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Reference	FP08
Project Title	Task Force - Hygiene procedures in test with research persons
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Project Duration	2020-09-01 to 2020-12-31
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Summary

Since the rapid outbreak and continued global spread of the Coronavirus Disease (COVID-19) in 2020, aspects of much of our day-to-day life in society has been impacted – our workplaces are no exception. Due to the novelty of COVID-19 to health officials in Sweden and around the world, standardized guidelines on how to safely proceed with business activities that require the sharing of physical spaces and/or equipment between individuals has yet to be established. In anticipation of this pandemic being an ongoing issue, a task force was assembled to help address this gap. The task force was comprised of transport industry professionals in Sweden that have a role in conducting research and testing that would currently be deemed to place individuals at risk of contracting the virus if one of the involved actors were to be an active carrier of the virus. Therefore, the goal of this task force was to help establish a set of general guidelines to consider when attempting to mitigate the risk of contagion while performing research or testing activities at our respective corporate facilities. Questions related to "How can experiments involving test persons in vehicles, driving simulators, virtual-reality studios, or similar test facilities continue?", "What safety procedures should we consider to introduce in order to ensure proper hygiene for the individuals involved?", "Is it required for drivers to wear a face mask?", and "How do we implement physical distancing provisions pre- and post-experiment interviews?" were addressed.

Partners in the Task Force were VTI (coordinator), Volvo Group Trucks Technology, Autoliv, Veoneer, RISE and Scania.

Task Force - Hygiene procedures in test with research persons

1. Background

Since the rapid outbreak and continued global spread of the Coronavirus Disease (COVID-19) in 2020, aspects of much of our day-to-day life in society has been impacted – our workplaces are no exception. Due to the novelty of COVID-19 to health officials in Sweden and around the world, standardized guidelines on how to safely proceed with business activities that require the sharing of physical spaces and/or equipment between individuals has yet to be established. In anticipation of this pandemic being an ongoing issue, a task force was assembled to help address this gap. The task force was comprised of transport industry professionals in Sweden that have a role in conducting research and testing that would currently be deemed to place individuals at risk of contracting the virus if one of the involved actors were to be an active carrier of the virus. Therefore, the goal of this task force was to help establish a set of general guidelines to consider when attempting to mitigate the risk of contagion while performing research or testing activities at our respective corporate facilities. Questions related to "How can experiments involving test persons in vehicles, driving simulators, virtual-reality studios, or similar test facilities continue?", "What safety procedures should we consider to introduce in order to ensure proper hygiene for the individuals involved?", "Is it required for drivers to wear a face mask?", and "How do we implement physical distancing provisions pre- and post-experiment interviews?" will be addressed.

Although the guidelines outlined in this report will not provide absolute certainty in mitigating all risk, it should however help outline standard practices to consider that will help reduce the risk. As this health issue is a concern for all organizations having activities involving research persons, we proposed and were accepted to undertake a task force at SAFER to jointly discuss and share hygiene protocols/procedures for use in tests with research persons.

2. Project set up

2.3 Purpose

Traffic safety research is heavily dependent on studies using real people to collect data on current and future traffic systems. It must be possible to complete this research even during difficult pandemic situations.

The purpose of this project was:

- To establish a 'new normal' by consolidating research and testing procedures to consider that will help reduce the risk of contracting the virus by all participating actors in tests with research persons.
- To share the result with all SAFER partners.
- To integrate the results in the participants respective organizations.

2.4 Objectives

- To gather SAFER partners that are interested in establishing practical and appropriate solutions
- To initiate Task Force meetings to facilitate ongoing discussions and sharing of procedures to and from all participating members of their respective organizations, and to follow up on project progress.
- To present project results on a SAFER lunch seminar.
- To submit a SAFER Pre study final report.

2.5 Project period

2020-09-01 to 2020-12-31.

2.6 Partners

- VTI (coordinator, Arne Nåbo)
- Volvo Group Trucks Technology (Emma Johansson)
- Autoliv (Arun Muthumani)
- Veoneer (Annika Larsson)
- RISE (Mikael Söderman)
- Scania (Musa Hadi, Stas Krupenia)

3. Method and activities

The partners collected information on health procedures used by similar organizations and organizations in their networks. An analysis was done on formal and legal responsibilities for health issues in tests with research persons.

The partners contributed with information on health procedures used in their respective organizations due to Covid-19. The collected material has been shared with all partners so that prompt action could be taken in order to re-start their testing using adequate health procedures.

The Task Force met regularly (web meetings) to discuss collected materials and how it could be used in order to develop and integrate health procedures into their respective organizations.

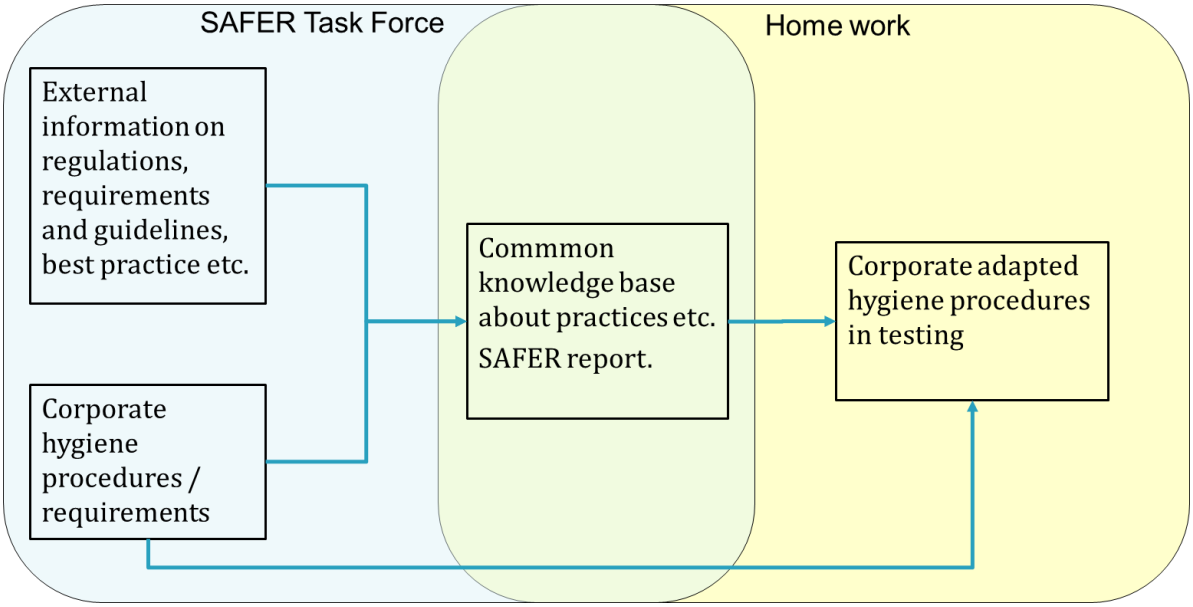

Figure 1 Information from external and own organizations was collected and shared among the project partners. Each partner then did their own homework integrating adequate health procedures in their own respective organization.

4. Results and Deliverables

Responsibilities

We found that the responsibility is divided among several actors. We looked at three sources of legal and regulatory information:

Folkhälsomyndigheten[1] (Public Health Agency of Sweden) states that it is the responsibility for all people to stop spreading the disease covid-19. "*Det är allas ansvar att hindra spridningen av sjukdomen covid-19*". They recommend measures like wash hands, physical distancing, use bike or walk instead of public transport, avoid crowding etc.
The important take away for us is that all people involved in tests have a responsibility, research persons included.

Arbetsmiljölagen[2] (The Work Environment Act) contains rules about the employers´ responsibilities. The employer is responsible for safe operations within their organization and that all personnel has proper training to act safely. Thus, the employer is responsible for that adequate health procedures can be carried out in their facilities and that all personnel has adequate training and that visitors (such as research persons) have all information needed.

Etikprövningsmyndigheten[3] (The Ethics Review Authority) considers the human in research. For most studies where research persons participate an application for ethical approval must be completed. *Etikprövningsmyndigheten* clearly points out that the responsible researcher (the applicant) is responsible for the research persons wellbeing in the actual study. Thus, the study design and its execution must allow for appropriate health procedures to be applied.

In summary, there are a lot of people and disciplines that all have responsibility to stop spreading disease in tests with research persons. Examples: Test persons, responsible researchers, test leaders, safety drivers, laboratory staff, vehicle technicians, project leaders, participants recruiters, cleaning staff, HR department, work environment committees (*arbetsmiljökommitté*), safety representatives (*skyddsombud*), occupational health services (*företagshälsovård*) reception, as well as front desk staff.

[1] https://www.folkhalsomyndigheten.se/
[2] https://www.av.se/en/work-environment-work-and-inspections/acts-and-regulations-about-work-environment/the-work-environment-act/
[3] https://etikprovningsmyndigheten.se/

Collected documents

All partners contributed in collecting information and material both from internal- and external sources. Below is a list of collected documents and the source.

Table 1 Collected and reviewed documents and the source on aspects of Health procedures in testing.

Source:	**Document:**
Autoliv	Autoliv Pandemic Response-Smart Start Playbook-04SEP2020.V15.
Ford	Covid-19 VIRTTEX Study Prep & Participant Handling Modifications.
Hamilton Health Sciences	HHSC-COVID-19-Authorization for Research Visits October 2020. HHSC-COVID-19-Pre-Screening Flowchart October 2020. HHSC-COVID-19-Pre-Screening Questions October 2020.
ITS Leeds	CLEANING PROCEDURE FOR PARTICIPANT AND OPERATOR. Covid-19 instructions Clean. Revised Participant Protocol – Clean. UOLDS Full Car Simulator COVID-19 Mitigation.
NADS	Covid-screening_paper-version. Human Subjects Testing in the Covid Era.
RISE	Precautions Covid-19 experiments, DRAFT.
Skånes universitetssjukhus	Process_prio_start kliniska studier SUS_Covid _final20200605[1] (1).
Veoneer	Veoneer-Corona-riktlinjer-cleaning. Veoneer-Corona-riktlinjer-social-distansering. Veoneer-Corona-safety-for-visitors.
Volvo GTT	Volvo GTT health measures.
VTI	informationsmöte - Datainsamling som involverar forskningspersoner under pandemin. Smittskydd_simulatorförsök VTI_2020-07-01_utgåva 1.1. VTI_Procedur_VR-studie_figur.

Good recommendations were also obtained from *Arbetsmiljöverket*[4], *Prevent*[5] and *Ingenjören*[6].

[4] https://www.av.se/halsa-och-sakerhet/sjukdomar-smitta-och-mikrobiologiska-risker/smittrisker-i-arbetsmiljon/coronaviruset/systematiskt-arbetsmiljoarbete-och-riskbedomning/

[5] https://www.prevent.se/amnesomrade/coronaviruset/

[6] https://www.ingenjoren.se/2020/08/19/sa-coronasakrar-du-din-arbetsplats/

Main considerations in tests with research persons

The following are the main considerations found when having gone through and analyzed the collected documents. These could be used as a base when developing and implementing health procedures and guidelines to fit an actual organization or purpose.

Risk assessment. This involves reviewing all steps in the process regarding research persons; inviting, receiving, preparations, execution of test, debriefing, etc. For each step the risks are assessed and preventive measures identified. This risk assessment can be done as a formal safety and security check (*Skyddsrond*) where employer, safety representative and occupational health service are present. A "*Skyddsrond*" is also a good way to secure that the test will be in agreement with the organizations' health and security policies.

Invitation letter. Health procedures should be described in the invitation letter when recruiting research persons. If not, there is a risk that people will refrain from participation. It is important that research persons feel confident in the health procedures described.

Risk persons. There are studies where risk persons are included in the targeted test population, for example elderly drivers or people with medical disorders. These studies may need even more rigorous health procedures.

Information to colleagues. Usually test facilities are not totally separated from other facilities and there will be other people present. Therefore, it is important to inform all people in the local area that tests will be done and how it may affect other activities. Maybe some areas have to be reserved during tests like rest rooms for research persons only or just to prohibit research persons to meet people non-related to the tests.

Travel to the test facility. The research persons must be able to travel to the test facility in a safe way to minimize the infection risk. If the test person cannot facilitate this, you should consider to provide the travel for them.

Screening of symptoms at arrival. Research persons should be asked about their health status, if they have any symptoms of infection or if they have been ill recently. The research person must be informed that it is okay to abort the test at any instance if they feel ill or uncomfortable with themselves or the test situation.

Physical distancing. Physical distancing should be practiced as much as possible. For example, instead of having the test leader to put on equipment on the research person he/she can be instructed to do it themselves, or a video can be shown explaining how to complete this. In narrow places (like a vehicle interior) a laser pointer can be used instead of leaning in and point at tings.

Minimize interactions. Try to minimize the number of persons involved in the tests.

Personal cleaning. See to that there are cleaning possibilities (soap, disinfection, etc.) in all facilities like rest rooms, preparation rooms, vehicles, simulators etc. For example, the research person should use disinfections before entering and after exiting the test vehicle (or similar).

Protective personal equipment. When possible, test leaders and research persons can wear disposable shoe covers, hand gloves and face mask. If physical contact is a must, when applying skin electrodes etc., consider also to use a visor.

Protective covers. Try to use protective covers as much as relevant. In the vehicle interior the seat and steering wheel can have disposable plastic covers. Plastic sheets can be used to separate the safety driver or test leader from the research person in accompanied tests.

Cleaning of equipment. The test facility and all equipment used should be cleaned and disinfected between each research person. Time between tests should allow for renewing air. Offer the research persons to disinfect surfaces themselves again for their own peace of mind.

Scheduling for cleaning. More frequent cleaning of rooms and emptying of waste bins are usually required (once a day or more). Remember to order cleaning services in advance of the testing.

Infection tracing (*smittspårning*). This is not included in these health procedures, but it should be clear how such a situation shall be dealt with, who to contact etc. Probably this is a task for the HR department or the Occupational health service (*Företagshälsovården*.)

Implementation of Health procedures in the respective organizations

As the participants' respective organization are different it was clear that the integration of these health procedures must be adapted to the actual organizations' routines. Below are some examples on how this was done at the beginning. This was an important activity in order to really get the Health procedures effective. However, this pandemic situation continues, society learns more and more how to deal with it, and so must also we. It will certainly be reflected in the future health procedures and guidelines.

Organization A: We did a safety and security check (*skyddsrond*) with special participation by a hygiene expert from the Occupational health service

(*Företagshälsovården*). After that, procedures and checklists were established and implemented in testing.

Organization B: We will communicate our Final Guidelines through the companys' internal corona service department that oversees companywide information distribution via their intranet. In parallel to this, we will report up through management.

Organization C: We are asked to consider if on-line study methods can be used instead of in real life. Did a risk analysis template to estimate probability of infection. Have to answer to the management's control questions. We will be briefing management and safety representatives about the health procedures to be taken.

Organization D: We did a safety and security check (*skyddsrond*). We identified infection risks and measures to prevent them. We shall use face mask and reduce people in the test facilities.

Tests with research persons participating remotely

The work in SAFER Hygiene task force has shown that there are many considerations and measures to take into account for the planning and the implementation of user studies with regard to COVID19. They require time, resources as well as (new) knowledge in fields that most people are not trained and as an organizer of user studies you also take a certain responsibility.

Considering the rigorous precautions for COVID19, as mentioned in this report, there is a (growing) need for knowledge and best practice of how to carry out efficient and useful online studies and remote tests as alternatives to user studies in real life (IRL). Online user studies require the same careful planning as user studies IRL in terms of recruitment participants, formulating the research questions and designing the setup of the study. But there are some additional challenges, some of which are mentioned below.

Remote testing is a method of conducting usability studies, where users and moderators (test leader) are located at different physical location (Schade[7], 2013). This enables users to use their own laptop (and maybe also gaming equipment, VR equipment, etc.) for the study which could either be *moderated* or *unmoderated*. In moderated studies, the user and the moderators are connected via web conference tools at same time. They could interact with each other, ask questions and provide inputs and so on. In unmoderated studies, the users have to complete the study by their own. One major disadvantage with unmoderated studies is that users wont' be able to get any real-time

[7] https://www.nngroup.com/articles/remote-usability-tests/

assistance. For example, if users have any questions related to study, methods or task, then, it might be difficult to support until they complete the study. Remote testing is a very good platform to conduct studies during this global pandemic, however it poses a set of challenges that needs to be addressed (Gupta[8], 2020) such as

- Representative users' knowledge and confidence in using web-based evaluation platforms.
- Recruitment of representative users.
- Reliable internet/wi-fi connection at users' location.
- Physical and cognitive capabilities of users to set up web conferencing and cameras by themselves.
- Moderators ability to run through the discussion guide with users without being too intrusive and leading.
- Users ability to take the non-leading instructions and simulate the study process in a realistic manner.
- Moderators ability to capture the subtle user errors and difficulties.

There are also benefits with online and remote tests. Regarding COVID19 the obvious advantage is that the people involved in the studies do not meet in person and, consequently, the precautions are not necessary. Moreover, online studies can be accessible to people from home, at work or from wherever they can connect via a computer. Also, many more people can participate in studies online compared to participants IRL. Online studies can also be repeated at different occasions and with different user groups etc.

There are numerous ways of how to design online studies. For example, you could live-stream events, tests and user interactions which can be observed and as they happen. The "live-streamer" can carry out actions on request from the observers. Another method is to use recorded events, tests and of user interactions which can be shown and discussed with users. The studies can be moderated or unmoderated. Nevertheless, the situation with COVID19 has stressed the need for alternatives to user studies IRL. Therefore, it would be interesting to explore the field of online user studies to gain better understanding of the possibilities and limitations and to develop new methods and best practice of efficient online user studies.

[8] https://www.mddionline.com/human-factors/human-factors-engineering-hfe-during-covid-19-pandemic

5. Conclusions, Lessons Learnt and Next Steps

The pandemic situation with Covid-19 that hit the world in the beginning of year 2020 stopped almost all tests with research persons. Soon we realized that this situation will be present for quite a while. And after this pandemic situation we will face 'the new normal' where more concern will be given on health procedures to prevent infections to spread. But scientists in human behavior need people for their studies, so it was necessary to find ways to conduct tests with research persons even during these difficult pandemic conditions.

Health concerns all people. It is a human right and not competitive. Therefore, we decided to join forces at SAFER to help each other to find a way to resume our tests with research persons as soon as possible.

This Task Force has no next step. The result is disseminated and integrated in our respective organizations, and the work will continue there.

6. Dissemination and Publications

How have the results been spread or will be spread?
State the publications published in combination with this project.

The result will mainly be disseminated and used within the project partners respective organization. That is where the project result is turned into practice.

Documentation:

- A SAFER Pre-study report (this one). It will be registered at SAFER and in DIVA. (*Digitala Vetenskapliga Arkivet*)
- A presentation at the SAFER lunch seminar 2020-10-22 (web seminar).

7. Acknowledgement

This work has been carried out at SAFER - Vehicle and Traffic Safety Centre at Chalmers, Sweden. It was financed by SAFER and the project partners. A special thanks to all participants in the project group (Emma Johansson, Stas Krupenia, Musa Hadi, Annika Larsson, Arun Muthumani and Mikael Söderman) for your engagement and contributions. Also, not to forget, thank you all people in our respective organizations that are doing a fantastic job in executing tests with research persons during this pandemic situation.