TeleFOT: field operational tests of aftermarket and nomadic devices in vehicles.

D 1.3, Applications

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### D 1.3 Applications

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<th>Author(s)</th>
<th>S. Fruttaldo, F. Tesauri, R. Montanari (UNIMORE) R. Welsh, A. Morris (Loughborough University) PetriMononen (VTT) Henar Vega María Alonso (CIDAUT)</th>
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in the 7th Framework Programme
## TABLE OF CONTENTS

TABLE OF CONTENTS .................................................................................................................. 2  
LIST OF ABBREVIATIONS ........................................................................................................ 4  
REVISION CHART AND HISTORY LOG......................................................................................... 5  
EXECUTIVE SUMMARY ............................................................................................................ 6  
INTRODUCTION ........................................................................................................................ 7  
1. TOPICS OF COOPERATION AND METHODOLOGICAL ISSUES ........................................... 10  
2. APPLICATION AREAS ........................................................................................................ 16  
   3.1 TeleFOT INCO Application Areas .................................................................................. 16  
   3.2 Discussion with projects worldwide .............................................................................. 17  
CONCLUSIONS .......................................................................................................................... 20  
ANNEX 1 - MATERIAL FROM EVENTS ..................................................................................... 23  
   1.1 TeleFOT-INCO Kick-off Meeting Held at ITS-WC, Busan, South Korea on 27th October  
      2010 23  
   1.2 FOT-NET Round-table Discussion, 25th October 2010 at Busan, South Korea ............... 24  
   1.1. ITS WC 2010 Busan Korea .......................................................................................... 25  
      1.1.1. Special Session SS11 "An international Perspective on FOTs for Nomadic Devices in Vehicles" 25  
   1.2. Information Exchange on Traveler Behavior Survey Results, December 9, 2010 ........... 26  
   1.3. Meeting with Metropolitan Transportation Commission (MTC)- San Francisco, 10 October  
      2012 28  
   1.4. PATH meeting - San Francisco, 11 October 2012 (TeleFOTinco Meeting) ....................... 30  
ANNEX 2 - MEETINGS ORGANIZED: MAIN CONTENT .......................................................... 32  
   1.4.1. TeleFOT-INCO Kick-off Meeting, held at ITS-WC, Busan, South Korea on 27th October  
      2010 32  
   1.4.2. FOT-NET Round-table Discussion, 25th October 2010 at Busan, South Korea .......... 34  
   1.4.3. ITS WC 2010 Busan Korea - Special Session SS11 "An international Perspective on FOTs for  
      Nomadic Devices in Vehicles" ................................................................................. 37  
   1.4.4. Information Exchange on Traveler Behavior Survey Data ............................................ 38  
   1.4.5. TRB (Transportation Research Board) 90th Annual Meeting ..................................... 38
1.4.6. Meeting with Metropolitan Transportation Commission (MTC) - San Francisco, 10 October 2012

1.4.7. PATH meeting - San Francisco, 11 October 2012 (TeleFOTinco Meeting) ............................ 39

1.4.8. ITS World Congress - Vienna, 22-26 October 2012 .......................................................... 40

1.4.9. TeleFOT Final Event ..................................................................................................... 40
## LIST OF ABBREVIATIONS

<table>
<thead>
<tr>
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<tr>
<td>CAN</td>
<td>Controller Area Network</td>
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<td>DAS</td>
<td>Data Acquisition System</td>
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<td>DFOT</td>
<td>Detailed FOT</td>
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<td>FOT</td>
<td>Field Operational Test</td>
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<td>GPS</td>
<td>Global Positioning System</td>
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<td>INCO</td>
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## REVISION CHART AND HISTORY LOG

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EXECUTIVE SUMMARY

The concrete Applications, e.g. services and functions that are being tested in different partner projects, the way how they are addressed within a common framework and lessons learned are described in D1.3.

The structure of D1.3 is based on the following issues:

- TeleFOT INCO projects **commonalities and areas of cooperation**:  
- **Topics of cooperation and Methodological issues** sums up different lessons learned from the different projects (TeleFOT and the sister INCO projects);
- **Application areas**, including Achievements at projects’ work level, Relevant topics for international co-operation and Dissemination of Cooperation results: this chapter aims to outline concrete cases represented by services and functions tested in different projects worldwide and extract from these the cases of multilateral interest.
- **Annex 1** contains material from events;
- **Annex 2** outlines main content from the meetings organised.
INTRODUCTION

TeleFOT INCO aims at supporting international cooperation between the FP7 project TeleFOT 224067) “Field Operational Tests of Aftermarket and Nomadic Devices in Vehicles” and the projects:

- “SafeTrip-21, Safe and Efficient Travel through Innovation and Partnerships in the 21st Century” (University of California PATH programme and NAVTEQ, USA)
- “VMC project” (ETRI, Korea)
- “Ubiquitous Transportation Systems” (KOTI, Korea)

by multilateral exchange on the use of travel and traffic information for driver support by means of aftermarket and nomadic devices. The cooperation concerns Field Operational Tests (FOT) in countries worldwide currently either running or starting FOTs in the areas comparable to the TeleFOT project.

The main objectives of TeleFOT INCO are:

- General objective: create an international network of projects addressing issues related In-vehicle Information Systems using vehicle positioning, nomadic & aftermarket and other in-vehicle devices for driver support;
- Organise meetings and workshops to address the area of driver information systems;
- Define areas of cooperation and exchange;
- Discuss and agree on most feasible methodology and methods to be applied in the problem area defined above;
- Exchange information and knowledge on FOTs;
- Discuss possibilities of deeper international cooperation in FOTs and IVIS.

During project life TeleFOT INCO partners have joined and have actively organized meetings and events with aim to involve in the debate a wider number of projects focused on similar topics or methodology.

The main objective of D 1.3 – Application is to:
enter the discussions had during meetings and outline concrete cases represented
e.g. by services and functions tested in different partner projects and in different
projects worldwide;

extract from these the cases of multilateral interest, which can be applied to the
single TeleFOT INCO projects, to interested FOT projects and to future FOT
initiatives, with particular reference to functions and services tested.

describe the way how they are addressed within a common framework. This has allowed
and will allow to get awareness on the activities and achievements gained by the
individual projects and on how discussion with other projects has contributed to widen
their achievements and perspective, as well as to increase their potential.

The content of D 1.3 will be based on the following issues:

- Meetings organized
- Topics of cooperation and Methodological issues
- Application areas, including Achievements at projects’ work level, Relevant
topics for international co-operation and Dissemination of Cooperation
results.

The chapters will be based on the outcome from the following tasks:

- Task 1.1 Coordination of cooperation activities
- Task 1.2 Identification and agreement on precise topics of cooperation
- Task 1.3 Methodological issues
- Task 1.4 Application areas
1. TOPICS OF COOPERATION AND METHODOLOGICAL ISSUES

This chapter is based on Task 1.2 Identification and agreement on precise topics of cooperation and Task 1.3 Methodological issues.

It aims to:

- describe the main objectives of projects involved in TeleFOT INCO, outlined in the DoW and enforced during the project life;
- to outline the different topics of cooperation and methodological issues identified as of mutual interest for all projects involved: issues for international cooperation identified in the DoW have been detailed during project life and enriched by the dialogue among projects.

1.1 TeleFOT INCO projects short outline

As outlined above, TeleFOT INCO aims at supporting international cooperation between the FP7 project TeleFOT and the projects:

- “SafeTrip-21, Safe and Efficient Travel through Innovation and Partnerships in the 21st Century” (University of California PATH programme and NAVTEQ, USA)
- “VMC project” (ETRI, Korea)
- “Ubiquitous Transportation Systems” (KOTI, Korea)

SafeTrip-21 project

SafeTrip-21 was part of the Vehicle-Infrastructure Integration Program administered by the US Department of Transportation’s Research and Innovative Technology Administration.

The purpose of the SafeTrip-21 Initiative was to build upon current and prior research into the use of sophisticated information, navigation, and communications technologies to further national transportation goals in safety and mobility.
The Connected Traveler Project was a research performed under the SafeTrip-21 initiative.

It provided a Field Test Site with Intelligent Transportation Systems (ITS) applications, and was comprised of the Connected Traveler Test Bed, with the appropriate hardware, software, and architecture to field test a broad range of ITS applications, together with intermodal ITS applications covering the mobility, safety, and e-payment areas. This project integrated the Field Test and ITS applications into a product.

In particular the major objective of the FOT was to develop an integrated real-time multimodal traveler information application, and use this tool as a platform to understand the impact of real-time multimodal information and the effectiveness of real-time multimodal information on traveler behavior, especially in terms of improving travelers’ perception of transit service and encouraging mode shift from single-occupancy vehicle driving to public transit.

**Within the Connected Traveler project, the Networked Traveler was at a similar stage as TeleFOT:** a primary field test component is being developed to evaluate the hypothesis, “Smart phones can help people drive more safely.” Thus, the primary product will be a field test enabling evaluation of the validity of the hypothesis. The field evaluation recorded the experience of drivers using the connected traveler field test system.

**VMC project**

VMC (vehicle multi-hop communication) project aimed to achieve vehicle to vehicle and vehicle to infrastructure communication technology for Smart Highway and vehicle safety. VMC provided seamless fast radio link between vehicle and infra-system or among vehicles by applying for WAVE technology with handover.

From March 2007 to February 2009, ETRI developed V2V communication test bed and showed that safety messages can be delivered via V2V multihop communication with very low latency. This application can decrease consecutive accidents by informing emergency situation in advance.
From March 2009 to February 2011, ETRI has built a VMC test bed which consists of automobiles with WAVE communication module, road side equipment (RSE) and server and develop vehicle information-based service (VIS) and intersection safety service (ISS) to seek market valued key applications.

In VIS, vehicle information generated by ECU/TCU/MCU in the vehicle can be transmitted to the server where the vehicle equipped with WAVE communication module, and this vehicle information is used for diagnosing and analyzing the vehicle status remotely as well as gathering of traffic information. By providing bidirectional communication, the diagnosed information will be reported to the corresponding vehicle. Then, the driver can monitor the status of vehicle. In ISS, safety messages, i.e., vehicle approaching, traffic signal information, pedestrians alerting and etc, are broadcasted to the corresponding vehicles by infrastructure.

This application will guarantee safety enhancement at the intersection. One important HMI solution and platform in this are aftermarket and nomadic devices.

One of them main topics of common interest between ETRI/VMC and TeleFOT was vehicle to vehicle communication technology development. It has been performed by ETRI since 2004 and will continue to do active research on Vehicle IT convergence technology with international collaboration.

A mutual interest identified by the two projects is in exchanging practices and discussing methodological issues when testing the use and impacts of aftermarket and nomadic devices in vehicles.
**Ubiquitous Transportation Systems project**

In 2005, the Korea central government has suggested the "u-Korea Plan" to prepare for the ubiquitous environment. To cope with this national strategy, currently, all related ministries (e.g., Ministry of Land Transport and Maritime Affairs, Ministry of Knowledge Economy, Ministry of Strategy and Finance, Ministry of Education, Science, and Technology) have been initiating large research and development projects to develop the core technologies required for ubiquitous society. Consequently, this project has been launched to develop core technologies to build u-Transportation (u-T) systems, which present a new concept of the transportation environment where drivers, passengers, pedestrians, as well as system operators and managers, can both provide and take information provided by Intelligent Transport Systems (ITS) for their respective travelling and operating purposes. It is anticipated that features of the u-T system will enable the provision of real-time transportation information without any limitations of time and place without network boundaries, and suitable for all transportation states.

This project consists of six sub-projects according to the research and development of the u-T technology: (1) u-T technology for system engineering, (2) u-T technology for collecting and integrating real-time data, (3) u-T technology for creating information and providing services, (4) u-T technology for operating and managing traffic flows, (5) u-T technology for transportation planning, and (6) u-T technology for building and deploying a test bed.

The importance of this project with reference to TeleFOT is in the future trends identified for Nomadic Devices and functions and services, as ‘any-time and any-where’ functions and services provided by devices more and more present in people’s lives and used for multiple purposes.

### 1.2 Topics of cooperation and methodological issues identified as of mutual interest

The areas of interest for International Cooperation debate have been enriched during the project life: this was due not only to the lively discussions and activities carried out by TeleFOT INCO partners, but also to contributions from other projects focusing on ITS and
FOT methodology: they have been involved in the debate by TeleFOT INCO partners all over project life, in order to share experiences, knowledge and lessons learned, as well as to identify issues to be deployed in a future perspective.

Several meetings have been organized involving TeleFOT INCO partners. Also, project partners have been encouraged to open the debate to other projects focusing on similar topics or on FOT methodology. Information on meetings are outlined in Annexes 1 and 2. During the different meetings and events where INCO partners have met, experiences, methods and procedures have been discussed.

The discussion among TeleFOT INCO partners has dealt with different issues, e.g.:

- Data collection
- Data transfer
- Data handling and analysis
- Experimental design issues (including Pilot testing)
- How to carry out tests observing the principles of a rigid control and economic design.
- Business cases
- How to create services out of the data collected.

In particular, the following aspects have been highlighted as the most important ones:

- **Functions and hypothesis**: selection of functions to be tested and the procedure to obtain the corresponding hypothesis and research questions.

- **Study design**: identification of the most suitable study design according to the objectives, the functions and the hypothesis under study

- **Data collection and management**: identification of the variables and aspects to be gathered during the FOT as well as selection of the data acquisition system and the data management procedures.

- **Pilot tests**: definition of a pilot phase with appropriate reliability and duration.
Different lessons have been learned from the different projects (TeleFOT and the sister INCO projects) and they can be considered multifold, since they cover from the study design to the recruitment.

As a summary, some conclusions from the discussions about methodological aspects are shown below:

- **The study design is critical for the whole process.** Particular attention should be paid to the harmonization aspects, covering different issues such as the use of the same device or the establishment of the same design and its corresponding conditions. This will facilitate the subsequent analysis and the development of conclusions at a general level.

- **Selection of DAS is critical** in terms of efforts needed and will have an impact of the format of the data gathered.

- **Questionnaires and other means of data-gathering** are useful tools and should be selected according to test site requirements and the information to be collected.

- **Piloting phase** is essential to assess full execution and check feasibility of the proposed study and should not be underestimated.

- Motivating briefing sessions, continuous informal meetings and good support service can preserve user involvement.

TeleFOT experience together with the vision obtained from the sister projects, are of paramount relevance to future revisions of the FESTA handbook and an important source of reference for future FOTs.

For more information on TeleFOTinco methodological aspects, please refer to D1.2 Methodological issues.
2. APPLICATION AREAS

This chapter is based on Task 1.4 Application areas.

It is divided into two parts.

The first one describes the concrete services and functions tested in TeleFOT INCO partner projects and the way how they are addressed within a common framework.

The second one includes, in a wider sense, topics, experiences and lessons learned identified in different projects worldwide representing cases of multilateral interest. It is based on discussions and exchange that the TeleFOT INCO partners and other ITS- and FOT-related projects have had in occasion of meetings, workshops, conference calls, events.

3.1 TeleFOT INCO Application Areas

The sister projects involved in TeleFOT INCO are based on Field Tests, applied to different areas:

- **TeleFOT** used the FOT methodology to assess the impacts of driver support functions provided by smartphones, navigators and other in-vehicle aftermarket and nomadic devices on the driving task and driver behaviour.

- **SafeTrip-21** and in particular **Connected Traveler** applied FOT methodology to a Mobility scenario, by developing an integrated real-time multimodal traveler information application, and use this tool as a platform to understand the impact of real-time multimodal information and the effectiveness of real-time multimodal information on traveler behavior, especially in terms of improving travelers’ perception of transit service and encouraging mode shift from single occupancy vehicle driving to public transit.

- **VMC project**: ETRI (Korea) applied FOT methodology to Vehicle-to-Vehicle (V2V) and Vehicle-to-Infrastructure (V2I) communications which provide various telematics and Intelligent Transport Systems (ITS) services for vehicles. The study highlighted important implications on 1) Safety, since e.g. V2V communication can be used for safety applications and inter-vehicle...
communications such as collision protection service, community service, and a group communication; **2) Mobility**, since V2I communication can provide Infotainment service, collection and distribution of traffic information, and convergence services.

- **Ubiquitous Transportation Systems** (KOTI, Korea)

### 3.2 Discussion with projects worldwide

FOT methodology has been used in different projects dealing with different topics, from TeleFOT INCO sister projects to other ITS- and FOT- related projects.

During its life TeleFOT INCO partners have been encouraged to share achievements, problems, lessons learned with other projects working in similar areas or using the FOT methodology.

Some of the benefits from opening the debate to a wider international audience include:

- a larger knowledge transfer and information exchange;
- harmonisation of knowledge among the different projects dealing with FOT methodology;
- it would highlight the future and bring different points of view regarding e.g. system effectiveness.

Some of the questions addressed during the meetings and events have dealt with:

- **kinds of needs for international cooperation on FOT project level:**
  - There is a hierarchy of needs and each country/continent has its own priorities –which may differ
  - It would be desirable to develop and test the same systems in different parts of the world (for harmonisation)
  - Research institutes should have comparable testing approaches to make comparable analyses

- **potential benefits of international cooperation activities:**
• Needs to be better multi-lateral co-operation, since there is a lot of ‘knowledge’ to share

• The knowledge includes:
  • Scientific methods
  • Experiences and challenges and how they have been overcome

• Inter-operability of nomadic devices internationally would be beneficial (but would require standardisation of platforms)

• **FOT topics most likely to produce considerable added value from international cooperation:**
  • Harmonisation would be desirable. However whose needs are we addressing determines the type and degree of harmonisation that is possible in international collaborative FOTs
  • More co-operation on nomadic devices to look at effects on mobility and travel efficiency
  • Safety-focused FOTs looking at Intersection/rear-end collisions
  • Co-operative driving/systems
  • To share Methodologies is also important!
  • Green transportation and logistics
  • Green mobility and travel efficiency

• **Challenges for implementing true international cooperation.**
  • Meeting the stakeholder needs – they vary from partner to partner, country to country, continent to continent
  • Raising recognition of the benefit of the FOT approach
  • Standardisation of test-methodology
  • Standardisation of (for example) communications equipment internationally
The purpose of FOTs in general differs – for example, whether to look at mature systems versus systems that are in development and not yet ready for market.
CONCLUSIONS

The main objective of D 1.3 – Application is to:

- enter the discussions had during meetings and outline concrete cases represented e.g. by services and functions tested in different projects worldwide;

- extract from these the cases of multilateral interest, which can be applied to the single TeleFOT INCO projects, to interested FOT projects and to future FOT initiatives, with particular reference to functions and services tested.

This has allowed and will allow to get awareness on the activities and achievements gained by the individual projects and to increase their potential.

TeleFOT INCO partners have been encouraged to open the debate involving other projects focused on ITS and FOT Methodology. The organization of meetings and participation to events to share results, lessons learned, experiences has been important not only for TeleFOT INCO, but for all projects involved. Future meetings focused on this exchanges have been encouraged.

Topics of cooperation and methodological issues have been identified, as summarized in Chapter 1. Main information on the TeleFOT INCO projects have been provided and the main links to TeleFOT have been highlighted. Topics and aspects discussed during the meetings have been outlined.

Application areas have been identified as well, including a) concrete services and functions tested in TeleFOT INCO partner projects and the way how they are addressed within a common framework; b) in a wider sense and perspective, topics, experiences and lessons learned identified in different projects worldwide representing cases of multilateral interest, based on discussions and exchange between TeleFOT INCO partners and other ITS- and FOT-related projects.

FOT methodology has been used in different projects dealing with different topics, from TeleFOT INCO sister projects to other ITS- and FOT-related projects, e.g. those invited by TeleFOT INCO to share experiences and lessons learned. Beyond specific application areas, general considerations from the international debate may include:

- Achievements at projects’ work level
• **Stakeholders’ priorities**, in the different, specific reference countries, should be taken into account;

• **Harmonization** of functions/services to be tested or at least comparability is needed to effectively produce comparable analyses through the chain and among projects in different countries;

• **co-operation** is a necessary and valuable evolution in the FOT process but that there are challenges that will need to be confronted;

• There is existing knowledge and experience in handling FOTs and there needs to be a way of sharing this. This knowledge and experience includes **scientific and methodological information but also sharing of details of experiences and challenges** and how they have been dealt with is important.

• **bringing knowledge together** is important, so that the stakeholders understand the objectives of FOTs and how they can accelerate the uptake of systems by highlighting benefits and potential dis-benefits of individual systems.

• **Relevant topics for international co-operation:**
  - further co-operation on **Nomadic Devices** to look beyond merely the road transport system and extend into FOTs looking at door-to-door mobility, especially now that a smart-phone has so many different uses;
  - deployment, operation and maintenance of (new) **travel information services and apps**;
  - importance of **co-operation on Safety** within the international domain and looking at **specific problem areas such as intersection collisions and rear-end crashes**;
  - **green-driving**;
  - **green transportation**;
  - **logistics**;
  - **co-operative systems**.
ANNEX 1 - MATERIAL FROM EVENTS

1.1 TeleFOT-INCO Kick-off Meeting Held at ITS-WC, Busan, South Korea on 27th October 2010

List of participants

Present;
Petri Mononen, VTT, Finland
Sami Koskinen, VTT, Finland
Tapani Makinen, VTT, Finland
Andrew Morris, Loughborough University, UK
Ching-Yao Chan, California PATH, University of California at Berkeley
Hyun Seo Oh, Electronics and Telecommunications Research Institute (ETRI), South Korea
Youn-Soo Kang, The Korean Transport Institute (KOTI), South Korea
1.2  **FOT-NET Round-table Discussion, 25th October 2010 at Busan, South Korea**

**Attendees:**

Andrew Morris, Loughborough University, UK

Ching-Yao Chan, California PATH, University of California at Berkeley

Hyun Seo Oh, Electronics and Telecommunications Research Institute (ETRI), South Korea

Hanbyeog Cho, Electronics and Telecommunications Research Institute (ETRI), South Korea

Youn-Soo Kang, The Korean Transport Institute (KOTI), South Korea

Jim Meisener, Booz-Allen-Hamilton, USA

Akio Hosaka, Highway Industry Development Organisation, Japan

Paul Potters, ITS Netherlands

Wil Botman, FIA, Belgium
1.1. **ITS WC 2010 Busan Korea**

1.1.1. **Special Session SS11 "An international Perspective on FOTs for Nomadic Devices in Vehicles"**

**Organizer**

Petri Mononen, TeleFOT Project Coordinator, Senior Research Scientist, Technical Research Centre of Finland - VTT, Finland

**Invited Moderator**

Maxime Flament, Head of Sector - SafeMobility, ERTICO - ITS Europe

**Invited Speakers**

Ching-Yao Chan, Executive Director, TeleFOT INCO Project, California PATH - University of California, Berkeley, USA .pdf (4.1 MB)

Hyun Seo Oh, TeleFOT INCO Project, Electronics and Telecommunications Research Institute, Republic of Korea .pdf (2.7 MB)

Youn-Soo Kang, Research Fellow, TeleFOT INCO Project, The Korea Transport Institute, Republic of Korea .pdf (3.4 MB)

Petri Mononen, TeleFOT Project Coordinator, Senior Research Scientist, Technical Research Centre of Finland - VTT, Finland .pdf (5.3 MB)

Friedemann Kuhn, euroFOT Project, Daimler AG, Germany
1.2. **Information Exchange on Traveler Behavior Survey Results, December 9, 2010**

**Agenda**

8:00 Arrive at Keck Center

8:30 Welcome and Introductions

9:00 Introduction to Volpe Center survey work

Q&A session to follow

10:00 Break

10:15 Panel 1:

- Travel Survey Methods – Guy Rousseau
- Traveler Behavior and Values – Maren Outwater
- In-Time: Intermodal and Interoperable Travel Management for European Cities – Martin Böhm
- Telefot: Field Operational Tests of Aftermarket and Nomadic Devices in Vehicles – Petri Monenen

Q&A session to follow each presentation. After the final Q&A session, a discussion session will begin.

11:45 Lunch

12:45 Panel 2:

- Traffic Flow Theory and Characteristics – Samer Hamdar, Michael Mahut
- Transportation Demand Forecasting – Stacey Bricka
- Transportation Network Modeling – Srinivas Peeta

Q&A session to follow each presentation. After the final Q&A session, a discussion session will begin.
2:15 Break

2:30 Panel 3:
- Regional Transportation Systems Management and Operations – Walter Kraft
- High-occupancy Vehicle, High-occupancy Toll, and Managed Lanes – Ginger Goodin
- Traffic Signal Systems – Mark Hickman

Q&A session to follow each presentation. After the final Q&A session, a discussion session will begin.

3:45 Closing Remarks

4:00 Adjourn
1.3. **Meeting with Metropolitan Transportation Commission (MTC)-San Francisco, 10 October 2012**

**Attendees**

Petri Mononen, VTT, Finland

Andrew Morris, Loughborough University, UK

Roberto Montanari, UNIMORE, Italy

Serena Fruttaldo, UNIMORE, Italy

Maria Alonso, CIDAUT, Spain

Henar Vega, CIDAUT, Spain

Thomas Spiekerman, Metropolitan Transportation Commission, Oakland, California

Emily van Wangner, Metropolitan Transportation Commission, Oakland, California

Radiah T Victor, Metropolitan Transportation Commission, Oakland, California

**Agenda**

Arrive, introductions, short intro to the motivation and interest from TeleFOT towards SFBA 511

SFBA 511, status, future plans

TeleFOT research results (effect of "nomadic device services" on safety, environment, efficiency, mobility and user uptake)

Q & A

Discussion and future collaboration possibilities

Wrap up

**Presentation of 511 work**

The TeleFOT team learnt about the 511 transport information services in the San Francisco Bay Area (SFBA) and the service network model applied with the SFBA 511 service. In the US, the three digit number 511 has been selected as a common brand for
traffic and travelling related information. The US federal government provides several types of support and incentives for the states in order to facilitate the early stages in the deployment of 511 services. These means include e.g. assistance funding and various deployment and marketing support toolboxes.

Currently 28 states have the service available either through the phone or the Internet or both. The SFBA 511-service covers different modes and is available both on the Internet and as a phone service. The service includes information on traffic, transit, bicycling and ridesharing. The service was one of the forerunners in the 511 implementation in the US; it is quite well known in the area and is well appreciated by its users. About 90% of existing users are very or somewhat satisfied with the services. Today the service generates around 500 000 phone calls and over 2 000 000 web-sessions per month. The SFBA 511 is facilitated by a partnership of public agencies led by the Metropolitan Transportation Commission (MTC), the California Highway Patrol, and the California Department of Transportation. The SFBA 511 services are based on public sector funding. The annual operational budget is about $6.2 million. The public partners include the aforementioned agencies, congestion management agencies and emergency response services. The private partners include a system manager contractor, companies supplementing public agency data collection efforts, local media and various information service providers. Secondary beneficiaries, i.e. the public actors pay the majority or all of the costs regarding the deployment, operation and maintenance of travel information services - in general, it has been found that travellers are not willing to pay very much for travel information services such as the 511 service.
1.4. **PATH meeting - San Francisco, 11 October 2012 (TeleFOTinco Meeting)**

**Agenda**

10:00-10:15 Welcome

10:15 -12:00 TeleFOT Presentations

Lunch Break

13:15 -14:45 SafeTRip 21 Presentations

PATH Facility Tour

Collaboration Discussions

16:00 Meeting adjourned

**TeleFOT Representatives**

Maria Alonso, Cidaut Foundation (Spain)

Serena Fruttaldo, University of Modena and Reggio-Emilia (Italy)

Roberto Montanari, University of Modena and Reggio-Emilia (Italy)

Petri Mononen, VTT (Finland)

Andrew Morris, Transport Safety Research Centre, Loughborough University (UK)

Henar Vega, Cidaut Foundation (Spain)

**UCB/PATH Attendees**

Ching-Yao Chan

Jerome Chiu (Visiting Scholar, Industrial Technology Research Institute, Taiwan)

Somak Datta Gupta

Aude Hofleitner

Shunsuke Kamijo (Visiting Professor, University of Tokyo, Japan)

Jing-Quang Li
Vicente Milanés (Visiting Scholar, Centro de Automática y Robótica, Spain)

Christopher Nowakowski

Fen Wang (Visiting Doctoral Student, Tongji University, China)

Wei-Bin Zhan
The content of this chapter is based on Task 1.1 Coordination of cooperation activities.

The objective of this task is to take care of communication and coordinating the international cooperation from TeleFOT side.

The events organized in TeleFOT INCO from the kick off to the end of the project review are listed in this paragraph.

Further details (e.g. List of attendees and Agenda) are available in Annex 1.

1.4.1. TeleFOT-INCO Kick-off Meeting, held at ITS-WC, Busan, South Korea on 27th October 2010

The meeting started with brief introduction to each of the projects including:

- **SAFETRIP21** – focussing on Mobility and Safety. The Mobility activity will involve possibly thousands of drivers from the general public who will be recruited through a website. The Safety activity will involve 20/30 instrumented cars and up to 40 drivers focusing on driver distraction.

- **ETRI** – the VMC activity which is in the development stage and is developing a test-bed for evaluating mobile-phone applications in traffic situations including intersection safety, signal information, accident warning and video-streaming. In effect, the FOT will look at whether the car could be considered as the ‘mobile office’.

- **KOTI** – the “V2I” Communications project (which starts in January 2011). In this FOT drivers will perform normal driving manoeuvres in instrumented vehicles in several corridors close to the KOTI test-centre. 6 services provided by a smartphone will be evaluated. A ‘birds-eye view’ will look at the driver performance in the context of traffic accidents, intersection assistance etc in 3 conditions – no system/normal ITS system/KOTI system. The test will run for 5 months initially.

- **TeleFOT** - the EC FP7 project is looking at the effects of nomadic and after-market devices on driver performance particularly in the context of driver efficiency, safety, mobility and environment. The project will also look at the user-uptake situation with such devices and also test an eCall system. The TeleFOT
study is conducting 18 FOTs in total in 8 different European countries and will involve approximately 3,000 drivers in total.

There was a discussion about what the co-operation should entail and a general agreement that there could be sharing of information on methodological issues and applications of technology.

It was mentioned that there are FOT activities in Taiwan, Chain and Japan that may have a similar goal and it was suggested that partners in these countries could be invited to join the TeleFOT-INCO activity if the partners agreed.

There was a general agreement to continue with the co-operation on a regular basis. It was suggested that bi-monthly phone-conferences could be a method for maintaining dialogue although the issue of time-zones would have to be accommodated.

There were also suggestions for further face-to-face meetings and possible suggested venues included the TRB Conference in Washington (USA) in January 2011, Berkley, California in April 2011, the next TeleFOT General Assembly probably in Athens in May 2011 and the next ITS-WC in Orlando, USA in October 2011. Other possible venues for meetings included he ITS-Europe conference (Lyon 2011), and the ITS-WC 2012 (in Vienna).

There was an agreement to circulate the slides that were produced on the basis of the discussions at the RT Workshop held on 25th October 2010 as part of the FOT-NET activity. The following is a narrative of the meeting.

**Although the international sister projects have some commonalities to the European FOTs there are big differences also.** The Korean projects concentrate quite a bit on cooperative driving (v2v & v2i) and the related technologies - the FOT element and the associated methodologies are not on key focus, neither are nomadic devices. Aftermarket devices are used though. Still, there surely are lots of things that we can learn from each others. In the US project the commonalities are maybe more evident.
1.4.2. FOT-NET Round-table Discussion, 25th October 2010 at Busan, South Korea

In general, the participants discussed not just TeleFOT international co-operation but since there was participation from the wider international community, it was decided that it would be more appropriate to focus the discussion on the theme of wider international co-operation on FOTs in general.

The overall consensus was that co-operation is a necessary and valuable evolution in the FOT process but that there are challenges that will need to be confronted. To facilitate the discussions, presentations were heard from the SAFETRIP-21 project (in the US), the VMC and V2I FOTs in Korea, the Japan Smartway FOT and the TeleFOT project. This helped to identify the lessons learnt from the experiences and to some degree helped to isolate how to overcome the challenges associated with international co-operation.

A hierarchy of needs was identified in which different priorities in terms of what is required from an FOT in different countries. Even in a one-nation FOT, different stakeholders will require different things from an FOT and so scaling this up to international collaboration is even more challenging.

Overall, it is desirable within any co-operation to have the same system tested in different parts of the world but this by itself is not easy. If harmonisation were to be attempted, research institutes should try to at least have comparable testing regimes in order to produce comparable analyses through the chain. FESTA was mentioned in this regard but it is fair to say that not everyone has heard of the FESTA methodology even amongst those participating in the FOT-NET workshop.

There is existing knowledge and experience in handling FOTs and there needs to be a way of sharing this. This knowledge and experience includes scientific and methodological information but also sharing of details of experiences and challenges and how they have been dealt with is important.

There should be recognised means of knowledge-sharing and this is potentially the FOT-NET activity.
Harmonisation overall is desirable but the degree of harmonisation depends on whose needs are being addressed. The stakeholder needs will determine the degree of co-operation and collaboration but then again, it was discussed whether international co-operation is absolutely essential and maybe it is sufficient that we learn from our experiences throughout the various FOTs and leave it at that.

The round-table heard about a number of FOTs and it was interesting to hear about the challenges and experiences in each of them. They have all thrown up valuable insights. The challenge is how we use the experiences to improve things for the future in terms of marketing the FOT tool to the wider community.

**Benefits of international co-operation** were discussed. Some of these are self-evident. However, not so obvious but no less important is bringing knowledge together so that the stakeholders understand the objectives of FOTs and how they can accelerate the uptake of systems by highlighting benefits and potential dis-benefits of individual systems. Co-operation can further highlight the benefits of systems for industry and therefore industry is a key-stakeholder in the FOT process and arguably a key beneficiary of the results. Therefore co-operation with industry is essential within the FOT community. In some ways, it makes sense to have a manufacturing partner on board at the outset of each FOT.

The discussion continued on which topics were relevant for international co-operation. It was discussed the possibility of further co-operation on Nomadic Devices to look beyond merely the road transport system and extend into FOTs looking at door-to-door mobility, especially now that a smart-phone has so many different uses. It was also discussed the importance of co-operation on Safety within the international domain and looking at specific problem areas such as intersection collisions and rear-end crashes. Other co-operation topics included green-driving, green transportation and logistics and co-operative systems (which are suggested by some to be the future purpose of FOTs).

Challenges of international co-operation in some detail were discussed. It was agreed that there are many and they are varied. First of all, it is a challenge to determine how the stakeholder needs are to be met. These needs vary from partner to partner, country to country and continent to continent and the challenge is how to have a reasonable uniform FOT approach internationally which yield results that the stakeholders demand.
Another challenge is to raise awareness of the benefits of FOTs since not everyone is fully aware of the FOT approach and the benefits it can give.

Other challenges were noted. For example, standardisation methods are desirable but may be difficult to achieve in practice - not only are the methods and tools problematic but the functions to be tested in an international activity may vary quite considerably as has been found within the TeleFOT project.

Another issue raised was the scope of an FOT. There is some discrepancy on this. For example, in the USA, FOTs are used in the system development process. However, in Europe, FOTs are mainly examining mature systems that have already reached the market. Industry may conduct individual FOTs as part of the system development process in Europe but there is no acknowledged international co-operation on this.

The discussion continued on overcoming challenges. This would involve activity at a number of levels. It is important that governments and national administrations buy into the concept of FOTs and it remains a challenge for the FOT community to develop an “education” component within its ‘sphere of influence’ so that it can be communicated as to what can be achieved and how best practices can be promulgated.

It was agreed that international co-operation is the right start and a good start at that but it some respects, we need to go to the next ‘level of energy’ to develop an action-plan. More well-advertised workshops specifically targeted at international co-operation would be a good thing and FOT-NET should be well-placed to facilitate this.

Moreover an outlook on the future was given. One suggestion was that there should be any event highlighting what FOTs bring to the international domain. It was identified the possibility of a dedicated FOT conference although this may be somewhat premature as yet. It was also postulated that if there is a great desire for international co-operation, there should be a common topic to focus on.

It was highlighted the importance of using a cost-benefit approach so that governments and industry can appreciate that the FOT approach will give us tangible returns in the long-run. Otherwise funding of FOTs will simply dry up.

It was also discussed the possibility of learning from experiences within other transport modalities since there are data from other tests in other transport modes that can be relevant.
To enhance international co-operation and collaboration, it would be good to engage a discussion with the vehicle manufacturers to see where opportunities for harmonisation activities exist. Also, it would be important to involve the ICT/Nomadic Device manufacturing companies to know what is happening in the context of the system deployment.

Lastly, it is needed that FOTs look at all aspects of personal mobility given that a vehicle may only take into account a certain proportion of the journey.

1.4.3. ITS WC 2010 Busan Korea - Special Session SS11 "An international Perspective on FOTs for Nomadic Devices in Vehicles"

A TeleFOTinco Special Session and a TeleFOTinco Workshop were held in Busan. In the TeleFOT INCO session issues discussed during the conference were further discussed.

The discussion started from how the increasing role of ICT supporting mobility makes it important to know the impacts of nomadic devices on driving.

Then the floor was left TeleFOT and TeleFOT INCO, as FOT-related projects involved in international cooperation activities:

The European project TeleFOT aims to assess the impacts of functions provided by aftermarket and nomadic devices in vehicles, and raises awareness of their traffic safety potential.

TeleFOT INCO project supports international cooperation between TeleFOT and the sister projects SafeTrip-21, (University of California and NAVTEQ, USA), VMC (ETRI, Korea) and Ubiquitous Transportation Systems (KOTI, Korea).

The main common factor that the involved countries share is the use of nomadic devices as one platform for informing drivers of events and conditions which have significance to their travel.

This session gave a detailed overview of the similarities and differences of FOT approaches in these three different parts of the world. The session also provided a working example of hands-on cooperation across the Atlantic and Pacific - one that has been implemented despite challenges.
1.4.4. Information Exchange on Traveler Behavior Survey Data

This meeting held in Washington, on 9 December 2010 at Keck Center was an important occasion for TeleFOT and TeleFOT INCO to present their achievements and to exchange experiences with USA researchers and Volpe representatives on the following points:

- Travel Survey Methods
- Traveler Behavior and Values
- In-Time: Intermodal and Interoperable Travel Management for European Cities
- Traffic Flow Theory and Characteristics
- Transportation Demand Forecasting
- Transportation Network Modeling
- Regional Transportation Systems Management and Operations
- High-occupancy Vehicle, High-occupancy Toll, and Managed Lanes
- Traffic Signal Systems

1.4.5. TRB (Transportation Research Board) 90th Annual Meeting

TeleFOTinco representatives attended the meeting in Washington, 23-27 January 2011.

The Transportation Research Board (TRB) 90th Annual Meeting was held in Washington, D.C., at the Marriott Wardman Park, Omni Shoreham, and Washington Hilton hotels. The information-packed program attracted 10,900 transportation professionals from around the world to Washington, D.C.

The TRB Annual Meeting program covered all transportation modes, with more than 4,000 presentations in nearly 650 sessions and workshops addressing topics of interest to all attendees—policy makers, administrators, practitioners, researchers, and representatives of government, industry, and academic institutions. More than 85 sessions and workshops addressed the spotlight theme for 2011: Transportation, Liveability, and Economic Development in a Changing World.
1.4.6. Meeting with Metropolitan Transportation Commission (MTC)- San Francisco, 10 October 2012

Presentation of TeleFOT and TeleFOTinco work

The meeting started with the introduction of:

- SFBA 511, status, future plans
- TeleFOT research results (effect of "nomadic device services" on safety, environment, efficiency, mobility and user uptake)

Then a short intro to the motivation and interest from TeleFOT towards SFBA 511 was made.

This preliminary session helped the two parts to understand.

There was a lively discussion on methodology and tools adopted by 511 and TeleFOT and in particular:

- transport information services
- service network model applied
- traffic and travelling related information management and sharing
- Internet and phone services.

A discussion on future collaboration possibilities closed the meeting. One of the main points was the deployment, operation and maintenance of (new) travel information services and apps.

1.4.7. PATH meeting - San Francisco, 11 October 2012 (TeleFOTinco Meeting)

During the MTC-PATH meeting in San Francisco (October 2012) TeleFOT and TeleFOT INCO were presented. The discussion continued with the presentation of the SafeTrip21 project.

Some commonalities were found and in particular:
Christopher Nowakowski (University of California, PATH) presented the work undertaken in SafeTrip21: Networked Traveler Foresighted Driving Field Experiment. The tests, part of the SafeTrip21 initiative, focused on an auditory alert ("Slow traffic ahead, XX MPH") to help prevent end-of-queue crashes.

Baseline and experimental conditions are met during the tests, following a naturalistic approach but using an experimental vehicle. This protocol is similar to the one used in DFOTs in TeleFOT.

The DAS used during the experiments recorded data at 20Hz, including among others GPS and CAN data. Moreover, a video was recorded considering 4 different view.

Different images together with vehicle information are combined in the video recording. Similarities with the video recordings used in TeleFOT DFOTs (UK and Spain-Valladolid), are clearly identified.

1.4.8. ITS World Congress - Vienna, 22-26 October 2012

TeleFOTinco was presented at the TeleFOT stand: a presentation was shown and leaflets were distributed.

A TeleFOT INCO meeting was held as well, involving representatives of PATH, VTT, CIdaut and Loughborough University.

Topics discussed during the last meeting in S. Francisco were consolidated and the willingness to continue the information sharing and exchange of practices was enforced.

1.4.9. TeleFOT Final Event


The participation of PATH researchers has been taken into consideration as well as the possibility to organize a final workshop of TeleFOT INCO.