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D4.10.1 Framework for collection of initial FOT system technical performance

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LIST OF ABBREVIATIONS

ABBREVIATION	DESCRIPTION
D-FOT	Detailed Field Operational Test
DoW	Description of Work
DWG	Data Working Group
FOT	Field Operational Test
L-FOT	Large Scale Field Operational Test
ND	Nomadic Device
WP	Work Package

REVISION CHART AND HISTORY LOG

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EXECUTIVE SUMMARY

This deliverable reports on the initial activities undertaken in WP4.10 Technical Evaluations. This WP comprises two tasks; Task 4.10.1 System Performance Targets and Task 4.10.2 Actual System Performance. These tasks were planned to support the Sub-Project 4 of TeleFOT in Evaluation and Assessment of nomadic devices within the national Field Operational Tests (FOTs). The key objective of WP4.10 is to identify and define the target and actual technical performance metrics for the Nomadic Devices (NDs) used, it is not to assess the usability or quality of the data provided by the functions evaluated, but simply technical evaluations of the ND. This will allow cross community comparisons to be made, and assist with the answering of Research Questions (RQs; specifically the User Uptake RQs) which form the basis for SP4. This deliverable is intended to be used in conjunction with the raw data collected by individual test sites to assist those partners in answering questions which may arise from their analysis. For example UURQ4 focuses on if driving behaviour is affected by the use of the NDs. Raw data from data loggers and questionnaires my suggested that driving behaviour was affected more in the UK than Sweden when using GDS (test sites used for illustrative purposes only), this deliverable will assist in answering *why* these differences may occur. For example factors such as screen size and quality, time to boot up, or method of information presentation may have affected perceived usefulness or amount that the ND was actually used, thus affecting actual driving performance differences.

The main purpose of this deliverable is to provide guidance to those involved in the FOTs in what aspects of the performance of the systems and applications under trial should be defined to enable a subsequent comparability to be performed. The framework described in this deliverable also provides the information necessary for the test sites to develop a system performance definition for their own trial systems and applications that is both achievable and helpful to the later data analysis aspects of the project.

In addition, a timescale is outlined for the test sites to define the performance of trial systems and feedback the results to enable the completion of the subsequent deliverable 4.10.2.

The deliverable report is structured in a manner that follows the ordering of the tasks undertaken to complete task 4.10.1 in the Description of Work. A chapter is allocated to each of the four tasks completed.

Chapter 1, Introduction, sets the context of this WP within the general development of TeleFOT and the somewhat developmental nature of the progress from original project and FOT goals and the many practical issues that have had to be addressed in setting up multi-site trials. The implications of these factors on how system performance can and will be assessed is outlined, as is the implications to the scope of this WP.

Chapter 2, Objectives and Scope, examines in further detail the need to revisit the specific objectives and scope of an applicable and achievable system performance framework for TeleFOT specifically. This chapter also addresses the range of functionality deployed in the FOTs and the implications toward definition of a framework.

Chapter 3, Framework Rationale, expands upon the resulting approach taken which is based upon capturing from the FOT test sites their collective experience and expert assessment of the chosen systems deployed.

Chapter 4, Framework Definition, then describes the approach taken and the methodology to apply this for the test sites. An indication of the timing plan to be followed by the test sites to respond to the framework is given and the manner in which the feedback used is outlined. Framework templates to capture data are contained in supporting annexes. (This also includes a worked example of how the templates should be completed based upon a candidate system selected from within the FOTs in TeleFOT in Annex 1).

Chapter 5, Conclusions, summarises the earlier discussions and indicates the actions required to facilitate later stages of analysis and deliverables for WP4.10.

It should be noted that the system performance framework defined in this deliverable is applicable for both the L-FOTs and the D-FOTs across the TeleFOT project. The blank data entry templates with guidance on completion are found in Annex 2. The results from subsequent feedback received from the test sites will then be collated in the final deliverable from WP4.10.

1. INTRODUCTION

TeleFOT is a Large Scale Collaborative Project under the Seventh Framework Programme, co-funded by the European Commission DG Information Society and Media within the strategic objective "ICT for Cooperative Systems".

Officially started on June 1st 2008, TeleFOT aims to test the impacts of driver support functions on the driving task with large fleets of test drivers in real-life driving conditions.

In particular, TeleFOT assesses via Field operational Tests the impacts of functions provided by aftermarket and nomadic devices, including future interactive traffic services that will become part of driving environment systems within the next five years.

Field Operational Tests developed in TeleFOT aim at a comprehensive assessment of the efficiency, quality, robustness and user friendliness of in-vehicle systems, such as ICT, for smarter, safer and cleaner driving.

This deliverable reports on the initial activities undertaken in WP 4.10 Technical Evaluations. This WP comprises two tasks; Task 4.10.1 System Performance Targets and Task 4.10.2 Actual System Performance. The main objective of this WP was to identify and define the target and actual technical performance metrics for the various nomadic systems used in the national Field Operational Trials (FOTs) to enable cross FOT comparisons to be made.

In the original project Description of Work (DoW) this was suggested as perhaps including factors such as:

- Infrastructure Data gathering and handling
- Communications protocols utilised
- Nomadic device data handling
- Information Presentation
- User selected data presentation options
- Overall system reliability and redundancy

This was based on original assumptions about what types of technology and applications would be deployed within the TeleFOT FOTs. It was also based upon some assumptions about the level of access to specific products target or design performance specifications

provided by the manufacturers. Finally it was also based upon assumptions about the abilities of the test sites to carry out performance tests to support such a list of aspects.

As the TeleFOT project developed over an initial stage of detailed investigation and planning as to the practicalities of setting up multiple FOTs with mainly commercially available equipment, several conclusions were eventually reached.

Firstly, the emerging nature of both the commercial market of Nomadic Device (ND) functions and the range of capabilities possible to be deployed caused some delays in eventual final definition of the functions and the manner in which they were to be deployed. A particularly disruptive influence was the sudden development of Smartphone applications in the initial years of TeleFOT detailed planning.

Secondly, this caused some changes in the way in which some functionality was eventually deployed and as a result some review on how data could be captured for behavioural trials, and how access to system performance data may be reduced. In cases where the underlying technology platform remained the same as the original plan, access to data on a commercial design from an external supplier/manufacturer also became problematic.

Finally, there was the assumption that test sites would have a broad capability for investigating technical system performance at a comparable level across the project. In discussion within the project it became clear that there were discrepancies in the levels of capability to investigate and carry out some of the originally conceived goals.

It was therefore necessary to carefully define the detailed scope and objectives of WP4.10 in order to yield useful complimentary analysis to that carried out in other areas of SP4. These factors have been addressed within this deliverable and a practical rationale for a system performance framework has been produced and a methodology for collecting information that is achievable within a project context has been defined.

2. OBJECTIVES AND SCOPE

2.1. Initial Objectives

The TeleFOT DoW describes the objectives of WP4.10 as follows.

- The main objective of this work package is to identify and define the target and actual technical performance metrics for the various systems used in the national FOTs to enable cross FOT comparisons to be made.

This objective was to be addressed in two sequential Tasks. These were described as: -

Task 4.10.1: System Performance Targets

At an initial stage in this WP, this task will define a system specification matrix that will identify key system specification and target performance criteria that will form a technical system definition for each system to be deployed in FOT. This activity will be timetabled to assist the work within TeleFOT SP2 in defining Framework requirements for the national FOTs. The co-ordinators of each national FOT will then be required to supply technical specifications to populate this framework to enable a holistic project definition of the technical capabilities of the proposed FOTs to be given and a comparison of the relative specifications and target performances of the systems to be carried out.

Task 4.10.2: Actual System Performance

As the various national FOTs in SP3 are established and carried out, this task will initially establish the reporting structure to be applied at the national level to assemble data on the actual "technical performance" of the systems in service to be collected. This information will then be collected by each national FOT for eventual supply to the task leader for collation, collective analysis and reporting. This will be detailed in the Final deliverable.

2.2. Initial Approach

Clearly different specific nomadic device functionality implemented in commercial products may have different methods and techniques, and potentially technologies, to deliver a specific function. As the TeleFOT project completed its initial stages of agreeing methodologies to be adopted in the first years of the project (2008-2010) it became apparent that there were still uncertainties in the actual functionalities and services to be deployed in the planned FOTs. Many of these uncertainties were related to the practical nature of defining achievable solutions and identifying, investigating, assessing and sourcing commercially available, or very near to market, viable ND applications that reflected state-of-the-art functionality.

Many of the practicalities in establishing viable trials were discussed in detail between consortia partners during plenary and SP meetings in the 2008-2010 period. This included a great deal of informal feedback on how test sites were addressing the contractual issues with regard to establishing ND device supply, data interfacing and access to system specification details. In many cases this appeared to result in a basic consumer-supplier relationship only, where the only system specification definition of performance was that available to a normal consumer, e.g. instruction manuals and supplier web site public information. These discussions indicated that detailed target performance goals and design parameters for the ND applications from the system manufacturers/suppliers would not be accessible to the Test Sites. This had an impact in considering how the objectives of WP4.10 could be addressed.

The detailed definition phase of the project however is documented in a number of internal deliverables. An initial review of the planned functionality to be deployed in the various FOTs within TeleFOT was initially available in July 2009 (Functions Specification - D2.5.1 v1) which was subsequently amended based upon the inputs from the various Test Sites as initial plans became revised as systems were sourced and implemented. This was re-issued in July 2010 (Function Specification - D2.5.2 v2). This was supported by further definition of the way in which these functionalities were deployed and data recorded to support the behavioural analysis of the possible impacts of the use of the NDs. This was reported in further TeleFOT SP3 deliverables as these plans were firmed up.

Particular relevant references include definition of FOT status deliverables from SP3 in May 2010 (FOT Plans – D3.4.1 v4) and later revisions in August 2010 (FOT Plans – D3.4.1 v6). These defined positions of FOT intent and ND function deployment formed the major inputs to WP4.10 analysis.

These inputs are illustrated in the following diagram (Figure 2.1). This also indicates how the framework defined in this deliverable on ND system performance will be applied by the Test Sites and collated and analysed by WP4.10 to form context relevant feedback for the impact analysis work within SP4.

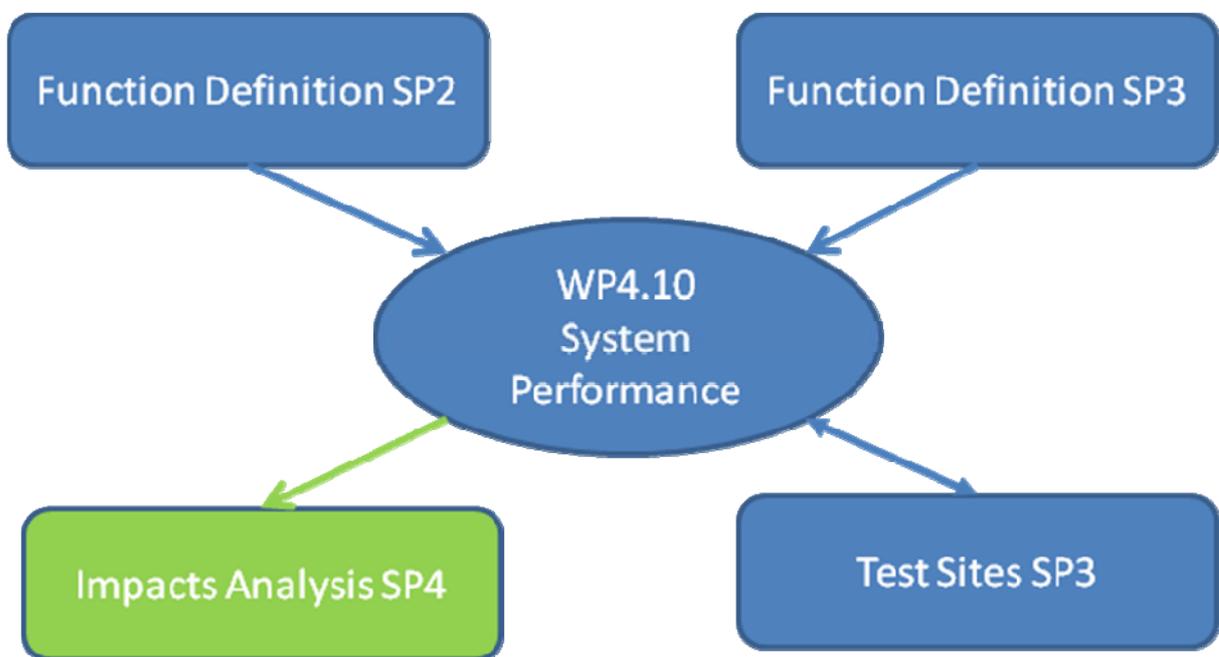


Figure 2.1 WP4.10 Inputs, Interactions and Outputs

2.3. Review of Detailed Objectives

Based upon the informal test site feedback noted above and the agreed device and trial plans described in internal deliverables, an analysis of what was possible for a “system performance” analysis WP within the context of the emerging TeleFOT working arrangements and information access. This specifically addressed the initial ambitions

for areas of system performance assessment that was outlined in the original project DoW.

These initial ideas were defined as:

- Infrastructure data gathering and handling
- Communications protocols utilised
- Nomadic device data handling
- Information presentation
- User selected data presentation options
- Overall system reliability and redundancy

After review it was identified that there were practical issues with regard to assessment of the first three items listed above. The topic of "Infrastructure Data gathering and handling" would only apply to a small sub-set of the ND functionality trialled within TeleFOT but would require a full understanding of how this aspect of service provision was implemented. It would also potentially require access, perhaps via the service provider, to meaningful indicators that would enable analysis of this aspect. As this was not available to Test Sites then this idea was disregarded.

Similar issues with practicalities of understanding and accessing any potential indicators relating to system performance for "Communications protocols utilised" and "Nomadic device data handling" which would also require ND/Service supplier support were also disregarded.

As a result a new definition of system performance target areas was arrived at. This was defined as three areas from the original concept.

- Information Presentation
- User selected data presentation options
- Overall system reliability and redundancy

In addition as the rationale for defining a system performance framework was being developed a fourth area was added. This was:

- Use Cycle Performance

This is expanded upon in the next chapter.

2.4. Nomadic Device functionality

It was clear that TeleFOT would carry out FOTs on a range of ND functionality. The definition of these “types” of ND functionality is has been described in earlier TeleFOT internal deliverables, but a brief summary of the types is given here (from D2.5.1 v2 - D2.5.1 Functions specification, version 2.0) and subsequent documents. These definitions are given in the section below.

Traffic Information (TI)

This function can be found on both nomadic and aftermarket devices and can generically be described as follows:

The system provides drivers with real-time information about the traffic situation (including congestions, weather conditions, road works, crashes, etc.). The system draws on external databases and connects to a traffic control centre.

It is designed to:

Make the driver aware of the actual as well as potentially critical traffic conditions in the immediate road and street environment.

Speed Limit Information (SLI)

This function is found on both nomadic and aftermarket devices. A generic description is the following:

Display current vehicle speed and current speed limit of the road/street used.

It is designed to:

Make the driver aware of actual speed limits on the road/street used.

Speed Alert (SA)

This function is found on both nomadic and aftermarket devices. A generic description if the following:

Display current speed of the vehicle and the current speed limit of the road/street; a warning is issued when speed limit is exceeded.

It is designed to:

Make the driver aware of actual speed limits on the road/street used; Make the driver follow the current speed limit by providing a warning (visual and/or auditive) when the speed limit is exceeded.

Navigation Support (Static) (NSS)

The function is found on nomadic and aftermarket devices. Its generic description is as follows:

Guide the user to a destination set beforehand, through locating the vehicle (using a positioning system) and calculating "best path" (in terms of travel time, distance or other preferences) by the use of relevant algorithms.

It is designed to:

Provide navigation support to the driver to find the way towards a pre-defined destination.

Navigation Support (Dynamic) (NSD)

The function is available on nomadic and aftermarket devices. Its generic description is as follows:

Guide the driver to a destination set beforehand, through locating the vehicle (using a positioning systems) and calculating "best path" (in terms of travel time, distance or other preferences) by the use of relevant algorithms. The algorithms also take into account the actual (and real time) status of the traffic system or other pre-selected topics.

It is designed to:

Provide navigation support to the driver to find the way towards a pre-defined destination, the current traffic situation and other pre-selected conditions influencing the traffic process are also taken into account.

Green Driving Support (GDS)

The function is found on both nomadic and aftermarket devices. Its generic description is the following:

A system which calculates what environmental impact one or several of the actual conditions of choice of route, driving style, operation of driveline, etc. will have. The algorithm also calculates what measure the driver can take in order to improve the situation at hand.

It is designed to:

Provide driving support (on all driving task levels) to the driver (often in real time) in order to, if possible, reduce the actual environmental impact of the driving.

eCall

The function is found on embedded systems. Its generic description is as follows.

A system that is intended to bring rapid assistance to motorists involved in a collision anywhere in the EC. It sends an emergency call message on being activated in an accident situation and can deliver information about location and severity of the accident.

Autonomous Cruise Control – (ACC)

The function is found on embedded automotive system. Its generic description is as follows:

A function which supports the automatic maintenance of speed and safe headway of a vehicle within traffic. It utilises on-board distance sensors to detect vehicles ahead and adjust vehicle speed from a driver selected target speed to maintain headway.

Forward Collision Warning – (FCW)

The function is found on embedded automotive systems and installed nomadic devices. Its generic description is as follows:

The function employs a forward facing sensor to detect the presence and closing speed characteristics of a vehicle ahead. The system warns the driver when a "safe" threshold is exceeded and a forward collision is imminent.

Collision Avoidance System – (CAS)

The function is found on embedded automotive systems. Its generic description is as follows:

The function employs a sensor to detect the presence and closing speed characteristics of another vehicle around that of the supported drivers. The system can warn the driver when a "safe" threshold is exceeded and a collision is imminent or can intervene with vehicle control if the driver does or cannot respond in time. While such systems can be for side and rear (blind spot warning) the most common is an intervening forward collision avoidance with automatic brake activation.

Lane Departure Warning – (LDW)

The function is found on embedded automotive systems and installed nomadic devices. Its generic description is as follows:

The function employs sensors to detect the location and direction of the road lane and the relative location and trajectory of the vehicle in relation to the lane. It can provide the driver with a warning if the system detects a trajectory that will result in the vehicle leaving the lane.

Lane Keeping Assistance – (LKA)

The function is found on embedded automotive systems. Its generic description is as follows:

The function employs sensors to detect the location and direction of the road lane and the relative location and trajectory of the vehicle in relation to the lane. It can provide the driver with a warning if the system detects a trajectory that will result in the vehicle leaving the lane and if the driver fails to respond the system can intervene and provide a corrective steering input.

2.5. Redefined Scope of the Workpackage in the context of TeleFOT

During the course of the detailed planning and modification of the form and context of the proposed FOTs, both LFOT and DFOT (as described in SP3) and an awareness of the type of data captured, and the emerging perceptions of the implications of the likely data to be collected from LFOTs and DFOTs, it was clear that there were implications to the task to be undertaken in data analysis. Parallel discussions in the analysis process to be undertaken in SP4 suggested the need for analysts in particular to have relevant and useful context information relating to the “performance” of the systems during the FOTs.

This understanding also related to the importance of understanding the subjective questionnaire data collected from FOT trialists and how that related to perceptions of User related factors.

It was clear that in order to assist this analysis the “system performance framework” had to be an effective and achievable way to collect relevant and applicable context information. This was particularly important in establishing an understanding of how similar generic functionality “performed” in different Test Site locations. The most relevant source of information of this aspect would obviously have to come from the Test Site personnel themselves who had gained the most experience of trialling a specific ND system or application.

For these reasons the Framework for collection of system performance information was shaped to have the most applicability to support the analysis work packages of SP4 within TeleFOT.

3. FRAMEWORK RATIONALE

The review of the objectives and scope of investigation described in the previous chapter led to a reconsideration of how meaningful and achievable data could be gathered on the comparative system performance of a wide range of ND applications and functions across a pan-European test sites.

3.1. Use Cycle - User

The concept of a use cycle was used as a basis for collecting system performance data. This considers the cycle of activity that a user carries out in interaction with a ND. This considers the following stages.

After initial system installation of the ND within the vehicle all NDs require an initial **system activation** stage to switch on or activate the device and/or function. This may take the form of pressing an “on” button or switch to supply power to the ND and activate the system. This may take some period of time until the system/function is ready for use. When the system has reached this activation stage it may then be possible to make **system adjustments** to ready the system for its use on that particular day/journey. A simple example here in the context of a Navigation Device would be to select a setting for the visual or auditory display. Subsequently the user may make **data inputs** to the system, again using the Navigation Device example this would be to select a destination for the journey and adjust, if necessary, the routing options required. The next stage in use would be for the user to receive **data outputs** from the system, again using the Navigation Device example this would be receiving turn-by-turn or distance-to-destination feedback. Finally at completion of the journey the user has to receive final system information, if provided, and **de-activate** the system. After this the system can be demounted and removed if required.

These highlighted areas form the focus of the system performance parameter that are proposed to be captured along with some other contextual information about system design, e.g. visual display screen sizes and resolution.

Collection of data on performance of NDs in this Use Cycle from Test Site Personnel having gained wide experience in the use of the device in FOTs in an objective manner, supported by any further clarifying subjective observations about system performance will provide a basis on comparing implemented ND functionality from Test Site to Test Site. It will also give necessary context to assessing cross Test Site comparison of behavioural results in SP4.

The following diagram indicates the Use Cycle and indicates that information gained on system performance related to timing/response and errors can be related to ease of use

and impacts of system design on perceptions of “performance”, “quality” and be related to User perceptions concerning acceptability.

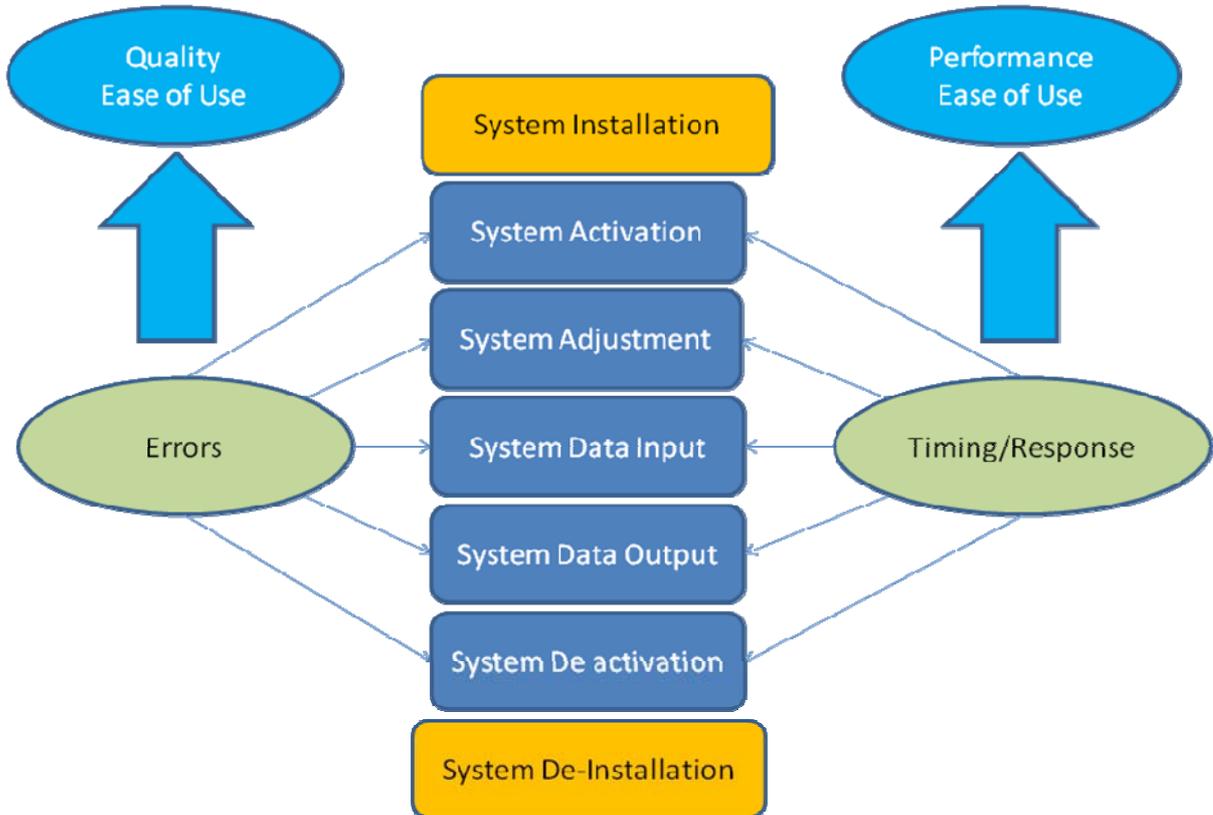


Figure 3.1 Use Cycle Elements and performance data use

3.2. Use Cycle - TeleFOT

It should be stressed that this individual user “use cycle” represents the way in which the FOT trialists experienced the ND systems and functionality deployed in trials. However this only represents a proportion of the experience generated within the project overall. Clearly the individual Test Site personnel also were “users” in a different way as they accumulated considerable experience directly in the performance of the system through initial selection of the technology, pilot trials and implementation in the FOTs. These personnel also were part of the data collection process from the trialists and received informal feedback over and above that documented in the various questionnaires that were completed during the FOTs.

It was therefore agreed that collection of the FOT experience on “system performance” over the course of the FOT period was a useful addition to the “user data” captured by questionnaires.

In particular the availability of this information would enable the impact analysis partners in SP4 to be as fully informed as possible as to the performance of the specific ND systems and applications when “in-service”.

This would particularly assist understanding of the context in which behavioural data on a function can be compared from different test sites where some comparable functions were trialled. A key issue here may be where similar “generic functionality” has been trialled by different test-sites but delivered by different specific products with potentially different design and performance parameter.

For this reason the system performance framework took particular emphasis on collecting data on two main aspects. Firstly, this included system specification (design) information on topics like display and control type and functionality, device size and functional design (including time and number of control activations to access functions). Secondly, subjective summary data on system performance perceptions from Test Site personnel to enable a more holistic understanding of the features of the ND that related to Usability, Reliability, Trust, Perceptions of design optimisation, Usefulness and Value. Finally the framework should enable free text recording of any other observations or comments that the Test Site felt was appropriate to note in understanding how the ND system and application performed over the FOT period.

3.3. Summary

This section indicates that the original intent to capture engineering forms of “system performance” data was not only difficult to achieve, but would not assist the impact analyses WPs in SP4. As it became clear that this was an identified need within TeleFOT it was accepted that the “System Performance Framework” should instead be more appropriately focussed on generating definitions of the trialled device/application in such a way that would assist analysts in setting their analysis in context. This should necessarily include a standardised framework that enabled both objective data on each ND to be captured, and also, summarised subjective evaluation of overall system performance experienced by both managers and users within the individual FOT setting.

The data collection using this Framework was most appropriately carried out towards the end of FOTs in early 2012 when the test sites have gathered practical experience of the devices and applications deployed.

The overall definition of the Framework is described in the following section.

4. FRAMEWORK DEFINITION

4.1. Framework Introduction

The Framework for collection of system performance data and definition was therefore required to capture the specification and aspects of performance of the ND devices and applications deployed by the individual test sites. This Framework would also be required to capture summaries of the Test Sites, and Users, overall perceptions of factors relating to actual performance of the systems over the FOT. This should also allow the capture of any other perceptions of the Test Sites related to general or specific aspects of how the system operated while on trial. By definition this latter part would be relatively unstructured to enable Test Sites to have an adaptable way of reporting any other information that would be useful to set the context under which the specific system performed that would aid independent analysts within the project in interpreting data.

The Framework was also required to be delivered in a form that could be easily completed by the individual test sites based upon their existing knowledge, rather than requiring considerable additional tasks. Therefore the final defined framework was developed on the basis of experience gathered in LFOTs and DFOTs and their relevant NDs employed by the authors.

The Framework developed takes the form of a series of template tables that could easily summarise the ND and the experience gathered during the FOTs. Finally it allowed the ability for the FOT personnel to add further additional performance or collective user perception feedback that would not be reported elsewhere in the project that may aid cross site and cross ND data analysis comparisons.

The application of the defined specific Framework within the project also had to enable subsequent collation and analysis in the latter aspects of WP4.10.

4.2. Framework Elements

For the reasons above a series of templates were designed to enable Test Sites to record data on each of the specific NDs and applications trialled.

The individual elements of the templates generated for the Framework are illustrated in Figure 4.1 below.

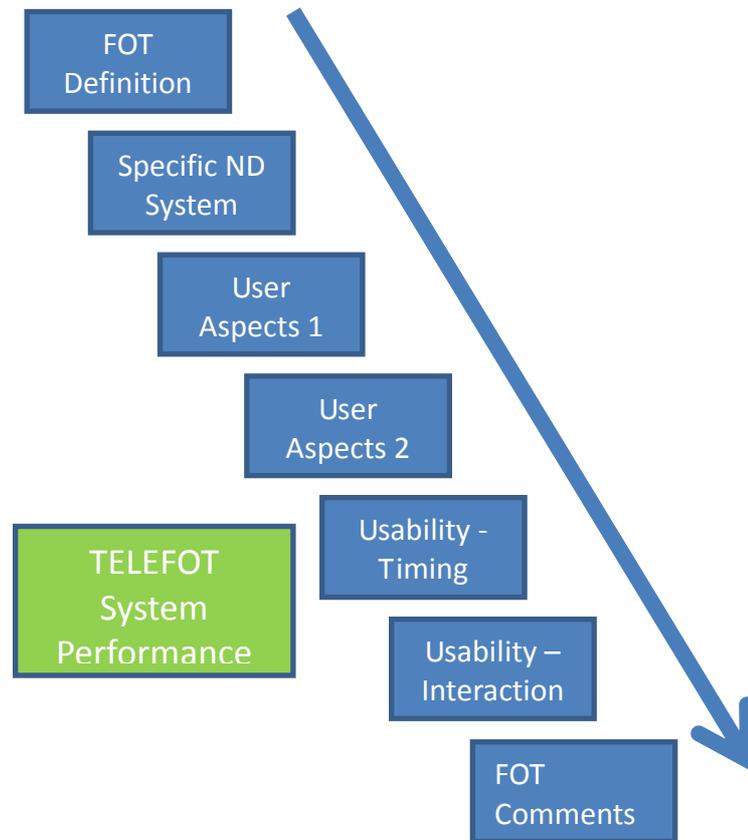


Figure 4.1 TeleFOT System Performance Elements.

The individual elements were intended to enable the collection of data as defined below

FOT Definition

This section defined which particular DFOT and system functionality was being assessed including any specific product name or definition. It also defined who had carried out the reporting of system performance described within the completed templates and confirmed their role within the FOT and specific contact details in the case of any need to clarify aspects of the performance.

Specific ND System Definition

This section defined the specific characteristics of the system under evaluation. It clarifies whether the system was truly nomadic (i.e. capable of being removed after each journey). If it was not further clarification should be given in the comments section. It also defines whether the application was stand alone, or installed on a secondary device such as a Smartphone. It also identified what location the device was mounted or located in the vehicle during the FOT. A section then defines which modalities of HMI display and feedback were available from the ND; either visual, audio or haptic and which of these was the principal mechanism. As the majority of devices offered visual feedback

the capabilities and format of the display screen is then defined. Next the physical and power characteristics of the ND are described (i.e. size, weight and battery performance). Finally the adjustability and user preference capabilities are assessed.

User Aspects 1

This section contains details of aspects related to user perceptions of aspects such as usability, perceived benefits, system trust, opinions on design and indications of future use potential for the ND, with results taken directly from the User Uptake Questionnaire.

User Aspects 2

This section contains details of aspects of system performance related to reported test site personnel perceptions of usability, reliability, system trust, usefulness and availability of user support for the ND.

Usability – Timing

This section defines the aspects of system performance related to the time taken to activate the ND system and application. This includes the interval time to access the main system menu, the primary function, the primary application and provides a total time summary in seconds from start up to access the primary function. It also details time taken to adjust the function or HMI. Finally it details the de-activation and shut down timings. This is included as long time to activate and access functions can often result in dissatisfaction or failure to use ND systems.

Usability – Interaction

This section defines the aspects of system performance related to the number of system interactions necessary to activate the ND system and application. This includes the interactions to access the main system menu, the primary function, the primary application and provides a total interaction summary from start up to access the primary function. It also details the number of interactions to adjust the function or HMI. Finally it details the de-activation and shut down interactions required. This is included as complex interactions to activate and access functions can often result in dissatisfaction or failure to use ND systems.

FOT Comments

Finally a section is provided to allow free text comments to be recorded by test site personnel on any other aspect of system performance, failure, usability or error experienced during the FOT that may have had an impact upon data captured and perceptions of usability.

Other information

Test Sites are also encouraged to supply other material to support this system performance summary such as copies of manufacturers manuals and target performance data sheets (if available) and photographs or images of HMI and ND devices to allow the third party analysts to have a more informed view of the system that generated test data.

4.3. Framework Deployment

This deliverable therefore defines the System Performance data capture framework to be deployed across the test sites in early 2012.

To enable full guidance to the test site personnel in the completion of the information requested in these framework a “worked example” of how data can be recorded and coded in these templates is given in Annex 1. This includes explanatory notes to explain the terminology used and form of reporting required.

The “worked example” is based upon a ND employed in the UK DFOT2 trial which utilised a Green Driving System (GDS) running as an application of a host Smartphone.

The completed framework elements as working documents are enclosed in this deliverable in Annex 2 as a blank Word Document. They are also available for the test sites in Excel and .pdf format from the TeleFOT XWiki at <http://telefot.openinno.fi:8080/bin/view/SP4Evaluation/FOT+System+Technical+Performance>.

This deliverable and annexes will be distributed to the project partners in early February 2012 and an agreed response timetable will be agreed with SP4 leaders and circulated to partners in parallel.

Responses will be collated by the WP4.10 leader and made available to partners, and particularly analysts, shortly after completion and supply of those responses. This will be an internal report

Finally a review of the results supplied will be constructed and supplied by WP4.10 as an overview of final system performance reported by the TeleFOT test Sites.

5. CONCLUSIONS

This deliverable has reviewed the requirements of the TeleFOT project to define the system performance characteristics of the NDs employed and assessed in FOT trials. It has noted that some revision has been made of the aspects to be assessed in relation to system performance.

A review of the range of functionalities deployed in the FOTs has been given and some of the practical considerations that have to be taken into account in scoping the tasks to be undertaken.

The key objective of WP4.10 was to identify and define the target and actual technical performance metrics for the Nomadic Devices (NDs) used, thus allowing cross community comparisons to be made and to assist with the answering of RQs. This deliverable is intended to be used in conjunction with the raw data collected by individual test sites to assist those partners in answering questions which may arise from their analysis; this deliverable will assist in answering *why* differences may occur between test sites.

A summary of the results from the WP as a whole will be provided in D4.10.3 - Final summary of achieved technical performance from National FOTs.

ANNEX 1: SYSTEM PERFORMANCE FRAMEWORK – WORKED EXAMPLE

This Annex contains the templates that will be utilised by the TeleFOT test sites to record the system performance elements relating to the ND functionality deployed in the FOTs.

In order that guidance can be provided on how these templates should be completed a worked example using one of the FOT ND functions is assessed and data entered into the template.

The principles and working methodology described should inform the Test Sites on how data should be recorded and eventually returned to WP4.10 for collation and analysis.

Summary Tables – Template completed as a worked example of Data Derived from a Green Driving System GDS

This is based upon an assessment of the UK FOT Green Driving System (GDS) that was an ND System which consisted as an application running on a HTC Smartphone.

This ND and application was assessed using the Framework outlined here in this Deliverable and data recorded into the template.

Further guidance notes are given on data entry and comments made on the worked example.

ND System Performance Framework

Worked Example

General Instructions to Complete this Document

A separate template should be completed by EACH test site for EACH nomadic device/application trialled in both DFOT and LFOT.

This template should be completed by the Test Site Manager, or someone who has significant experience both using the system and also detailed knowledge of participants' views on the system under evaluation.

Please include any further comments that you may have on the 'Comments' sheet, this more detailed information will greatly assist the people using this document to answer RQs and add context to specific questions.

The template consists of:

- Definition of the Specific FOT and Personnel responsible for the assessment
- Date of Assessment
- Definition of the design of the Device
- Definition of factors related to User Uptake
- Definition of Other Factors related to Test Site experience of deploying and trialling the Device
- Definition of system performance in relation to time to activate, access to functionality and shut down
- Definition of number of control inputs to activate, access to functionality and shut down
- Definition of any further comments that the test site has in relation to system performance experienced during the FOT

In addition any manufacturer derived product information, including instruction manuals and any target performance manuals should also be collated at each test site for each device/application.

The completed templates should be completed in MS WORD or EXCEL format by the Test Site.

Instruction manual and any other manufacturer supplied information should be produced in Acrobat format (.pdf).

Both of these items should be sent to the WP4.10 leaders at MIRA.

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Mark Fowkes mark.fowkes@mira.co.uk

Table A1.1: Evaluation of trialled system in TeleFOT – FOT Definition (Worked Example)

TeleFOT Country Code	UK
TeleFOT FOT Code	DFOT2
Primary Function of System Evaluated	Green Driving Support System (GDS)
Secondary Function(s) of System Evaluated	Lane Departure Warning (LDW), Forward Collision Warning (FCW)
System Name	Foot-LITE
Evaluation completed by	Stewart Birrell - MIRA
Role in Test Site	Test Site Manager
E-Mail Contact Details	stewart.birrell@mira.co.uk
Telephone Contact Details	+44 024 7635 8073
Date of Evaluation	06/02/2012

Table A1.2: Specific ND System/Function Physical Definition (Worked Example)

Host Device			Screen Specification					Preferences	
Nomadic Device (Y/N)	Secondary function	Vehicle Mounting	Screen Size (cm - HxW)	Screen Resolution	Colour (Y/N)	Orientation	User Interface (Touch/Hard/Soft Key)	User Stored Favourites (Y/N)	Customisable Preferences (Y/N)
Y	Smartphone	Windscreen	5.7 x 9.4	480 x 800	Y	Portrait	Touchscreen	Y	N

HMI Feedback				Unit Specification				Adjustability	
Visual (Y/N) - (Text/Graphic)	Audio (Y/N) - (Speech/Tone)	Haptic (Y/N) - (Location)	Principle Feedback	Unit size (cm - HxWxD)	Weight (g)	Battery Life - Standby (h)	Battery Life - Usage (mins)	Volume - (Simple/Complex/No)	Brightness - (Simple/Complex/No)
Y - Graphic	Y - Speech	N	Visual	12.2 x 6.7 x 1.1	157	490	380	Simple	Complex

Notes to Complete A1.2

Host Device

- Is the host device 'Nomadic' i.e. can be removed from the car after use? Does the device have a secondary function, if so what is this? How is the device mounted in the vehicle: Windscreen holder, Specific vehicle mounting or No specific mounting etc?
- *In the worked example the Host Device is a Smartphone upon which the GDS is an application, device mounted on the windscreen*

Screen Specification

- These questions relate to the physical properties of the screen of the host device: Screen size, Resolution, Colour, Orientation, User Interface
- *In the worked example the characteristics of the visual display is described*

Preferences

- Does the system allow user defined preferences or favourites to be established?
- *In the worked example, these were judged as Yes and No respectively*

HMI Feedback

- How is the feedback presented to the driver in the vehicle by the host device: Visual (Text/Graphical), Audio (Speech/Tone) or Haptic (Location of the haptic feedback). In what form is the feedback principally offered to the driver: Visual, Audio or Haptic
- *In the worked example the Host Device has both an audio and visual interface, visual is primary*

Unit Specification

- Relates to physical properties of the host device: Size, Weight and Battery life
- *In the worked example these aspects are described and data on battery life quoted from manufacturers specifications*

Adjustability

- Can the volume and brightness be adjusted by a reasonably experienced user to enable use in all driving scenarios: Is this process Simple, Complex or Not possible
- *In the worked example, these were judged as Simple (Auditory Volume) and Complex (Visual Brightness)*

Table A1.3: User Aspects 1 (User Uptake) Definition – Test Site Perceptions (Worked Example)

Usability				Benefits	
To what extent was the system used	Initial reaction to the system	Impressions change during the test	Reasons given for this change	Benefit of having access to system	Main reason for benefit
100	Positive	N/A	N/A	Large benefit	Safety

Trust	Design		Future Usage
System would provide accurate information	Opinion on Design of Device	Opinion on Design of User Interface	Future use & paying to use system
Moderate	Attractive design	Learning	26-50

Notes to Complete A1.3

This section can only be completed if the User Uptake questionnaire has been completed for the FOT. If multiple questionnaires have been completed at different stages throughout the FOT, please use the 'Post' FOT User Uptake Questionnaire (UUQ) results.

Usability

- To what extent was the system used - Refers to Q1a of UUQ - Answers available: 0, <25, 50-75, >75, 100 (this will be 100% for systems only analysed during DFOTs)
- Initial reaction to the system - Q2 - Very negative, Negative, Neutral, Positive, Very positive (can be completed for L & DFOTs)
- Impressions change during the test - Q3a - Considerably negative, Somewhat negative, Unchanged, Somewhat positive, Considerably positive (N/A for DFOTs)
- Reasons given for this change - Q3b & d - Convenience, Efficiency, Safety, Reliability, Usability, Other
- *In the worked example, the system was used 100% of the time as it used during a DFOT, with the initial reaction to the system being stated as positive. As participants only used the system on the one occasion changes in impressions were not applicable*

Benefits

- Benefit of having access to system - Q4a - No benefit, Small benefit, Moderate benefit, Large benefit, Very large benefit
- Main reason for benefit - Q4b - Convenience, Efficiency, Safety, Reliability, Usability, Other
- *In the worked example, the system was judged as being a large benefit and the main reason given for this were safety features*

Trust

- System would provide accurate information - Q5 - Not at all, Small, Moderate, Large, Completely
- *In the worked example, participants rated their trust in the system according to the UUQ as moderate*

Design

- Opinion on Design of Device - Q8 - Easy to carry, Easy to transfer, Attractive design, Quality, Size of screen, Design match
- Opinion on Design of User Interface - Q9 - Installation, Manual, Learning, Text on screen, Symbol size, Symbol meaning, Control (stationary), Control (driving), System response, Understand info, Amount of info, Help function, Error messages
- *In the worked example, the most common answers given by participants related to the attractive design and learning*

Future Usage

- Future use & paying to use system - Q11, 12 & 13 - Not use, Not pay, 1-10, 11-25, 26-50, 51-100, >100
- *In the worked example, between £26-50 was the average amount being prepared to pay*

Table A1.4: User Aspects 2 (Other Factors) Definition – Test Site Perceptions (Worked Example)

Usability				Reliability	
Ease to interpret information given by user	System responds fast enough to user changes	Ease to amend driving based on advice given	Ease of set up & installation	Systems would rarely crash or freeze	System would always start up
4	3	5	NA	2	3

Trust		Usefulness		User Support	
User would follow the advice given	Systems would generally give good advice	Most useful aspect of the system	Least useful aspect of the system	User Manual Supplied (Y/N) - (Online/Paper)	After Sales Support (Y/N) - (Online/Phone)
4	3	Safety features	Audio	Y - Both	N

Notes to complete A1.4

NB: Questions not taken from a generic TeleFOT questionnaire.

Ratings on a general scale of, the higher the score the better it performed, i.e.:

1 = Poor, difficult, disagree, never;

5 = Good, easy, agree, always.

- **Usability:** Based on the general opinions of participants how would you summarise their experience using the system.
- *In the worked example, the system was rated as being easy to interpret the information given and amend driving based on this feedback, with the system generally responding fast enough, but ease of installation was not applicable during the DFOT*
- **Reliability:** How would you rate the reliability of the system evaluated, both in terms of starting up and then crashing when in use.
- *In the worked example, the test site manager rated the system as not always starting up when requested and that it would on occasion freeze or crash during operation*
- **Trust:** Would participants generally follow the advice given by the system or ignore it, and what was the interpretation of the participants regarding the accuracy and completeness of the advice given.
- *In the worked example, trust in the system by participants was generally high*
- **Usefulness:** Based on participant's feedback what were the most and least useful aspects of the system (please indicate as many as you feel appropriate).
- *In the worked example, the safety features were rated as the most useful aspect of the system with the audio given the least*
- **User Support:** Is a user manual supplied with system (either online, a physical paper copy or both), and is there any aftersales support offered with the system (whether or not participants use this support is not important, just if it is offered).
- *In the worked example, both an online and physical manual were available (however these were never offered or used by the participants), with no aftersales support offered as the system is not a current market ready product*

Table A1.5: Usability – Timings Definition (Worked Example)

System Activation				Total Time to System Activation	System Adjustments		Time to System De-Activation
Main Menu	Primary Function	Primary Application	Auto Start-up		Primary Function	HMI Function	
47	NA	24	NA	71	21	21	23

Notes to Complete A1.5

Note all time recorded in seconds. If there is variability in any of these timings based upon any system configuration aspects, then please give range of timings and record possible reasons for this in the later comments section.

- Time to access '**Main Menu**' or homepage of the host device, or first screen where multiple user options are available (i.e. not the disclaimer screen, passcode input, or screen unlock etc).
- *In the worked example, it took 47 seconds for the Smartphone to turn on and load the main menu*
- Time to access '**Primary Function**' of Satnav system from the main menu (i.e. navigation to destination mode with NS(S or D), relevant route or destination traffic information with TI, or ability to present speed limit of current location with SLI etc).
- *In the worked example, the host device is a Smartphone so the primary function is considered to be a phone so this is N/A*
- Time to access '**Primary Application**' of Smartphone system from the homepage (i.e. navigation to destination mode with NSS, or feedback being given in GDS).
- *In the worked example, it took a further 24 seconds to access the GDS application from the Smartphones main menu*
- Time for '**Auto Start-up**' from ignition on to system being fully functional.
- *In the worked example, the Smartphone requires turning on so there is no auto start up, hence N/A*
- '**Total Time to System Activation**' (i.e. from system off to fully functional).
- *In the worked example, the total time is the time to access the main menu, plus primary application, so 71 seconds in total*
- Time to adjust '**Primary Function**' parameter (i.e. something that is central to the primary function of the system, namely change a destination with NS(S or D), change threshold of SA, or sensitivity of GDS or ACC).
- *In the worked example, the time to adjust the sensitivity of certain information presented was 21 seconds*
- Time to adjust '**HMI Function**' (i.e. this will normally be changing the volume of the system, if no audio present then changing a visual aspect of the display).
- *In the worked example, the time to adjust the volume was also 21 seconds as it was accessed from the same menu*
- '**Time to System De-activation**' (i.e. from fully functional to system off).
- *In the worked example, from the GDS being active and feeding back information to the diver to fully off was 23 seconds*

Table A1.6: Usability – Interaction Definition (Worked Example)

System Activation			Total Number to System Activation	System Adjustments		Number to System De-Activation
Main Menu	Primary Function	Primary Application		Primary Function	HMI Function	
1	NA	5	6	5	5	4

Notes to Complete A1.6

Note interactions with the host device should be calculated, whether pressing physical buttons on the device or interacting with the touchscreen. Within this analysis inputting multiple values on the same screen (e.g. entering a four digit PIN code or a 6 digit post (aka zip) code only count as one interaction). However, entering a post code followed by a street number, then selecting to confirm the address will count as three different interactions on different screens not just one.

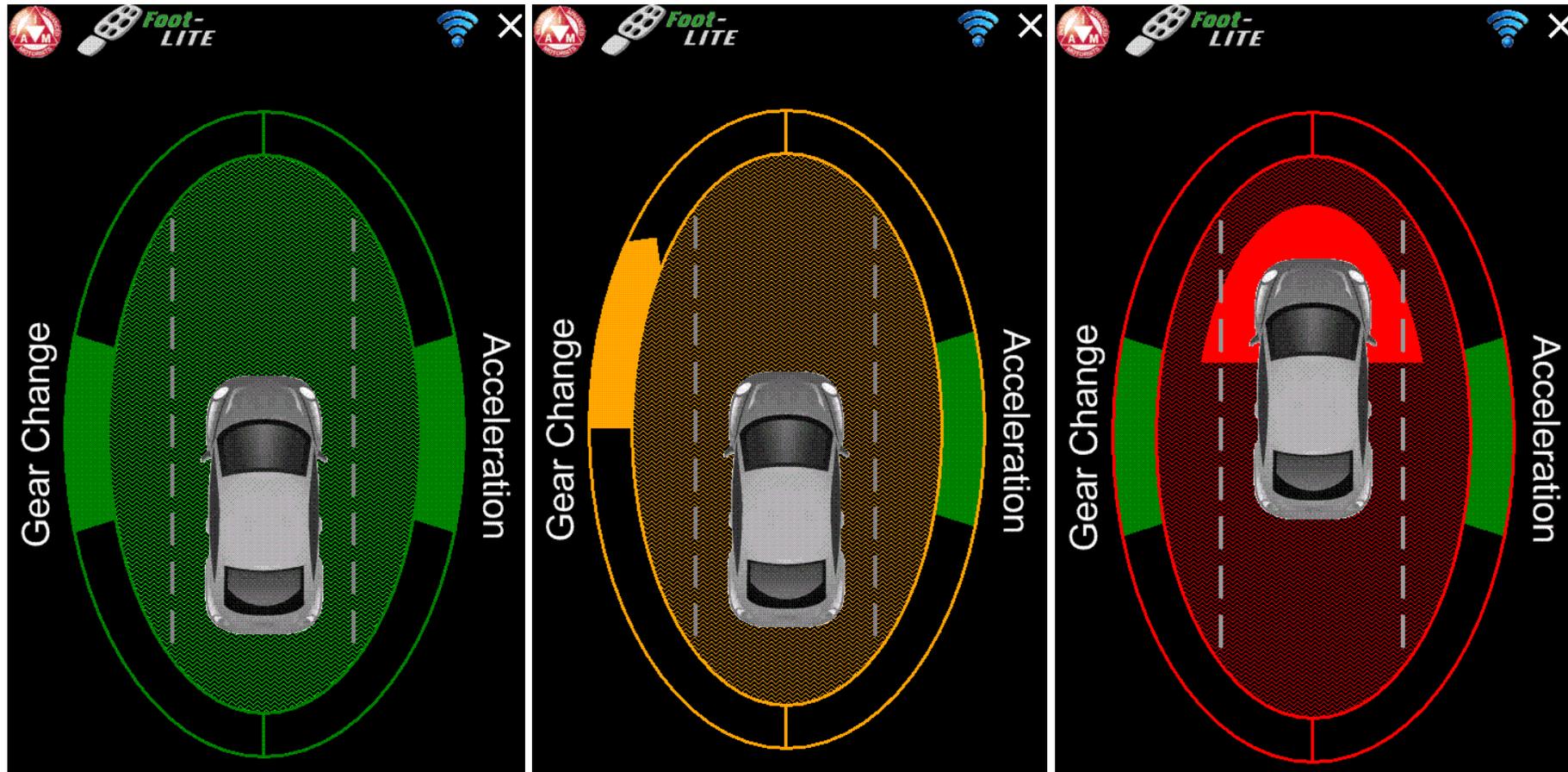
- Number of menu levels, pages which require user input, or screens which have to be negotiated to access '**Main Menu**' or homepage screen.
- *In the worked example, the number of interactions with the host device was calculated based on the same parameters as described previously in 'Notes to Complete A1.4'*
- Number of menu levels, pages which require user input, or screens which have to be negotiated to access '**Primary Function**' of Satnav system from the main menu.
- Number of menu levels, pages which require user input, or screens which have to be negotiated to access '**Primary Application**' of Smartphone system from the homepage.
- '**Total Number to System Activation**' (i.e. from system off to fully functional).
- Number of menu levels, pages which require user input, or screens which have to be negotiated to adjust '**Primary Function**' parameter.
- Number of menu levels, pages which require user input, or screens which have to be negotiated to adjust '**HMI Function**'.
- '**Number to System De-Activation**' (i.e. from fully functional to system off).

Table A1.7: Further Comments concerning ND performance observed in the FOT – (Worked Example)

Questions	Free Text Response
Please Indicate the TeleFOT FOT REFERENCE	UK DFOT2 – GDS: Foot-LITE
Please indicate here any comments you have regarding the Host Device	Participants liked the fact that the Foot-LITE system was hosted on a Smartphone as there was no need to carry another device into the car. As this was a DFOT no assumption can be made as to if participants would turn the system on for all journeys.
Please indicate here any comments you have regarding the User Uptake	Whilst participants were generally positive about the Foot-LITE system in the DFOTs some participants were irritated by the 'Lane positioning feedback' which was deemed too frequent and sensitive, this reduced user acceptance and future use.
Please indicate here any comments you have regarding Other issues - specifically reliability, usability and trust	As this was a DFOT the examiner controlled the system (start-up/shut down) and would reboot the system if it crashed or froze - which occurred to some extent on about 25% of journeys. This would not be tolerated by participants in an LFOT who would probably just not use the system in the future.
Please indicate here any comments you have regarding Timings and Number	Again as this was a DFOT the examiner controlled the system so there was no participant interaction.
Please indicate here any other comments you have	Foot-LITE was seen as a safety device first and foremost, with eco driving information an added value. Similar weather conditions were present through the trials.

Further Supporting Information – Please include Screenshots of HMI , Specific Issues etc (Worked Example)

UK DFOT2: The following images are screen shots of the ND display screen showing the GDS real-time feedback screen in operation.



ANNEX 2: SYSTEM PERFORMANCE FRAMEWORK – BLANK FRAMEWORK TEMPLATES

General Instructions to Complete this Document

A separate template should be completed by EACH test site for EACH nomadic device/application trialled in both DFOT and LFOT.

This template should be completed by the Test Site Manager, or someone who has significant experience both using the system and also detailed knowledge of participants' views on the system under evaluation.

Please include any further comments that you may have on the 'Comments' sheet, this more detailed information will greatly assist the people using this document to answer RQs and add context to specific questions.

The template consists of:

- Definition of the Specific FOT and Personnel responsible for the assessment
- Date of Assessment
- Definition of the design of the Device
- Definition of factors related to User Uptake
- Definition of Other Factors related to Test Site experience of deploying and trialling the Device
- Definition of system performance in relation to time to activate, access to functionality and shut down
- Definition of number of control inputs to activate, access to functionality and shut down
- Definition of any further comments that the test site has in relation to system performance experienced during the FOT

In addition any manufacturer derived product information, including instruction manuals and any target performance manuals should also be collated at each test site for each device/application.

**The completed templates should be completed in MS WORD or EXCEL format by the Test Site.
Instruction manual and any other manufacturer supplied information should be produced in Acrobat format (.pdf).**

Both of these items should be sent to the WP4.10 leaders at MIRA.

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Table A2.1: Evaluation of trialled system in TeleFOT – FOT Definition

TeleFOT Country Code	
TeleFOT FOT Code	
Primary Function of System Evaluated	
Secondary Function(s) of System Evaluated	
System Name	
Evaluation completed by	
Role in Test Site	
E-Mail Contact Details	
Telephone Contact Details	
Date of Evaluation	

Table A2.2: Specific ND System/Function Physical Definition

Host Device			Screen Specification					Preferences	
Nomadic Device (Y/N)	Secondary function	Vehicle Mounting	Screen Size (cm - HxW)	Screen Resolution	Colour (Y/N)	Orientation	User Interface (Touch/Hard/Soft Key)	User Stored Favourites (Y/N)	Customisable Preferences (Y/N)

HMI Feedback				Unit Specification				Adjustability	
Visual (Y/N) - (Text/Graphic)	Audio (Y/N) - (Speech/Tone)	Haptic (Y/N) - (Location)	Principle Feedback	Unit size (cm - HxWxD)	Weight (g)	Battery Life - Standby (h)	Battery Life - Usage (mins)	Volume - (Simple/Complex/No)	Brightness - (Simple/Complex/No)

Notes to Complete A2.2

Host Device

- Is the host device 'Nomadic' i.e. can be removed from the car after use? Does the device have a secondary function, if so what is this? How is the device mounted in the vehicle: Windscreen holder, Specific vehicle mounting or No specific mounting etc?

Screen Specification

- These questions relate to the physical properties of the screen of the host device: Screen size, Resolution, Colour, Orientation, User Interface

Preferences

- Does the system allow user defined preferences or favourites to be established?

HMI Feedback

- How is the feedback presented to the driver in the vehicle by the host device: Visual (Text/Graphical), Audio (Speech/Tone) or Haptic (Location of the haptic feedback). In what form is the feedback principally offered to the driver: Visual, Audio or Haptic

Unit Specification

- Relates to physical properties of the host device: Size, Weight and Battery life

Adjustability

- Can the volume and brightness be adjusted by a reasonably experienced user to enable use in all driving scenarios: Is this process Simple, Complex or Not possible

Table A2.3: User Aspects 1 (User Uptake) Definition – Test Site Perceptions

Usability				Benefits	
To what extent was the system used	Initial reaction to the system	Impressions change during the test	Reasons given for this change	Benefit of having access to system	Main reason for benefit

Trust	Design		Future Usage
System would provide accurate information	Opinion on Design of Device	Opinion on Design of User Interface	Future use & paying to use system

Notes to Complete A2.3

This section can only be completed if the User Uptake questionnaire has been completed for the FOT. If multiple questionnaires have been completed at different stages throughout the FOT, please use the 'Post' FOT User Uptake Questionnaire (UUQ) results.

Usability

- To what extent was the system used - Refers to Q1a of UUQ - Answers available: 0, <25, 50-75, >75, 100 (this will be 100% for systems only analysed during DFOTs)
- Initial reaction to the system - Q2 - Very negative, Negative, Neutral, Positive, Very positive (can be completed for L & DFOTs)
- Impressions change during the test - Q3a - Considerably negative, Somewhat negative, Unchanged, Somewhat positive, Considerably positive (N/A for DFOTs)
- Reasons given for this change - Q3b & d - Convenience, Efficiency, Safety, Reliability, Usability, Other

Benefits

- Benefit of having access to system - Q4a - No benefit, Small benefit, Moderate benefit, Large benefit, Very large benefit
- Main reason for benefit - Q4b - Convenience, Efficiency, Safety, Reliability, Usability, Other

Trust

- System would provide accurate information - Q5 - Not at all, Small, Moderate, Large, Completely

Design

- Opinion on Design of Device - Q8 - Easy to carry, Easy to transfer, Attractive design, Quality, Size of screen, Design match
- Opinion on Design of User Interface - Q9 - Installation, Manual, Learning, Text on screen, Symbol size, Symbol meaning, Control (stationary), Control (driving), System response, Understand info, Amount of info, Help function, Error messages

Future Usage

- Future use & paying to use system - Q11, 12 & 13 - Not use, Not pay, 1-10, 11-25, 26-50, 51-100, >100

Table A2.4: User Aspects 2 (Other Factors) Definition – Test Site Perceptions

Usability				Reliability	
Ease to interpret information given by user	System responds fast enough to user changes	Ease to amend driving based on advice given	Ease of set up & installation	Systems would rarely crash or freeze	System would always start up

Trust		Usefulness		User Support	
User would follow the advice given	Systems would generally give good advice	Most useful aspect of the system	Least useful aspect of the system	User Manual Supplied (Y/N) - (Online/Paper)	After Sales Support (Y/N) - (Online/Phone)

Notes to complete A2.4

NB: Questions not taken from a generic TeleFOT questionnaire.

Ratings on a general scale of:

1 = Poor, difficult, disagree, never;

5 = Good, easy, agree, always.

- **Usability:** Based on the general opinions of participants how would you summarise their experience using the system.
- **Reliability:** How would you rate the reliability of the system evaluated, both in terms of starting up and then crashing when in use.
- **Trust:** Would participants generally follow the advice given by the system or ignore it, and what was the interpretation of the participants regarding the accuracy and completeness of the advice given.
- **Usefulness:** Based on participant's feedback what were the most and least useful aspects of the system (please indicate as many as you feel appropriate).
- **User Support:** Is a user manual supplied with system (either online, a physical paper copy or both), and is there any aftersales support offered with the system (whether or not participants use this support is not important, just if it is offered).

Table A2.5: Usability – Timings Definition

System Activation				Total Time to System Activation	System Adjustments		Time to System De-Activation
Main Menu	Primary Function	Primary Application	Auto Start-up		Primary Function	HMI Function	

Notes to Complete A2.5

Note all time recorded in seconds. If there is variability in any of these timings based upon any system configuration aspects, then please give range of timings and record possible reasons for this in the later comments section.

- Time to access '**Main Menu**' or homepage of the host device, or first screen where multiple user options are available (i.e. not the disclaimer screen, passcode input, or screen unlock etc).
- Time to access '**Primary Function**' of Satnav system from the main menu (i.e. navigation to destination mode with NS(S or D), relevant route or destination traffic information with TI, or ability to present speed limit of current location with SLI etc).
- Time to access '**Primary Application**' of Smartphone system from the homepage (i.e. navigation to destination mode with NSS, or feedback being given in GDS).
- Time for '**Auto Start-up**' from ignition on to system being fully functional.
- '**Total Time to System Activation**' (i.e. from system off to fully functional).
- Time to adjust '**Primary Function**' parameter (i.e. something that is central to the primary function of the system, namely change a destination with NS(S or D), change threshold of SA, or sensitivity of GDS or ACC).
- Time to adjust '**HMI Function**' (i.e. this will normally be changing the volume of the system, if no audio present then changing a visual aspect of the display).
- '**Time to System De-Activation**' (i.e. from fully functional to system off).

Table A2.6: Usability – Interaction Definition

System Activation			Total Number to System Activation	System Adjustments		Number to System De-Activation
Main Menu	Primary Function	Primary Application		Primary Function	HMI Function	

Notes to Complete A2.6

Note interactions with the host device should be calculated, whether pressing physical buttons on the device or interacting with the touchscreen. Within this analysis inputting multiple values on the same screen (e.g. entering a four digit PIN code or a 6 digit post (aka zip) code only count as one interaction). However, entering a post code followed by a street number, then selecting to confirm the address will count as three different interactions on different screens not just one.

- Number of menu levels, pages which require user input, or screens which have to be negotiated to access **'Main Menu'** or homepage screen.
- Number of menu levels, pages which require user input, or screens which have to be negotiated to access **'Primary Function'** of Satnav system from the main menu.
- Number of menu levels, pages which require user input, or screens which have to be negotiated to access **'Primary Application'** of Smartphone system from the homepage.
- **'Total Number to System Activation'** (i.e. from system off to fully functional).
- Number of menu levels, pages which require user input, or screens which have to be negotiated to adjust **'Primary Function'** parameter.
- Number of menu levels, pages which require user input, or screens which have to be negotiated to adjust **'HMI Function'**.
- **'Number to System De-Activation'** (i.e. from fully functional to system off).

Table A2.7: Further Comments concerning ND performance observed in the FOT

Questions	Free Text Response
Please Indicate the TeleFOT FOT REFERENCE	
Please indicate here any comments you have regarding the Host Device	
Please indicate here any comments you have regarding the User Uptake	
Please indicate here any comments you have regarding Other issues - specifically reliability, usability and trust	
Please indicate here any comments you have regarding Timings and Number	
Please indicate here any other comments you have	

Further Supporting Information – Please include Screenshots of HMI , Specific Issues etc