Peacox – Persuasive Advisor for CO2-reducing cross-modal trip planning

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D.8.5

Final Exploitation Plan

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1. Introduction

1.1 Scope of the Deliverable

The goal of the task is to define the strategy and the steps for the exploitation of the project results. The consortium agreed a suitable scheme for sustainable management of intellectual property rights within D8.3 Initial exploitation plan. The D8.5 Final exploitation plan will outline both the envisaged overall post-project exploitation strategy for different project outputs and different user groups and the individual exploitation plans of the project partners.

The next objective of this deliverable is to describe commercial exploitation of the Peacox projectresults after the end of project duration (from April 2015). For this purpose, the consortium members prepared an extended description of projects results and relevant market together with related business models and strategy for at least three years after project end.

1.2 Importance of exploitation

The sustainable exploitation of project results is one of main goal of wide European support for R&D activities. Two main areas can be considered within the Peacox project – scientific represented by e.g. universities in Peacox consortium and commercial, where FLU and TMX have very good motivation for using products based on Peacox technologies.

As it was showed in D8.3 document, the main aim for scientific exploitation is to use project results as input for next R&D projects or as a basis for consultancy activities.

Commercial use of project results would be focused on the extension of functionality of currently operated navigation (Dynavix) and journey planner (AnachB.at) services. Consortium members expect also consultancy activities besides these two main products.

2. PEACOX project outputs

Deliverable	Name (activity leader)	Output description
D3.1	Door-to-door emission model (TCD)	Online emissions model integrated into the PEACOX app
D3.2	Eco-driving and the emission exposure model (TCD)	Theoretical models produced in deliverables.
D3.3	Behavioural model (TCD)	Theoretical models produced in deliverables to evaluate the PEACOX app.
D4.2	Trip purpose detection (ETHZ)	
D4.3	learning routines for mode and trip purpose detection (ETHZ)	
D5.2	Guidelines for designing persuasive strategies within the mobility context AIT/CURE)	
D6.2	Peacox server (FLU)	
D6.2	Recommendation component (ICCS)	The component applies choice architecture and persuasive strategies when users are about to select a route to their destination in order to nudge them towards selecting the environmentally friendliest option.
D6.2	Peacox journey planner client (FLU)	
D6.2	Peacox navigation client (TMX)	
D8.1	Project Website (AIT/CURE)	
All public deliverables	All partners	

Tab 1: Project outputs

Table 1 represents the list of PEACOX project results, which should be taken into account for further exploitation. Additionally, several components, the ICCS Client (recommendation component) and the ETHZ client (travel mode detection and trip mode detection) and TCD client (emission model and exposure model) will be integrated within the application server.

3.   Main areas of exploitation

As it was written in D8.3, the main exploitation goal of the Peacox project is to prepare wider acceptance for next generation of navigation system, where multimodal data and on-line data will be joined together with persuasive strategies to change public transport passenger's behaviour and increasing using of less carbon emissions transport modes.

The exploitation strategy is described from different perspectives:

- Using Peacox project outputs by activity leader
- Using Peacox project outputs by other Peacox consortium member
- Using Peacox project outputs by third commercial entity
- Using Peacox project outputs by end user

3.1   Using Peacox project outputs by activity leader

The usage of Peacox's outputs by each activity leader has been already discussed in D8.3 chapter 3, where the expectation of all project partners were described. These expectations are concluded in Table 2:

Peacox output	Activity leader	Expectation
Door-to-door emission model	TCD	TCD would expect some environmental benefits from the use of the app
eco-driving and the emission exposure model	TCD	
behavioural model	TCD	
trip purpose detection	ETHZ	The existing routines as well as further developments are released under an open source license and are already available to the public free of charge. ETHZ interest is more in research and further development of the open source routines.
learning routines for mode and trip purpose detection	ETHZ	
Guidelines for designing persuasive strategies within the	AIT	AIT is interested in further research on the feedback and interaction design concepts developed in PEACOX.

mobility context		AIT's plan is to deepen the experience and knowledge in the areas of personal value-enhacing HCI research (with a special focus on sustainability and privacy) and persuasive interaction, as well as new feedback approaches.
Peacox server	FLU	Fluidtime wants to use and keep further development of the integrated client at least in other research projects
Recommendation component	ICCS	ICCS expect a flexible economic/commercial framework that will allow organizations across Europe to deploy and use the provided solution at reasonable cost, where the basic software should be distributed under open license and there could be commercial consultancy from ICCS available.
Peacox journey planner client	FLU	Fluidtime wants to use and keep further development of the integrated client at least in other research projects
Peacox navigation client	TMX	TMX is developing a mobile client for Android, where will be integrated navigation and Peacox functionality. TMX want to use widely available functionality within its commercial product Dynavix, which should be prepared for other cities in the Czech Republic and across Europe based on experiences raised from cooperation with other partners – e.g. persuasive strategies, multimodal navigation or mode detection.
Project Website	AIT	AIT is interested in further research on the feedback and interaction design concepts developed in PEACOX.

Tab 2: Using of project outputs

3.2 Using Peacox project outputs by other Peacox consortium member

The consortium members can use all current project outputs for preparing their own parts of the Peacox project. .

3.3 Using Peacox project outputs by third commercial entity

Using Peacox project output by third commercial entity is restricted to public deliverables; other outputs have to be negotiated with responsible project partner. We suppose that all public deliverables will be still available on the project website until the end of 2016. .

3.4 Using Peacox project outputs by end user

Using project outputs by end users is highly appreciated especially for Peacox journey planner and navigation client. Is it is described below, free or freemium business models should be used, which allow for commercial profit for partners Fluidtime and Telematix.

3.5 Intellectual property rights

Most of the server parts of project Peacox are developed using open source and have to be published under open source. The multimodal journey planner and navigation system clients are IPRs of FLU, resp. TMX and these will be published as a commercial solution. IPR to that software belong to the developers FLU and TMX. It is upon their decision which license will be used. TMX plans to use freemium business model for its multimodal navigation, where basic functionality should be for free and end user should pay for additional features.

4. PEACOX scientific exploitation plan

Scientific exploitation can be described within individual exploitation plans of each relevant Peacox partner.

4.1 ETHZ

The main topics of further planned paper publications of ETHZ are trip purpose imputation, improvement in mode detection algorithms, identification of public transport lines and personalisation of the GPS processing routines which is tightly coupled with automated calibration of parameters and learning. These papers will be presented mainly at conferences from the transportation field, such as TRB (Annual Meeting of the Transportation Research Board), ETC (European Transport Conference), STRC (Swiss Transport Research Conference) or Mobile Ghent.

The exploitation strategy of ETHZ focuses on the scientific aspects and comprises three points:

- Publication of papers on conferences and in appropriate journals.
- Further development of the OpenSource GPS processing framework POSitionDAtaProcessing (posdap) which is available especially to other researchers
- Use of the developed routines in further studies that use travel diaries reconstructed from GPS observations.

For this, particularly the personalization using automated calibration routines and the trip purpose imputation will be of great benefit.

4.2 ICCS

The members of the ICCS team focus on personalization and recommendation systems related research. Conferences where we will publish final results and insights from our work within the PEACOX project include:

- ACM conference on Recommender Systems (RecSys)
- ACM SIGCHI Conference on Human Factors in Computing Systems (CHI)
- International Conference on Persuasive Technology
- User Modelling, Adaptation and Personalization (UMAP)

ICCS researchers have already published their approach and the architecture of the proposed PEACOX recommender system. ICCS plans to pursue more publications with the research work and results related to the second trial. With respect to the exploitable scientific results, these are:

- The PEACOX recommender architecture.

- The PEACOX persuasive recommender algorithm that uses aspects of user profiles and route information in order to identify and present route options that are environmentally friendly and within the users' comfort zone.

- The PEACOX recommender software implementation.

ICCS as a research institute will promote the visibility of technology through dissemination, education activities and transfer innovative technology to project partners and industry. The following technological innovations of the PEACOX platform are based on the research work of ICCS:

- A personalized travel recommender that will nudge urban travellers to plan routes while considering the environmentally friendliest travel modes.

ICCS does not make profit from selling products or services directly, so it cannot participate in any kind of commercialization of PEACOX results, but it will exploit PEACOX results for:

- Improving its core activities by exploiting potential opportunities for following-up research projects. In this direction we are already involved in proposals of the H2020 programme where we also pursue applications and extensions of the PEACOX approach.

- Creating new teaching content. Training material on recommenders that support lifestyle changes are an "indirect" exploitation opportunity for ICCS, through its association to the National Technical University of Athens.

- Transferring PEACOX technology to the industry through existing spin-offs or people who do research at ICCS and transfer their knowledge to the industry.

4.3 **AIT**

For AIT, the goal of reaching out to the scientific community is to create awareness of the project and present our results, to form a basis for future research in this area and to make PEACOX a valuable reference for related research activities.

Scientific communities can effectively be reached at scientific conferences and workshops. AIT is gaining visibility by participating on numerous scientific events where PEACOX is relevant, giving presentations, showing posters and leaflets. AIT's topics raising the most interest among scientists are the user evaluation results and new user interaction approaches for persuasive strategies and persuasive sustainable technology.

AIT will further disseminate the project results in the field of human computer interaction, user experience and product experience, user centred design and persuasive interaction design. AIT will mainly continue to distribute the results of the project in form of research papers.

Within PEACOX, AIT and its predecessor CURE have been conducting research on persuasion in sustainable HCI, the requirements and the development of interaction prototypes suitable for providing persuasive strategies to motivate people to travel more ecologically friendly. Overall, the conducted research lead to user requirements and mental models, manifested in guidelines for the implementation of CO_2 feedback, persuasive interface concepts and prototypes of the developed systems. The following post-project exploitation gains are targeted:

- **Guidelines for the implementation of persuasive system designs in sustainable HCI**
  As a non-profit research organization, AIT aims to develop services and related tools and concepts on one hand for gaining knowledge for other funded research projects and direct research contracts, and on the other hand for exploitation within contractual research projects. . The developed guidelines will be used to develop strategies for the support of companies that are increasingly targeting this market.

- **Advanced feedback and interaction design concepts**
  As part of the interaction concepts being developed for persuasive technologies, advanced concepts for the realization of interfaces will be developed and implemented prototypically. In particular the visualization of the personalized CO_2 feedback mechanisms will be made available, e.g. as consultancy product in addition to the implementation guidelines. AIT aims at improving these concepts for further use in other funded research projects as well as in direct research contracts.

- **Experience/Knowledge in the areas of user modelling, sustainability research and persuasive technology, as well as advanced feedback approaches**
  This knowledge will be used for further research in these areas (as well as projects) and developed towards more business-oriented, contractual research and product development. Further research will include participation in further conferences, where AIT will present the results from PEACOX and future developments. With the help of its business development team, AIT will create services tailored to the special needs of future customers for applied research.

- **Services/Consulting on sustainable HCI, as well as user experience of persuasive technology**
  AIT will further develop this knowledge and elaborate consulting potential to support customers with knowledge in this area. Consulting services will be offered in form of expert knowledge and methodological support for customers.

- **Development of efficient testing and evaluation tools for persuasive technology services (e.g. persuadability questionnaires)**
  All developed tools and methods will be further used, researched and refined by AIT (as part of follow-up projects) and offered as consulting services. Within its consulting programme,

AIT will make the services commercially available to its customers by providing evaluations (expert- and user based) and employing the evaluation tools.

- **Further establishment of AIT's role in the scientific community of sustainable and persuasive HCI**

  Through research on sustainable and persuasive technologies focused in this area, AIT has established its role in the scientific community of sustainable HCI. To strengthen its position, AIT will conduct further research and create scientific publications and demonstrations and participate in public events (such as conferences or meetings). Furthermore, this knowledge will also be used as the basis for future research projects in the area of sustainable HCI, where AIT will further pursue these topics in other funded projects as well as direct research contracts, based on the results of PEACOX.

4.4 TCD

Trinity College has already published and presented papers relating to our research at:

- 2012 Annual meeting of the Irish Transport research Network
- 2013 Annual meeting of the Transportation Research Board
- 2013 European ITS Congress
- Transportation Research Part D
- Future Cities Exhibition 2013

With three papers accepted for the 2013 meeting of the Irish Transport Research Group

Scientific results are expected to include:

- Methods of presenting carbon dioxide emissions
- The socio-economic characteristics of smartphone users
- Attitudes towards emissions reduction amongst the Irish population
- Current levels of knowledge of emissions associated with transport
- The role emissions information can plan in a mode/route choice decision

5. Standardization and legal frame related to Peacox project outcomes

5.1 Security, privacy, inclusiveness, interoperability

Data Security

Service providers and network operators as well as Traffic Information Service Providers within the Peacox project outputs (framework) certainly need to consider data security. Data security may be defined as the ability of a network or an information system to resist, at a given level of confidence, accidental events or malicious actions that compromise the availability, authenticity, integrity and confidentiality of stored or transmitted data and the related services offered by or accessible via these networks and systems.

By becoming part of Peacox, the situation in which the content provider, service operator or Service Provider's Assets are positioned will be changed. By additionally providing their services through the Peacox framework, they will potentially be providing additional means for the threat to access the asset, or exposing the asset to additional threats. The provider will therefore seek to protect their asset from harm. The Peacox framework may provide a protector; the content provider, service operator or service provider may choose to provide their own protector; though most likely there will be some combination of both.

It should be considered that legitimately accessed information might only of value to the person accessing the information at that point in time. For example, a service providing a map annotated with real time traffic information for specific area is only likely to be of value at that point in time to another traveller in that particular area. Therefore providing encrypted access to such data would be inappropriate, especially given the likely processing overhead involved with the encryption/decryption process, leading to reduced service satisfaction on the part of the end user.

The approach to data security should fit within the context of current security systems within the enterprise, as well as with technology systems within the enterprise. If current infrastructure for web services exists, any provisions will need to be made within this context.

Specific security issues associated with Peacox are those arising as a result of being connected to the Peacox framework. These issues include those at legal, financial, organisational and technical levels. Data security is not simply a technological issue, which may be addressed by technological solutions.

However, within the context of Peacox, the situation in which the asset is placed may be significantly changed by it being placed in an information systems technology framework.

Failures in the security system might lead to:

- Loss of service, leading to reduced perception of quality, reduced revenues or wider benefits obtained from information access, and possible loss of future traffic;

- Failure to meet response times or quality of service agreements, leading to financial compensation;

- Unauthorized access to data leading to loss or corruption, damaging the quality of service provided to the customers in the value chain; and

- Unauthorized access to client data and personal information, potentially leading to claims for financial compensation or criminal charges.

Typical security vulnerabilities experienced interconnected systems include:

- Denial of service attacks;

- Unauthorized access to stored data;

- Unauthorized read access to data in transmission;

- Unauthorized alteration of data in transmission

- Unintentional access to resources

- Particular security vulnerabilities specifically related to Web Services include:

- Potential corruption of service registries;

- Bogus certificates;

- URL spoofing;

- IP spoofing;

- Denial of Service attacks sending large streams of apparently legitimate XML;

- Buffer overflow attacks on flawed processing libraries; and

- Flawed application exception handling leading to exposure of confidential information

It is important to set security measures within Peacox in the context of a wider security assessment. Guidance will vary for those companies who already provide access to their data through similar systems, compared with those who might only currently present data directly to end users through their own information services or through other proprietary interfaces. General guidance in terms of information security may be found in ISO/IEC 27002 (originally as ISO/IEC standard 17799:2005 and the technical report TR 18044:2004) establishes guidelines and general principles for information security management in an organization, and contains best practices in the following areas of information security management.

ISO/IEC 27035:2011provides advice and guidance on information security incident management, including examples of planning and documentation required, and the incident management process.

The Peacox Service Specification takes into accounts rights management components, which offer the necessary security.

Data Integrity and Data Confidentiality during transmission are handled by data encryption and digital signature techniques, Operators and Service Providers (mainly FLU and TMX), within the design of services, needed to consider that services and data may not be available, possibly due to an intentional Denial-of-Service attack.

Issue for service providers and service operators concern the fact that they are accessing data belonging to other content providers and service operators. Therefore they also need to be sure that their systems are secure and do not compromise the assets of these other parties, especially where only point-to-point encryption is employed between clients and servers in the value chain.

Privacy

The Peacox chain may give rise to several issues of privacy. It enjoys very wide protection both at the Community level and at the level of the national laws of each Member State. The right to privacy applies to individuals with respect to their personal data. The Peacox chain deals with the exchange of data of different kinds relating to facilitating the mobility of individuals at a European level. To this respect several kinds of data are exchanged. Within the services defined should to distinguish between:

- data provided by content owners,
- data provided directly by end users while using these services, and
- data collected by service providers from end users while administrating the service (e.g. data on the profession of the end user).

Data provided directly by end users while using Peacox services will mostly raise the privacy issues. Such privacy data might identify the segment/route of the user, starting and end point of the planned journey, actual position, etc. This is not surprising, since Peacox is based to a certain extent on personal data provided by end users in order to provide more valuable services. On the other hand, it could noted that among the information typically provided by Peacox content owner/provider the only kind of information that at least raise privacy issues is the information generated by traffic sensors.

However, Peacox respects the rules set in the:

- European Directive 95/46/EC regarding the processing of personal data, in the
- European Directive on privacy in electronic communications, and in the
- European Directive on the retention of traffic and location data.

All actors of Peacox faced with issues of privacy should develop a detailed privacy policy, reflected in a privacy statement made available to end users.

Article 4 of Directive 95/46/EC specifies that the national law implementing the Directive that will apply to each controller is the national law of the Member State were the controller is established. This provision is very important for services such as Peacox services (which are typically provided to end users of different European nationalities) because it enables each Peacox actor to rely on its own national law for the processing of all personal data in his possession, irrespective of the nationality of the data subjects.

If the applicable law was the national law of the data subject the controller should apply the national law of each data subject when processing the correspondent personal data. Such a regime would make processing more complicated and costly.

Directive 95/46/EC applies to the processing of personal data wholly or partly by automatic means, and to the processing otherwise than by automatic means of personal data which form part of a filing system or are intended to form part of a filing system (Article 3 Directive 95/46/EC). Collecting, recording, storing, consulting or disseminating personal data all qualify as processing. So whenever an Peacox service provider collects personal data from its end users, such as names, phone numbers, etc, the rules of the directive will have to be complied with if the processing is done by automatic means. This will be the case for all Peacox services, as the personal data will be transferred and/or will be stored in server or computer databases. Before carrying out any - wholly or partly - automatic processing operation the Peacox actor needs to notify the national supervisory authority. In some cases national laws may provide for a simplification or exemption from notification (Article 18.2 Directive 95/46/EC).

Peacox services will be delivered through electronic communications systems such as the Internet, mobile phones, GPS. Therefore, the regulation set forth by **Directive 2002/58/EC** will apply. This regulation is mainly concerned with electronic traffic data (i.e. data processed for the purpose of the conveyance of a communication on an electronic communication network) or location data (i.e. data indicating the geographic position of the terminal equipment of the end user). Peacox Service providers have to inform endusers of which types of electronic traffic data are being processed and how long they will be kept. When Peacox service providers want to process the data for marketing purposes (e.g. processing the time of the user's communications, in order to offer him varied rates depending on the moment of the day he uses the communication network), they have to obtain consent from end users prior to the processing.

Directive 2006/24/EC deals with the retention of traffic and location data generated or processed in connection with the provision of publicly available electronic communications services. It will therefore apply also to the Peacox services. This regulation is aimed at making traffic and location data available to public authorities in order to enable them to investigate, detect, and prosecute

serious criminal offences. The exact definition of what represent an offence serious enough to justify retention of such personal data is left to national laws implementing the Directive. The minimum principles provided for by the Directive are the following:

The retained data shall be of the same quality and subject to the same security and protection as´those data on the network. The data shall be subject to appropriate technical and organisational measures to protect the data against accidental or unlawful destruction, accidental loss or alteration, or unauthorised or unlawful storage, processing, access or disclosure. The data shall be subject to appropriate technical and organisational measures to ensure that they can be accessed by specially authorised personnel only.

The data, except those that have been accessed and preserved, shall be destroyed at the end of the period of retention

Service providers within Peacox will also face issues relating to consumer protection, to the extent that end users they contract with are consumers. The two relevant legal instruments to this respect are the **Directive 1997/7/EC** on the protection of consumers in respect of distance contracts and the **Directive 1993/13/EC** on unfair terms in consumer contracts. Both Directives define 'consumer` as any natural person who is acting for purposes, which are outside his trade, business or profession. Both Directives set forth a set of rules that are mandatory in the sense that the contract between the Service provider and the consumers may not opt out of this regulation.

All legal issues that have been discussed so far (Privacy and Consumer Protection) have been - wholly or partly- harmonized by Community law through the use of Directives.

Harmonization of national laws is extremely useful to services such as Peacox because it enables the different actors of the chain to operate within a much simpler legal framework. It should be noted however that harmonization through Directives does not imply that each actor of Peacox with deal with one and the same law with respect to the different legal issues of relevance.

Interoperability of services and products

Interoperability of the Peacox services and products is one of the really important issues within this project, where missing fully-interoperable approach is one of the main obstacles hampering the implementation of seamless, Europe-wide, multi-modal traveller information services, although there are many services at national level. This requirement leads to use relevant:

Standardisation and standards used

For European projects, in contrast to the national projects, systems and interface standardisation and open system architectures are of great importance, as well as large scale pilots in different cities of the member states. The standards that are used within Peacox are discussed in this section. The afterwards section will deal with the Peacox contribution to standards.

Standards are required to ensure compatibility. Standards and compatibility are particularly relevant when the various sub-systems and components may be produced by a number of different

manufacturers. The obvious standards that will be needed are concerned with communications between sub-systems and components, but "simple" communications standards are not always sufficient to produce a working and workable system. Of equal importance are the data that they use, and the behaviour of the sub-systems and components at each end of the communications link, e.g. can one end produce information in time for the other to make use of it, and will the receiving end understand the units and format in which the data is being provided.

The Peacox project rely on detailed analysis of available standards and their affect to the Peacox system performed within the In-time and eMOTION projects, where relevant parts have been updated for using during development phase of Peacox project. The analysis has been made by classifying standards in:

- Content standards
- encoding standards
- services standards
- network and communication standards

For the content standards the following domains have been considered:
- Road Network Data
- Public Transport Network Data
- Inter-modal Transport Network data
- Location Referencing
- Public Transport Service Data
- POI and other categories
- Data for Public Transport Journey Planning
- Data for Inter-modal Journey Planning

For the service standards the following domains have been considered:
- Application Service
- Data Service
- Mapping Service
- Routing Service
- Public Transport Journey Planning Service
- Positioning Service

- Directory Service

- Geocoding service

- Coordinate Transformation Service

- Registry / Catalogue Service

- Digital Rights Management and Security

- Workflow support

- Natural Language Translation

General IT standards useful for the purpose of Peacox have been investigated. It's important to outline that the design of the architecture is based on the European ITS Framework Architecture (EITSFA, short FRAME) for the e-service focusing on interoperability and intermodality. For the geographical information and geo-informatics standards based on ISO/TC 211 and OGC (Open Geospatial Consortium) are basis for spatial Data Infrastructures (SDIs), and are currently emerging on regional, European and world wide scale. Therefore a special focus has been given to mentioned standards.

The most relevant and well-established European and international standards for all the domains of interest for Peacox can be examined as: ISO (TC204, TC208, and TC211), OGC, OASIS (Organisation for the Advancement of Structured Information Standards), CEN and selected defacto standards and projects of interest such as: ALERT-C, DATEX 2, DELFI, FRAME, GDF, JourneyWeb, OTA, SIRI, TPEG, Transmodel, TransXChange, etc.

Concerning content, it seems obvious that Peacox system cannot be based on a unique network model. There is GDF (ISO 14825) being an international and widespread standard with an extensive, high quality database offered by two commercial vendors, which is the basis of nearly all navigation applications worldwide.

Location Referencing can be done by various means, where modern developments like TPEG-Loc or OPEN LR were also considered.

The results of the comparison of content standards regarding the domain of individual traffic (traffic data, traffic messages, parking) appear that most of the harmonisation work in this domain has already been carried out by the DATEX 2 specification, which can therefore be employed as the basis for the modelling of traffic data. Incidentally, DATEX 2 also uses a variable Location Referencing scheme, which in this case comprises RDS-TMC location codes, TPEG-loc, and the use of coordinates.

Additionally there is a CEN standard, named Transmodel (EN12896), which, being a reference model, appears to be the basis of most of the many public transport standards. However, Transmodel is a very complex and very abstract standard – it is a comprehensive reference model fitting all needs in the public transport domain.

5.2 Standardization outcomes from Peacox project

Through the observation of national and international standardisation bodies, members of the Peacox project team reflect the development of standards in several areas. Results of technological developments in Peacox related to international standardisation should be brought into discussion with the relevant bodies via representatives of Peacox. The discussions within the standardisation bodies will be fed back to the project results operating.

Standardisation body / area of standardisation

- ATE ON-K220 (national) Telematics in Road Transport

- ATE CEN TC 278 Strategy Group Transport Telematics

- CEN/TC278 Transport Telematics

- ISO/TC211 digital geographic information

- OGC Open Geospatial Consortium

- ADASIS Forum Advanced Driver Assistance Systems Interface Specifications

- PSI Public Services International

- TISA Traveller Information Services Association

Here is a set of standards which members of Peacox consortium currently monitor; CURE expects contributions to these standards, as well as a knowledge gain regarding usability and user experience:

- ISO 9241 – 20:2008 Ergonomics of human-system interaction – Part 20: Accessibility guidelines for information/communication technology (ICT) equipment and services. Contribution is possible in forming ISO standards through national ISO members.

- ETSI – European Telecommunication Standards Institute. We are mostly interested in the technical body called Human Factors and User Group that include accessibility, user-friendly design, user interface concepts and other issues of human-computer interaction. Related standards and on-going discussions are available at

  o http://portal.etsi.org/portal/server.pt/community/USER/340

  o http://portal.etsi.org/portal/server.pt/community/HF/311

- W3C – Web Content Accessibility Guidelines 2.0 (WCAG2), Accessible Rich Internet Application (WAI-ARIA), [and Mobile Web Best Practices (MWBP) [].All of these are guidelines that have been developed by the World Wide Web Consortium (W3C) and specify ways that web pages or web applications can be made accessible to different devices and users on the web.

ICCS is mostly interested in standards related to personalization and user modelling. Furthermore, for a broader and inclusive knowledge, we also keep track of standards related to interface description and task modeling. ICCS expects to reuse, if applicable, and contribute, if necessary, to:

- Standards of the European Telecommunication Standards Institute (ETSI) and in particular:

  o ETSI TS 102 747, 'Human Factors (HF); Personalization and User Profile Management; Architectural Framework': the specification describes the main requirements of user profile management architectures and provides recommendations on addressing these requirements.

  o ETSI ES 202 746, 'Human Factors (HF); Personalization and User Profile Management; User Profile Preferences and Information': the specification provides a set of user profile preference and information settings for deployment in ICT services and devices for use by ICT users and suppliers.

- Standards of the World Wide Web Consortium (W3C), and in particular:

  o W3C Composite Capability/Preference Profiles (CC/PP): this W3C recommendation provides a description of device capabilities and user preferences and can be used to guide the adaptation of content presented to the device.

  o W3C Delivery Context Ontology: this standard provides a formal model of the characteristics of the environment in which devices interact with the Web or other services. The Delivery Context can be exploited to create context-aware applications, thus providing a highly personalized user experience.

- ISO/IEC 24751-2:2008, 'Individualized adaptability and accessibility in e-learning, education and training': the specification provides a common information model for describing user needs and preferences when accessing digitally delivered resources or services.

- IMS Access for All Personal Needs and Preferences Description for Digital Delivery Information Model': this standard is mainly focused to digitally based education and learning, nevertheless it can be useful when addressing the task of delivering digital resources that meet a user's needs and preferences.

6. PEACOX commercial exploitation plan

6.1 Existing market – analysis for (sustainable) navigation/travel applications

There has been provided first market analysis for further sustainable operation of Peacox system and using its components within D8.3 Initial exploitation plan.

The consortium wanted to know, if there is any similar commercial solution like Peacox system or if consortium member could expect this approach within navigation/journey planner area in near future.

This analyzes concluded widespread diffusion of Journey Planners in European and Worldwide context, but beside this showed opportunities for using Peacox technology, e.g.:

- All the relevant examples considered are based on a web portal and in many cases a specific deal is paid to the usability for mobile devices. They can be clustered according to two main categories dealing respectively with individual and public transport. In fact only in few cases (e.g. anachb.at) a joint evaluation of both kinds of travels is performed.

- Concerning individual transport, apart from routing capabilities provided by commercial GPS navigation device, the analyzed cases are mainly Traffic Information systems managed by owners of infrastructure (especially motorway). They are usually characterized by a vast set of additional information but is lacking the integration of two relevant aspects:
  - Combination of real time traffic monitoring and re-routing functions
  - Integration of cross-border information in the single systems

- Public transport journey planners, instead, can range from a well devised timetable information provision to a complete multimodal journey planner. The level of representation in many cases reaches a high level of performance and usability.

- Travel and Traffic Information Systems (TTIS) could be characterized by an impressive acceleration in the recent years. In fact it profited from the growth and diffusion of Internet and it was stimulated by the needs of tourism industry and of growing number long distance travelers too.

In Peacox project deliverable D2.1 Description of User groups and travelling context (chapter 7.1) can be found a list of existing commercial traffic information systems that support users to travel more sustainable. In the table are shown information about the product itself, the producer as well as a web link and a description of the traffic information systems.

But beside this, it can be concluded that there are a few multimodal navigation/journey planners available at national level, but none of them cover more than one country (except Google) and **no one from big player on relevant navigation application market use approach similar to Peacox project with its persuasive strategies and whole service chain for e.g. transport mode detection, CO_2 footprint etc**.

	Tomtom	Navigon	Sygic	iGo	Google	Copilot	Wisepilot
Door-to-door emission model	No	No	No	No	No	No	No
Eco-driving and the emission exposure model	No	No	No	No	No	No	No
Behavioural model	No	No	No	No	No	No	No
Trip purpose detection	No	No	No	No	No	No	No
Guidelines for designing persuasive strategies within the mobility context	No	No	No	No	No	No	No
Peacox server	No	Multimodal route search engine	No	No	Multimodal route search engine	No	No
Recommendation component	No	Alternative routes	Alternative routes	No	Alternative routes	No	No
Multimodal journey planner client	No	No	No	No	No	No	No
Multimodal navigation client	No	InApp	No	No	Yes	No	No

Tab 3: Functionality of common commercial navigation application

6.2 SWOT analyzes for each Peacox component (output) suitable for commercial use

6.2.1 Door-to-door emission model

S: This functionality is currently not used by provider of commercial navigation. Possible new functionality for such software

W: Actual version needs computation power at server side, wireless connection is necessary to get emission estimation for concrete calculated route

O: Emission calculation can be simplified and moved to mobile client with really on-line response.

T: End- users will not want to pay extra money for such functionality, simplified version can be easily included to existing (navigation) clients provided by navigation software developers.

6.2.2 Eco-driving and the emission exposure model

S: This functionality is currently not widely used by provider of commercial navigation. Using such functionality can still be advantage for such software.

W: Actual version needs computation power at server side, wireless connection is necessary to get emission estimation for concrete calculated route

O: Emission calculation can be simplified and moved to mobile client with really on-line response.

T: End- users will not want to pay extra money for such functionality, simplified version can be easily included to existing (navigation) clients provided by navigation software developers.

6.2.3 Behavioural model

The SWOT analyze and arguments are the same as for door-to-door emission model.

6.2.4 Trip purpose and transport mode detection routines

S: High accuracies above 80% for a variety of participants.

W: Time intensive. Even with learning, big differences of quality between participants.

O: Useful for researchers and public authorities surveying travel behavior or further developing routines (open source).

T: Needs high resolution data (1Hz GPS).

6.2.5 Prompted recall application

S: Mobile, easy to use application to correct travel diaries.

W: Focuses on trip purpose and activity type only.

O: Researchers and public authorities surveying travel behavior using smartphones. Screens for questionnaires could be added.

T: Small display makes it hard to show all information (map).

6.2.6   Guidelines for designing persuasive strategies within the mobility context

S: New, up to date guideline reflecting actual trends for persuasive strategies.

W: This guideline is available as public deliverables.

O: This guideline can be used for different mobile application.

T: We cannot expect real income for selling standalone guideline.

6.2.7   Peacox server

S: Unique technologies developed for field trial, can be used for commercial operation without huge additional costs.

W: Commercial operation has higher requirements for testing and reliability of system.

O: Peacox server can be commercial advantage for Fluidtime.

T: Other competitors can prepare similar solution within aprox. one year.

6.2.8   Recommendation component

S: Choice architecture strategies are not considered in route planning applications which only rely on the user to provide proper configuration options to generate results.

W: Data interfaces are based on the PEACOX API definitions. Modifications are required for usage by other applications.

O: Increasing urbanization and availability of numerous multimodal transportation options require approaches that personalize and filter routing results according to the user needs and promote greener options, which mean that solutions like our offering are required.

T: Competition is always an issue since for example Google and Microsoft already provide route planning applications and can offer similar functionalities in the future.

6.2.9   Peacox journey planner client

S: New, very nice application using latest graphic trends.

W: It is journey planner, small restriction for car navigation and off-line using.

O: Peacox journey planner client can be platform for further development and additional functionality.

T: Competition with for example Google and Microsoft, which already provide route planning applications and can offer similar functionalities in the future.

6.2.10 Peacox navigation client

S: New, offline car navigation with integrated multimodal navigation and other functionalities

W: Still not final commercial solution, need time and effort to cover two main operating systems Android and iOS

O: Using freemium model and Openstreetmaps can increase number of end users remarkable.

T: Competition with other navigation apps.

6.2.11 Project Website

Project website is probably not suitable for further commercial operation.

6.3 TMX

TMX is focused on development of multimodal navigation client using other functionality available within Peacox project. TMX suppose to integrate these results of development to its commercial navigation Dynavix, which is currently available for Android and iOS operating systems at Google play and AppStore.

Based on fact, that FLU wants to operate Peacox server with minimum operational costs after end of Peacox project, for TMX is highly desirable to prepare simplified version of Peacox outputs, which could be operated independently either as a part of navigation client or as a part of Dynavix server. TMX consider these Peacox outputs as a most promising:

- Simplified recommendation component (Context Aware and Personalized Routing Results)

- Simplified eco-driving and the emission exposure model

- Simplified trip purpose detection

Integrating all these functionality requires probably more effort compare to development for field trial due higher requirements for testing and reliability of whole server and mobile client solution, which should be prepared not only for Android but for iOS too.

TMX wants continue with development of its Peacox navigation client beyond second field test to be prepared for using Peacox project results as a part of commercial navigation software Dynavix.

There should be used all channels or promotion of new technology included in Dynavix navigation, e.g. Facebook community, Twitter, dedicated website, email communication with Dynavix users, newsletters for them.

Telematix has issued first version of its web – based multimodal journey planner, which cover Prague and surrounding area, South Moravia area and Vienna. The server solution developed "behind" this web solution will be used for communication with next generation of Dynavix navigation systems, where it is supposed to integrate new functionality together with output from Peacox project:

- Multimodal navigation for whole Czech republic

- Multimodal navigation for connected area

- Integration of Mirror link technology

- Improving of handling of actual traffic data together with traffic cameras

- etc.

Telematix can see as a big opportunity for further system development application of EC Directive 2013/37 (re-using of public sector information), which should entry to national legislation at the end of Q2/2015, and where new sources of navigation-related data should be available.

6.4 FLU

FLU is focused on development of the integrated mobility client where all components from the project partners are integrated. The interest of FLU is on one hand the innovation in respect to the interface of the integrated mobility client. Another important aspect is the role of the integrator within the PEACOX project. The knowledge gained within the PEACOX project can be used within further research or commercial projects.

Furthermore, the integrated client, including all the components from other partner, can be used in a commercial sense, for example a public transport operator is interested in the overall solution.

The PEACOX integrated client will be promoted on all channels, including Social media, website and leaflet.

6.5 Tomtom

Exploitation of Peacox project results was discussed with Tomtom and it is obvious, that final decision cannot be made at this operating level. In the other hand, there is chance to use Peacox project outputs at least for improving several current Tomtom product functionalities:

- Door-to-door emission model – Tomtom has some similar functionality for its car navigation, maybe it's relevant to improve it with these findings in case they provide much better results.

- Trip purpose detection – potentially this could be good chance for integration, final decision is based on the quality of the detection, the kind of data/sensors and processing power it requires and the modes it can detect reliably without a cold start.

Tomtom has access to all project development and testing results but further commercial using cannot be declared at this moment.

6.6 **Operating of developed Peacox server and clients after end of March 2015**

Using Peacox project results and operating Peacox system after March 2015 can be split to two main parts:

- Peacox components, which cannot be used without additional city related data (such a maps, multimodal route planner and emissions model)

- Peacox components, which can be used without additional city related data (such a mobile clients, persuasive strategies or simplified mode detection)

First group of project results would be operated by FLU for Vienna and Dublin after March 2015 with minimized operating costs. FLU declared their aim to continue with development of this platform within next R&D project or upon request from Vienna public authority.

Second group of results is supposed to use as a part of commercial route planner AnachB and navigation Dynavix together with sharing stand alone parts of system under open public license.

7. Conclusions

This document summarizes the final exploitation plan, that is, the envisaged overall post-project exploitation strategy. The report is an extension of the initial exploitation plan D8.3, containing an extended and updated description of various project outputs and relevant market together with related business models and strategy for at least three years after project end.

In consistency to the overall exploitation strategy, the main aim for scientific exploitation is to use project results as input for next R&D projects or as a basis for consultancy activities. Commercial use of project results would be focused on the extension of functionality of currently operated navigation (Dynavix) and journey planner (AnachB.at) services. Consortium members expect also consultancy activities besides these two main products.