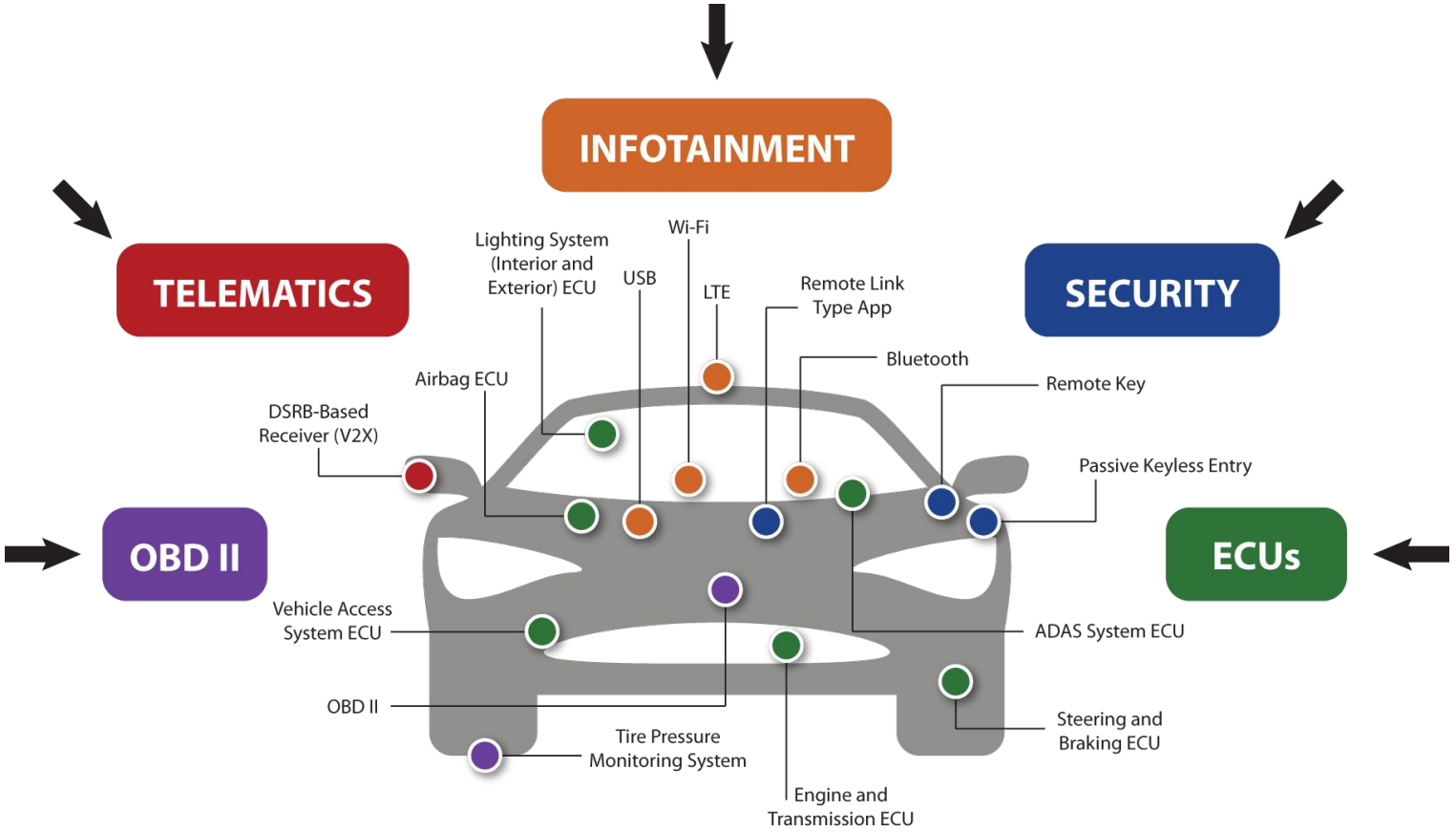
Car drivers' privacy concerns and trust perceptions

Giampaolo Bella ✻, Pietro Biondi ✻, Giuseppe Tudisco ✻
giamp@dmi.unict.it , pietro.biondi@phd.unict.it , giuseppe.tudisco@studium.unict.it
✻ Dipartimento di Matematica e Informatica, Università di Catania, Catania, Italy



Source: teledynelecroy.com

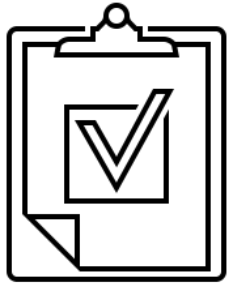
RQ1: Are drivers adequately concerned about the privacy risks associated with how that their car and its manufacturer treat their personal data?

RQ2: Do drivers adequately perceive the trustworthiness of their car, in terms of security especially?

Task 1: Encode privacy concerns and trust perceptions through questionnaires
Task 2: Administer the questionnaires through crowdsourcing
Task 3: Capitalise on outcomes of questionnaires

Questionnaire design:

- Basic information
- Capturing concerns on privacy
- Capturing perceptions of trust

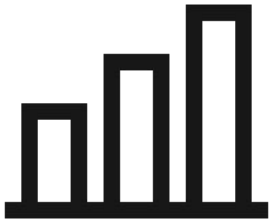


Crowdsourcing

- Choice of the platform (Prolific vs MTurk)
- Choice of the subjects
- Sample of 1101 respondents

Study of statistical correlations

Correlation coefficients allow us to establish whether there are any relationships between different data sets



The answers are catalogued and statistically studied by analysing indexes of central tendency and correlation coefficients

Simplifying the analysis: grouping the 7 levels of agreement into 3 categories

Levels of agreement	Categories
Strongly agree	Agreeing
Agree	
Somewhat agree	
Neither agree nor disagree	Undecided
Somewhat disagree	Disagreeing
Disagree	
Strongly disagree	

Q1: evaluates the driver's knowledge on modern cars
Q2: asks respondents whether or not they agree that modern cars are similar to modern computers

Q1, Q2 answers and their statistics

Knowledge level	[%]
Knowledgeable about modern cars	55
Average knowledge	16
Not knowledgeable about modern cars	29
Mean	4.37
Median	5
Standard Deviation	1.55

Agreement level	[%]
Agreeing	72
Disagreeing	14
Undecided	14
Mean	5
Median	5
Standard Deviation	1.35

Q3: asks participants to select all the categories of data they think a car collects

Collected data	[%]
Personal data about the driver	56
Public data about the driver	54
Public data not about the driver	47
Special categories of personal data about the driver	13
Financial data about the driver	11
No data at all	8

Q4: asks participants whether they think it is necessary to collect personal data to achieve full vehicle functionality

Agreement level	[%]
Agreeing	27
Disagreeing	54
Undecided	19
Mean	3.35
Median	3
Standard Deviation	1.58

Q5: asks participants whether personal data collected by a modern car about its driver needs to be transmitted over the internet

Agreement level	[%]
Agreeing	21
Disagreeing	65
Undecided	14
Mean	2.97
Median	3
Standard Deviation	1.67

Q6: asks whether participants agree that a modern vehicle safeguards the life of its driver

Agreement level	[%]
Agreeing	77
Disagreeing	8
Undecided	15
Mean	5.26
Median	5
Standard Deviation	1.20

Q7: asks participants whether a modern car protects its driver's personal data better than its driver's life

Agreement level	[%]
Agreeing	18
Disagreeing	56
Undecided	26
Mean	3.26
Median	4
Standard Deviation	1.46

Q8: asks whether the data collected from the vehicle is legitimately processed according to the relevant regulations

Agreement level	[%]
Agreeing	44
Disagreeing	25
Undecided	31
Mean	4.28
Median	4
Standard Deviation	1.31

Q9: asks if participants believe that the personal data collected is systematically analysed and evaluated using automated processes (including proling)

Agreement level	[%]
Agreeing	42
Disagreeing	32
Undecided	26
Mean	4.07
Median	4
Standard Deviation	1.43

Q10: asks whether the participants feel that the data transmitted over the Internet are protected by adequate technologies

Agreement level	[%]
Agreeing	46
Disagreeing	32
Undecided	22
Mean	4.19
Median	4
Standard Deviation	1.49

Correlations

Correlation	Meaning
Q1 & Q2	Participants who are knowledgeable about modern cars also think that modern cars are similar to modern computers
Q1 & Q4	Those who consider themselves informed about modern cars also believe that the data collected by the car is necessary for the full functioning of the car
Q1 & Q6	Those who are knowledgeable about modern cars think that a modern car safeguards its driver's life
Q4 & Q5	Who thinks that it is necessary to collect personal data for the full functioning of their vehicle also think that this data should be transmitted over the Internet
Q4 & Q8	Those who agree to the collection of personal data also think that the data are processed legitimately in a manner consistent with the relevant regulations
Q6 & Q8	Those who thinks that a modern car safeguards its driver's life also think that the personal data collected are processed legitimately according to the relevant regulations in force
Q7 & Q10	Who thinks that a modern car protects its driver's personal data better than it safeguards its driver's life also think that the personal data are protected by adequate technology when the vehicle transmits it over the Internet
Q9 & Q5	Who thinks that their data are analysed by automatic evaluation processes also think that they are transmitted over the Internet
Q10 & Q4	Those who thinks that the personal data collected by the vehicle is necessary for the full functioning of the car also think that their data is adequately protected when transmitted over the Internet

- We believe that the privacy concerns that arose are insufficient in the present technological setting
- We would have found it more positive if drivers exhibited higher awareness on the personal data involved through their driving, on how treating such data is fundamental for delivering driver-tailored services
- A somewhat logical explanation of low privacy concerns could be a high trust on security, but we were surprised once more that also trust on security was somewhat low

Overall result: Privacy is generally misunderstood by drivers, so it is necessary to provide them with more information to raise awareness and thus form correct privacy concerns and consequently adequate perceptions of trust

Car drivers' privacy concerns and trust perceptions

Thank you for your attention

Giampaolo Bella*, Pietro Biondi*, Giuseppe Tudisco*
giamp@dmi.unict.it , pietro.biondi@phd.unict.it , giuseppe.tudisco@studium.unict.it
* Dipartimento di Matematica e Informatica, Università di Catania, Italy