

Hypotheses and Experimental Design

Developing the FOT Methodology

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FOT

Bringing intelligent vehicles to the road

Main considerations

Participants:

- ⊗ Selection criteria
- ⊗ Attrition and replacement
- ⊗ Non-participation

Definition of the experimental design

- ⊗ Statistical power analysis
- ⊗ Identification of the driver
- ⊗ Baseline driving
- ⊗ Treatment order
- ⊗ Inclusion of a control group

Participant selection

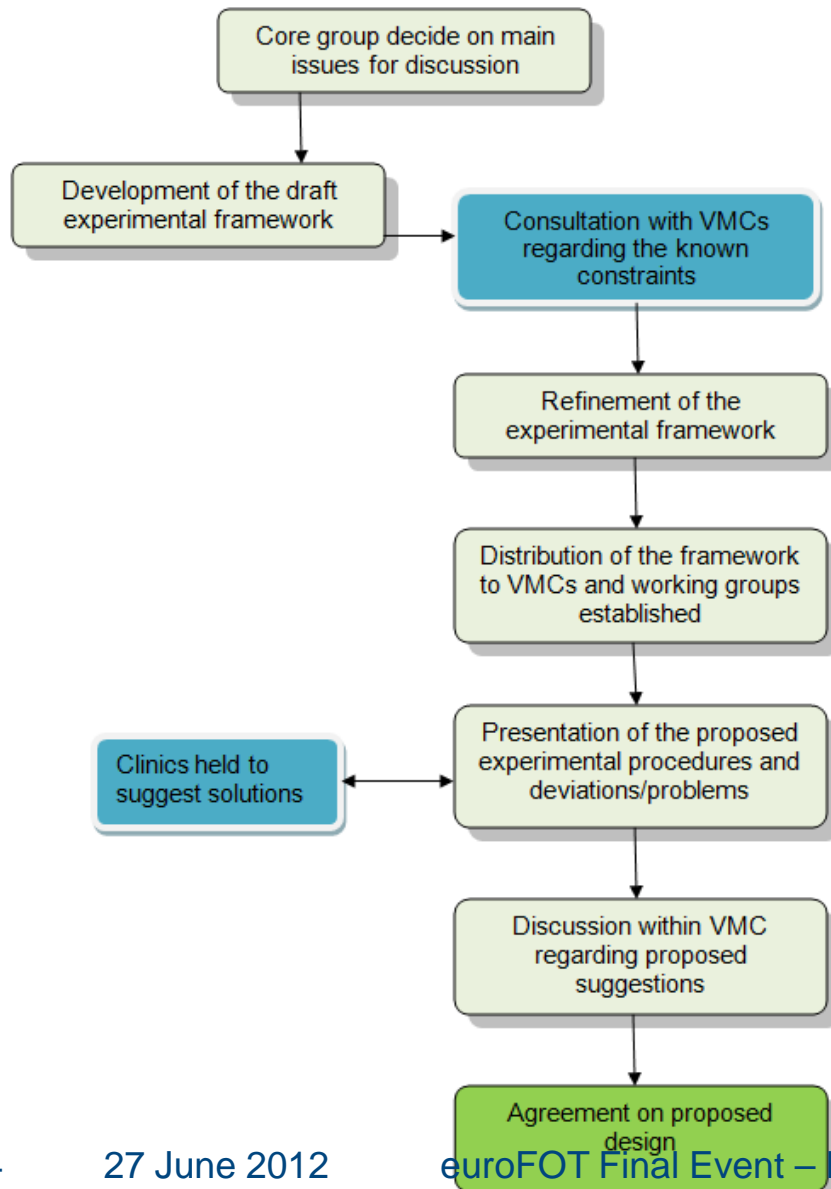
It is usual to consider how representative the participants are for:

- ⌘ Those drivers who would buy such a vehicle with those specific systems or
- ⌘ The driving population in the country in which the FOT is taking place or
- ⌘ The wider European driver population

But euroFOT employs a quasi-experimental

- ⌘ not so much at estimating parameters within a certain population
- ⌘ but at demonstrating the effect of a system on safety relevant behavioural characteristics.

Defining the experimental framework



- ♂ Top-down procedure, setting out various recommendations & assumptions.
- ♂ Face-to-face clinics helped us to brainstorm and use the expertise of the consortium
- ♂ Produce a design that would enable the collection and analysis of data that could be used to produce statistically reliable results.

Identifying the constraints

- ⌘ Budget –as in all research projects, the major deciding factor when developing the experimental procedures.
- ⌘ Vehicles – the types of vehicles depended largely on the availability of the functions on a particular model. The model may be more attractive to a particular group of drivers.
- ⌘ Economic climate – European new passenger car sales fell 7.8 percent in 2008, the high-end markets suffering most. This reduced the available participants.
- ⌘ Drivers – drivers were mostly self-selected
- ⌘ Multiple functions –eight functions under consideration in euroFOT are often sold in bundles – groups of functions.



Power analysis

When planning a FOT, three interrelated questions arise regarding the experimental design:

- ⌘ how large is the effect of the system under investigation,
- ⌘ how many cars have to be equipped to find this effect and
- ⌘ how long do they have to be driven

Power analyses was undertaken to determine the required sample size in order to determine how likely the statistical test will be able to detect effects of a given size in a particular situation.

Power analysis conclusions

- ⌘ Simulations showed that with at least 120 participants with a mileage of 15k per year, there is sufficient power (even with the small effect size that can be expected in a FOT)
- ⌘ Increasing sample size should take precedence over longer data collection periods:

LESS POWER

12 months with 60 drivers

MORE POWER

6 months with 120 drivers

- ⌘ Power is also increased by reducing the variance between participants - choose a homogenous group of drivers. However this is at the cost of generalisability of the results.
- ⌘ Baseline & treatment phases should as equal in length as possible

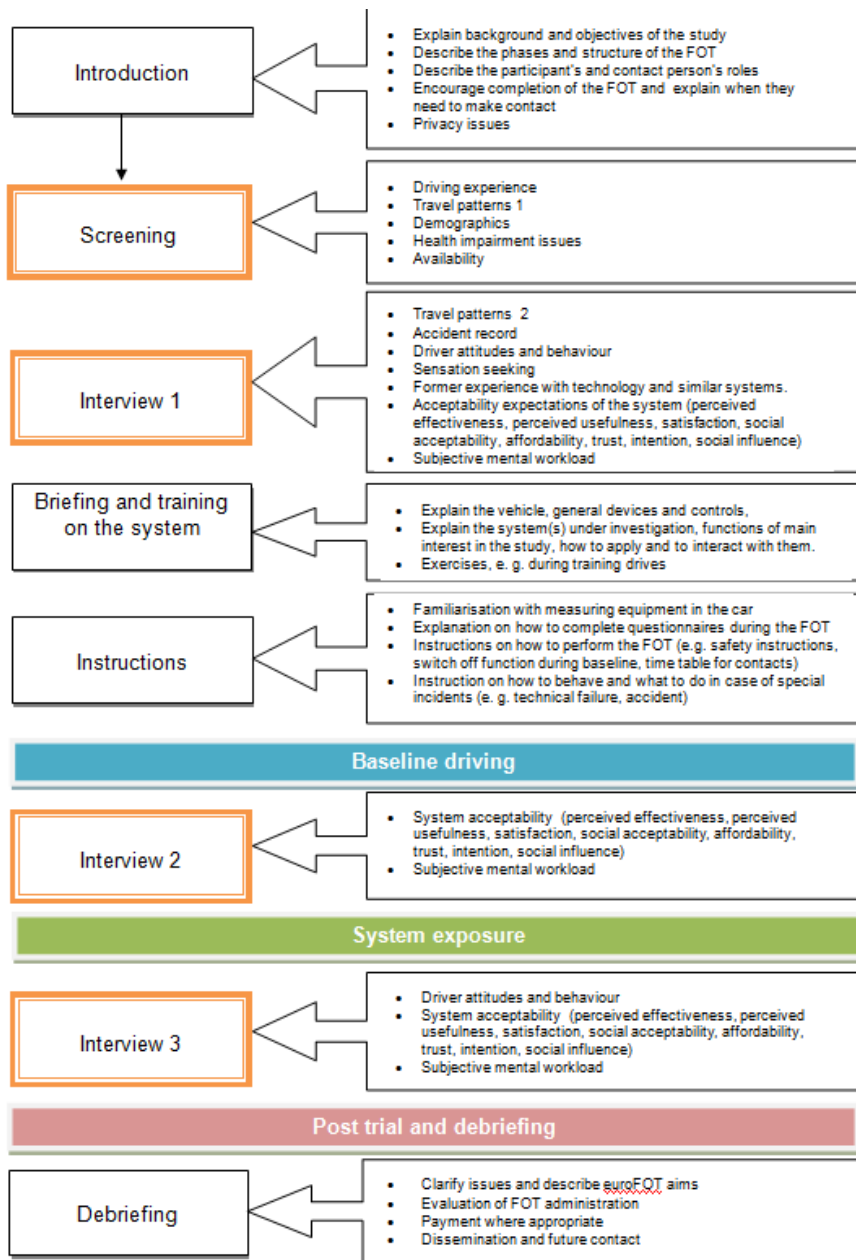
Further issues

- ⌘ Baseline – how to ensure a “no system period” (e.g. Italian test site)
- ⌘ Experimental designs being developed prior to the completion of the hypotheses
- ⌘ Some uncertainties about the actual systems and the combinations of systems
- ⌘ Measuring and quantifying “exposure” to the system

BUT

- ⌘ “As far as possible” harmonisation of experimental designs was achieved

Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12
Baseline			Treatment								



Harmonised questionnaires

- ⌘ All test sites used the same core questionnaires (same scales, items etc) with flexibility for additional items
- ⌘ Translation was carried in-country
- ⌘ Different VMCs had different strategies (and success rates!) for encouraging questionnaire completion.

How has this procedure helped euroFOT?

- ⌘ The approach taken has, within the identified constraints, enabled us to develop experimental procedures that are both robust and unified
- ⌘ With regards to the experimental designs, we have been able to achieve a coordinated effort in realising a common experimental method (some deviations are unavoidable due to external constraints)
- ⌘ Developing the questionnaires that provide the subjective data in a unified format for use in the impact analysis at the end of the project.

8 Functionalities, 28 Partners, 1000 Vehicles

1 Field Operational Test, 8 Functionalities

28 Partners, 1000 Vehicles, 1 Field Operational Test

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