

GOVERNANCE OF THE INTEROPERABILITY FRAMEWORK FOR RAIL AND INTERMODAL MOBILITY

D2.1 Analysis of the demand of travellers for the TC

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EXECUTIVE SUMMARY

The objective of the Governance of the Interoperability Framework for Rail and Intermodal Mobility project (GOF4R) is to define sustainable governance for the Interoperability Framework semantic technologies that are being developed under the IP4 Shift2Rail programme.

Within IP4, the objective is to create a seamless multimodal travel experience by providing travellers with smart personalised services to facilitate each stage of the journey. Travellers can access all these services through their 'Travel Companion' (TC), which functions as a 'front end' user interface, giving users full control of their door-to-door travel experience. Travellers can use the Travel Companion (which considers personal preferences, including mobility constraints) to plan their trip, manage bookings, validate entitlements, navigate at interchanges and, in case of disruptions, find alternative solutions for re-routing and re-accommodation. In the 'back end', the 'Interoperability Framework' (IF) guarantees technical interoperability of multimodal services by insulating consumer applications from the task of locating, harmonising and understanding an open-ended world of data, events and service resources, which are consequently made available 'as a service'.

In order to design and develop a sustainable and successful IF governance, the requirements from the different actors in the transport chain need to be mapped and analysed. This Deliverable D2.1 presents the outcomes of Task 2.1 within GOF4R, which focuses on the "Analysis of the consumer demands and interest in using the TC capabilities". The needs and requirements of other market actors (operators, authorities, service providers) are addressed in a separate Deliverable D2.2 "Analysis of the demand of market actors for the IF".

Travellers do not interact directly with the Interoperability Framework. That is why in this Deliverable the focus will not be on the Interoperability Framework as such but rather on the different functionalities developed based on or thanks to the IF, which the traveller can access through his/her Travel Companion. This report identifies and describes conditions for a large market uptake of the Travel Companion approach by the end-users: the travellers.

As a first step, the Travel Companion has been 'deconstructed' into its consumer-oriented capabilities and interaction points (Section 2).

For each interaction point, a series of assumptions have been formulated with regard to factors (incentives, needs, constraints, barriers) that could influence the consumer uptake of the TC approach. These assumptions were validated by means of interviews with stakeholders (Section 3).

Workshops have been organised in Belgium, Italy, Slovakia and the Czech Republic, in order to better understand the conditions for market uptake of the Travel Companion approach and to assess potential ethnographic differences between countries and cultures (Section 4).

Finally, the findings obtained during the interviews as well as the national workshops were presented and further discussed at a European-wide workshop with S2R IP4 and other experts (Section 5).

Deliverable D2.1 provides input for the task "Analysis of impacts on the governance solution" – and for its relevant Deliverable D2.3 (same title). Linking the research done in Task 2.1 and 2.2, D2.3 will formulate recommendations that can be used in other GOF4R Work Packages as well as in other Shift2Rail IP4 projects.

ABBREVIATIONS AND ACRONYMS

Abbreviation	Description
AI	Artificial Intelligence
API	Application Programming Interface
EPF	European Passengers' Federation
EC, EU	European Commission, European Union
GDPR	General Data Protection Regulation
GOF4R	Governance of the Interoperability Framework for Rail and Intermodal Mobility
GDS	Global Distribution System
GPS	Global Positioning System
ID	Identifier
IF	Interoperability Framework
IP	Innovation Programme
IPR	Intellectual Property Rights
IT	Information Technology
IT2RAIL	Information Technologies for Shift to Rail
MU	Masarykova Univerzita
NDC IATA	New Distribution Capability – International Air Transport Association
NFC	Near Field Communication
OTA	Online Travel Agency
PoliMi	Politecnico di Milano
PRM	Person(s) with Reduced Mobility
PTA	Public Transport Authority
PTO	Public Transport Operator
RSSB	Rail Safety and Standards Board Limited
S2R	Shift to Rail
TC	Travel Companion
TSP	Transport Service Provider
UNIZA	Zilinska Univerzita v Ziline
USFD	University of Sheffield
UX	User Experience
WP	Work Package

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1. INTRODUCTION

The objective of the Governance of the Interoperability Framework for Rail and Intermodal Mobility (onwards GoF4R) project is to define sustainable governance for the Interoperability Framework semantic technologies that are being developed under the IP4 Shift2Rail programme.

IP4 (IT solutions for Attractive Railway Services) is one of the Shift2Rail Joint Undertaking’s long-term Innovation Programmes. The ultimate aim of Shift2Rail (S2R) as a whole is to achieve a modal shift from road transport towards more sustainable transport modes such as rail.

Travellers are increasingly ‘connected’ and technology-savvy and expect to have relevant and real-time information at their fingertips in a few clicks, through a variety of channels. Within IP4, the objective is therefore to create a seamless multimodal travel experience by providing travellers with smart personalised services to facilitate each stage of the journey.

Travellers can access all these services through their ‘Travel Companion’ (onwards TC), which functions as a ‘front end’ user interface, giving users full control of their door-to-door travel experience. Travellers can use the TC (which considers personal preferences, including mobility constraints) to plan their trip, manage bookings and related payments, validate entitlements, navigate at interchanges and, in case of disruptions, find alternative solutions for re-routing and re-accommodation.

In the ‘back end’, the ‘Interoperability Framework’ (onwards IF) guarantees technical interoperability of multimodal services by insulating consumer applications from the task of locating, harmonising and understanding an open-ended world of data, events and service resources, which are consequently made available ‘as a service’.¹

In order to design and develop a sustainable and successful IF governance, the requirements from the different actors in the transport chain need to be mapped and analysed.

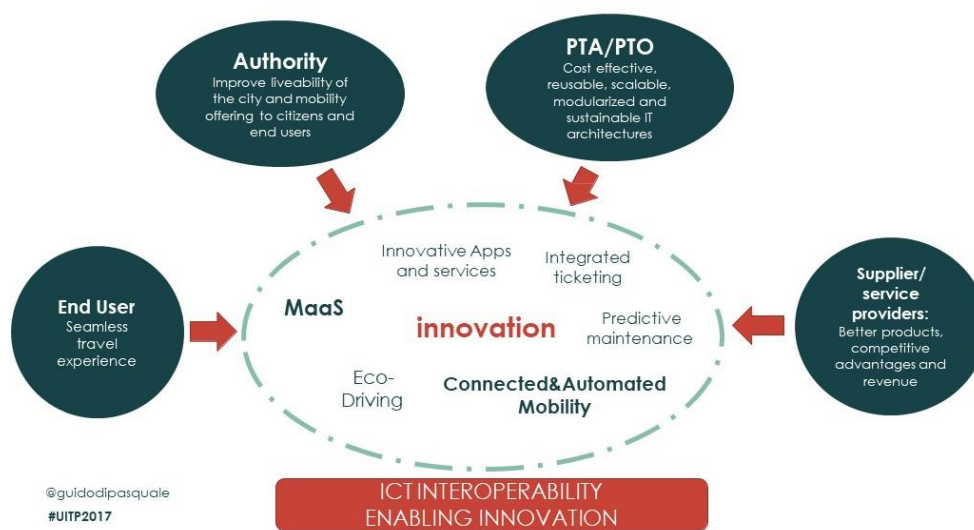


Figure 1: The different actors in the transport chain (UITP, 2017)

¹ IT2Rail Grant Agreement, Annex 1: Description of the action (April 2015), p.10 & IT2Rail D7.8 White Paper on IP4 concepts End-user applicability (EPF, 2017)

The objective of Work Package 2 “User Demand” within GOF4R is twofold:

1. Analyse market actors’ interests in the Interoperability Framework;
2. Analyse travellers’ demand for the Travel Companion.

This Deliverable D2.1 presents the outcomes of Task 2.1 which focuses on the “Analysis of the consumer demands and interest in using the TC capabilities”. The needs and requirements of other market actors (operators, authorities, service providers) are addressed in a separate Deliverable D2.2 “Analysis of the demand of market actors for the IF”.

Travellers do not interact directly with the Interoperability Framework or its assets. That is why in this Deliverable the focus will not be on the Interoperability Framework as such but rather on the different functionalities developed based on or thanks to the IF, which the traveller can access through his/her Travel Companion. This report identifies and describes conditions for a large market uptake of the Travel Companion approach by the end-users: the travellers, and is structured as follows.

As a first step, the Travel Companion has been ‘deconstructed’ into its consumer-oriented capabilities and interaction points (Section 2).

For each interaction point, a series of assumptions have been formulated with regard to factors (incentives, needs, constraints, barriers) that could (positively or negatively) influence the consumer uptake of the TC approach. These assumptions were validated by means of interviews with relevant stakeholders (Section 3).

Several workshops have been organised in Belgium, Italy, Slovakia and the Czech Republic, in order to better understand the conditions for market uptake of the Travel Companion approach and to assess potential ethnographic differences between countries and cultures (Section 4).

Finally, the findings obtained during the interviews as well as the national workshops were presented and further discussed at a European-wide workshop with S2R IP4 and other experts (Section 5).

Deliverable D2.1 provides input for the task “Analysis of impacts on the governance solution” – and for its relevant Deliverable D2.3 (same title). Linking the research done in Task 2.1 and 2.2, D2.3 will formulate recommendations that can be used in other GOF4R Work Packages, especially WP5: Governance and management structure for interoperability framework.

2. TC CONSUMER INTERACTION POINTS

The Travel Companion, as it has been developed in the IT2Rail project, is conceived as the interface between the traveller (user) and the travel and transportation network system which:

- supports the user in all phases of the travel: preparation, execution and after trip operations;
- stores travel-related documents.

IT2Rail focuses on a number of concrete use cases – specific instances of an individual traveller’s journey – that follow the traveller throughout the different stages of planning, booking and executing a multimodal journey, in order to better understand actual user needs along the way.

The use case approach is important because the traveller is placed at the centre of innovative solutions. The figure below presents such a use case, in which we capture the travel experience of a fictionalised character named Jane. The use case illustrates how the Travel Companion could assist Jane during the different phases of her journey.

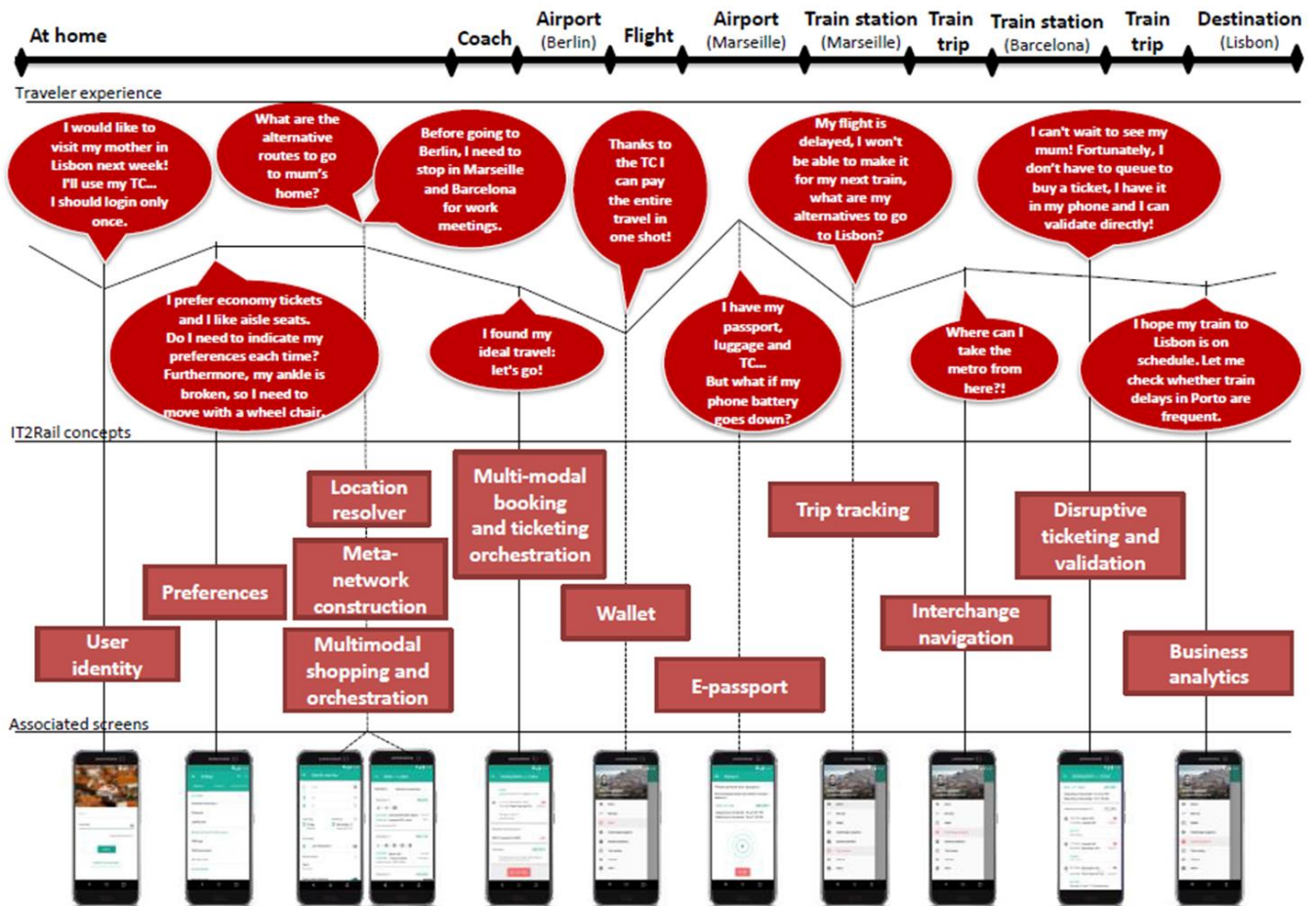


Figure 2: IT2Rail use case: Jane's travel (© IT2Rail)

Without entering into details about code information and IT technicalities, it is for our purposes interesting to consider the Travel Companion (TC) from an end-user point of view in order to understand how it could work in practice.

The IT2Rail concepts (figure 2) have been taken as a starting point to define 'consumer interaction points' i.e. all those situations in which the Travel Companion may assist the user in different phases of the travel experience. The main consumer interaction points are described below.²

User identity: In order to be able to use the Travel Companion, users will need to register and create an account. They will also be asked to provide some personal information (for ex. name, address, age, gender, e-mail address, phone number, payment details). The aim is that the Travel Companion will thus be able to provide the user with customised assistance and information.

² The Travel Companion concept is still very much in development. The list of interaction points is non-exhaustive and based on the current state as well as foreseen further developments within IT2Rail and subsequent S2R projects.

Preferences: A consumer will need to complement the user identity with their individual preferences. Some of these preferences may be transport related, e.g. PRM status, seating preferences, modal choices (possibly linked to weather or other circumstances e.g. week – weekend, business – leisure) and some may not be transport related, e.g. preferred social media, dietary needs etc.

Planning: Travellers can use the TC to plan their journey from A to B comparing different travel options and combining different variations of transport modes. The TC can provide personalised routing results according to the user’s specific travel preferences or needs, including for ex. the fastest or cheapest route. A user might re-iterate a planning request, altering input or preferences.

Buying: After planning a journey, a user will have the possibility of buying a ticket / entitlement. This is a separate step because not all planning will lead to buying.

Receiving entitlement: After paying for the journey, the ticket or entitlement will be stored in the Travel Companion (primary carrier). As a back-up (in case the smartphone cannot be used), the E-passport is planned to store data on the user’s journey within its NFC chip.

Information: A traveller will need different types of information during the trip: both transport related and possibly also non-transport related (e.g. information on the weather, shopping, tourist information, food and drinks, ...). The TC will be able to offer context-dependent information, based on the current location of the traveller (using the GPS and possibly the accelerometer in the user’s smart device), which could for ex. be useful in the case of navigation at interchanges.

Disruption: When a disruption occurs, a traveller will interact with the Travel Companion most likely a multitude of times to plan alternative solutions and to receive information.

After trip: After the trip, the user will be able to interact with the Travel Companion to give feedback on the trip and/or receive additional information in case something went wrong.

On-going communication: Since travelling carries a certain degree of uncertainty, a user will seek on-going communication throughout the journey.

A		Consumer interaction points	IT2RAIL concepts
On-going communication		User identity	User identity / E-passport / Wallet
		Preferences	Preferences
		Planning	Location resolver / meta-network construction / multimodal shopping / booking and ticketing
		Buying	Wallet
		Receiving entitlement	Booking and ticketing/ Wallet / E-passport
		Information	Trip-tracking / interchange navigation / business analytics
		Disruption	Disruptive ticketing and validation
		After trip	Business analytics
B			

Figure 3: Overview of TC consumer interaction points & corresponding IT2Rail concepts

For each interaction point, we aim to identify possible needs / expectations as well as barriers / constraints from the point of view of the end-user: the traveller. There is an extensive literature concerning the factors that can influence (positively or negatively) the adoption of new technologies by consumers. A brief synthesis of the seminal works in this field:

- Davis (1989) first introduced the concepts of perceived usefulness and ease of use.
- Then et al. (2003) defined the UTAUT (Unified Theory of Acceptance and Use of Technology) according to which the main concepts influencing the use of a technology are: performance expectancy, effort expectancy, social influence, facilitating conditions and attitude toward using technology.
- The UTAUT model has been refined in the UTAUT2 Model by Venkatesh et al. (2012) with the addition of some further factors: hedonic motivation, price value and habit.
- Wang et al. (2013), Pura (2005) and Slade et al. (2015) integrated the UTAUT model with other factors like perceived risk, trust, behavioural intentions, monetary value.

Different models coexist with a diversified range of factors, but it is possible to identify recurrent elements, that are consolidated in the literature:

- *Performance expectancy*: the degree to which using the Travel Companion will provide benefits to consumers in different phases of the travel experience (i.e. perceived usefulness)
- *Effort expectancy*: the degree of ease associated with consumers' use of the Travel Companion (i.e. ease of use, usability of technology)
- *Social influence*: the extent to which users perceive that important others (e.g. family and friends) believe they should use the Travel Companion and in turn promote it to their peers
- *Compatibility with current resources*: the degree to which the Travel Companion can rely on available resources / technologies like smartphones or similar
- *Habit*: the extent to which people tend to repeat behaviour automatically because of learning
- *Hedonic motivation*: fun or pleasure derived from using the Travel Companion
- *Value for money*: value / monetary benefit or superiority compared with alternatives
- *Perceived risk*: the perception of safety and security in providing private information
- *Reliability and trust*: the reliability of the information that users obtain and the trustworthiness of the provider (keep promises, keep consumers' interests in mind)
- *Learning effects*: the ability of the Travel Companion to learn from previous searches, preferences etc. to improve suggestions, routes, etc. to users.

In order to collect information on these and other factors that could influence the uptake and use of the Travel Companion, interviews were conducted with (UX) experts from various fields.

3. INTERVIEWS

The purpose of the interviews conducted within Task 2.1 was to collect information on:

- What are the needs experienced by the customers in connection to the TC?
- What factors are relevant 'in general' to explain customers' TC adoption?
 - What factors can obstacle the TC use?

- What factors can facilitate the TC use?
- What factors are relevant for each interaction point (cf. above) and how could they influence the customer acceptance and use of the TC?

We looked for potential interviewees with the following profile:

- Familiar with consumer-oriented ICT applications
- Preferably with expertise in consumer sciences (psychology, behavioural sciences, marketing, user-centred design, user experience researcher)
- Preferably with expertise in Human-Machine Interaction
- Can be a mobility professional but she/he can also be active in another sector as long as she/he has a strong consumer focus
- Aiming at a relative coverage of the whole mobility sector (local, urban transport, rail, car, aviation, ...).

In total, 17 in-depth interviews were carried out for Task 2.1 with experts from different countries.

Date	Interviewee (function)	Organisation	Country	Partner
24/07/2017	Lead	Waynaut	Italy	PoliMi
29/08/2017	Project manager	Digipolis	Belgium	EPF
30/08/2017	Researcher in marketing and consumer behaviour	Politecnico di Milano	Italy	PoliMi
31/08/2017	Product manager	Door2Door	Germany	EPF
01/09/2017	User experience expert	Fabriek	Belgium	EPF
07/09/2017	Responsible	Assoutenti	Italy	PoliMi
08/09/2017	Department of marketing and development	KORDIS JMK a.s.	Czech Republic	MU
11/09/2017	Manager Italy	BlaBlaCar	Italy	PoliMi
11/09/2017	Business development	LEO Express a.s.	Czech Republic, Poland, Slovakia, Austria	MU
14/09/2017	Transport consultant	Centaur Consulting Ltd.	UK, Europe	RSSB
15/09/2017	Technical Services expert	Rail Delivery Group	UK	RSSB
18/09/2017	Analyst		Czech Republic, Slovakia, Germany, Poland	MU
19/09/2017	Strategy and Innovation	Network Rail	UK	RSSB
26/09/2017	Manager	ZSSK a.s.	Slovakia and Central Europe	UNIZA
26/09/2017	Manager	BID a.s.	Slovakia	UNIZA
26/09/2017	Operations manager	WST	Slovakia and Central Europe	UNIZA
26/09/2017	Manager	RJ Slovakia a.s.	Slovakia, Czech Republic	UNIZA

Table 1: Overview of the interviews

To ensure basic information, uniformity and as much objectivity as possible, interview guidelines were developed including 28 prepared questions to structure the interviews.

The interviews were divided into 9 main sections related to the above mentioned ‘interaction points’ between the Travel Companion and its user. The answers have been recorded, translated into English and sorted to allow for comparison and analysis of the results. A summary of the results from each question is presented in the following section and finally conclusions have been made.

3.1 OVERVIEW OF THE INTERVIEW RESULTS

1. User identity

Q1: Do you think more people would use the TC if it is not necessary to register first? Please explain.

The respondents agreed that registration may form a barrier to acceptance of the Travel Companion. Issues raised included the speed of registration (and how this may put off persons using the TC for the first time, especially if they are in a hurry), and security and privacy concerns. Many interviewees stated that to make registration acceptable, the user should be clearly informed as to why certain information is required and that data should only be collected if it has a clear purpose, e.g. postal address is only needed if the customer wants tickets to be mailed to them; age may be required in order to select the appropriate ticket type e.g. adult, child, young adult discount; payment details are only required at the point of e-commerce or purchasing. It was also expressed that the number of steps before ticket purchase should be minimised to avoid putting off the customer.

2. Preferences

Q2: Do you think that the ability to indicate their preferences will be considered by users as an incentive to use the Travel Companion and/or could it be a barrier? Please explain.

The majority of interviewees wanted there to be basic functionality of the TC available without the need to register or express any preferences, e.g. a basic route planner. Others suggest that setting preferences should not be onerous and only be entered at the point where it is relevant, e.g. express preferred travel modes early on for the route planning, but other preferences such as class of travel, seat type etc. could be entered later at the point of booking a ticket. Entering many options initially is seen as a barrier. Again some of the respondents suggested that people should understand why they are being asked for the data and what will be the benefits to them: for some users it will be an incentive and provide additional benefits (e.g. information on accessibility is very important for PRM), but for other users it is less relevant and may get in the way. Saving preferences was identified as an incentive for persons to register on the Travel Companion. Several respondents also suggested though that it should be optional to the user whether or not their preferences are saved.

Q3: Preferences may be transport related, e.g. PRM status, modal choices or preferences, environmental impact choices, seating preferences, location preferences (preferred starting point, hubs), and some may not be transport related, e.g. preferred social media, preferred other means of contact, dietary needs etc. Can you think of any other preferences that are missing? Which ones?

Additional preferences suggested by the interviewees:

- Travelling with other people (friends, family, little children), pets
- Travel purpose: business / leisure (e.g. scenic route for tourists)
- Travel time – as short as possible

- Intermodal changes – minimised
- Crowding – avoidance of busy services or particularly busy places
- Type of vehicle (e.g. particular train types)
- Facilities available (e.g. in station)
- Information on meals and refreshments available / included during the trip
- Personal entertainment
- Availability and reliability of mobile data connectivity throughout the journey
- Luggage policies
- Travel classes
- Preferred operators
- Membership of loyalty schemes
- Ownership of season tickets / passes
- Privacy settings
- Communication language in the tool.

Several interviewees expressed that preferences should be weighted or ordered. For example, a user may select that they would like the fastest travel time and also personal entertainment available, but these might be incompatible, therefore there should be a way to prioritise these preferences.

Q4: Do you think the Travel Companion should 'remember' preferences from previous choices the user has made when planning / booking a trip?

All respondents replied that the Travel Companion should be able to remember preferences from previous bookings / travel plans. However, it was also suggested that this should be a setting that can be enabled / disabled, and that users should be able to easily clear (in one click) or edit their preferences at a later date. It was also mentioned several times that a single user might want to have multiple profiles with different preferences, e.g. business, leisure, travelling with family, and that it should be possible to select different preference profiles when using the Travel Companion.

3. Planning

Q5: When planning a journey, the consumer expects the following information as a minimum: travel modes, transfer points, travel & transfer time, cost. Are any important items missing from this list of basic information (e.g. accessibility, frequency, CO₂ emission, noise and air pollution, availability of seats, information on regular disruptions, ...)?

Cost and travel time were considered most important. Additionally, information could be included on:

- CO₂ and noise (identified by 6 interviewees – although many of these suggested that this is a low priority for many travellers especially during the route planning stage)
- Crowding / availability of free seats
- Frequency of service – especially if using a flexible ticket
- Accessibility
- Services / equipment on board and at different tariff points (e.g. air conditioning, meals, children's corner, luggage or bike transport, infotainment)
- Seat preference / business level
- Regular disruption information

- Recognise existing permissions to travel / season tickets / discounts – to optimise the journey if part is already paid for or discounted
- Availability and reliability of data connectivity
- Flexibility and opportunities along routes
- Time to interchange, distance to interchange, number of interchanges and time in between
- Name of operators and whether the operator participates in integrated transport
- Services at the destination – e.g. accommodation
- Legislative requirements and safety risk especially for international transport.

Q6: Should a Travel Companion be able to show some alternative options (longer journey, other dates, other points of departure or arrival etc.) which are more in tune with the preferences that a consumer has given? As example, online flight booking systems sometimes offer a matrix showing the prices on different days / times allowing the consumer to make an informed choice.

All interviewees responded that yes, the TC should show alternative options (e.g. Skyscanner type options: fastest, prettiest, cheapest), or provide alternatives for different days, times and costs. It should be noted that different customers have different levels of flexibility, e.g. a leisure traveller is potentially more flexible on departure dates.

Q7: Which barriers can you think of why travellers might not want to use the planning functionality of a Travel Companion?

Identified barriers include:

- Complexity of planning tool
- Information accuracy / trust / credibility
- Existing apps or habits / competition from other apps
- No offline functionality
- Desire for human interaction (phone / in person) and/or low computer literacy
- Privacy
- Cost
- Lack of options / flexibility covering personal needs
- Language
- In some cases, it may be quicker to decide for yourself e.g. a lot of luggage = car, long distance = flight.

4. Buying

Q8: Can you think of any barriers why users would not want to buy a ticket through the Travel Companion? (e.g. related to ease of payment, trust and secured payment options)

Ease of use was highlighted and the ability to save payment details is expected to simplify future payments (Amazon 1-click payment was mentioned as a good example). However, all interviewees were concerned about trust, with regard to pricing (will the TC offer the best deal?) as well as security of online payments. PayPal was mentioned twice as a trusted commercial operator providing the user with confidence in the payment system and a level of guarantee.

The main barriers mentioned during the interviews include:

- Trust – trust in the commercial integrity / safety of online payments
- Trust – trust in pricing and getting the most appropriate ticket price
- Lack of guarantees / refunds
- Lack of flexibility / ability to build a journey according to customer requirements e.g. split ticket
- No access to credit card or credit
- Caution / unwillingness with regard to online payments
- Security / cyber security
- Privacy
- Lack of ticket integration; lack of ability to use existing entitlements e.g. rail cards
- Having to print own tickets
- Unavailability of preferred payment method (may differ from country to country).

Q9: Do you think that the Travel Companion should offer a choice between pre-paid and post-paid?

The opinions of the interviewees were very mixed on this question. Some respondents felt that users should be offered a choice. Many felt that pre-paid was the most common for transport currently; travellers are used to it and it is considered more economically sustainable. However, others felt that especially for long and expensive journeys or for frequent travellers post-paid could be an interesting option. It could also be easier to arrange a refund in case of post-paid settlement.

Q10: What if the buyer is not the traveller? Should the Travel Companion offer the option to buy a ticket for another person / group of persons, and if so, how?

The interviewees unanimously agreed that the TC should allow for the user to buy tickets for other persons or for a group of travellers, even though it may not be that easy to implement from a technical point of view. Ideas on how this should be done include:

- TC asking to enter the personal information of other travellers
- Allowing for a ticket to be sent (in electronic or printed form) to the traveller
- Giving the traveller a code for ticket collection.

Third party buying could be less important than group buying (e.g. a couple or family including the TC holder). It is considered especially useful in case of under age, PRM, elderly travellers / family members, people who are not able to speak the language of the TC or are not able to use technology.

5. Receiving entitlement

Q11: The ticket will be stored in the Travel Companion (primary carrier). As a back-up (in case the smartphone cannot be used), the E-passport is planned to store data on the user's journey within its NFC chip. Do you think this is a good solution or can you think of alternatives?

The term E-passport appeared to cause some confusion amongst the interviewees. Some interpreted it as being the national passport issued by their country's passport office. To others it was viewed as a separate document/card issued by transport providers, a permanent reusable ticket.

Interviewees expressed concerns related to writing data to a national passport. People may not wish to carry their national passport for non-international journeys, for ex. in the UK. There is the issue of trust in those accessing and writing data to the NFC chip. Also, users cannot see whether their ticket

has been correctly stored on the NFC chip, which led respondents to show a preference for other possibilities such as QR codes on a smartphone or available to print at home, or collecting a printed ticket at a tariff point. It is interesting that nowadays, the focus is mainly on smartphones and apps, however many more options are either already available or around the corner, e.g. a contactless payment card, wearables or facial recognition / biometric data (e.g. to automatically open barriers).

Q12: Do you think that the user prefers one ticket / entitlement for the whole journey or should there be a distinction between its different parts?

Opinions were divided on this question. It was generally thought that one ticket is preferable as it would offer simplicity to the user. However, interviewees expressed their concern that there should be the option to change segments during the journey, to offer greater flexibility. In case of a single ticket, the crucial question is: who holds the customer contract and the associated travel risk. Does the customer know what he is getting, and from whom?

Q13: Do you think there should be an option to cancel or change the ticket (e.g. change the date, seat etc.)?

All the interviewees agreed unanimously that there should be an option to change or cancel a ticket. For some cases there may be fees for cancellation or greater costs for a flexible / adaptable ticket (pay more for less risk: non-refundable tickets are cheaper than full-flex ones).

6. Information

Q14: Is it useful that the Travel Companion provides non-transport related information (e.g. weather, food and drinks, shopping, tourist information) as well and if so, which are most relevant?

There were mixed views on whether the TC should provide such information. Many saw little extra value, as people tend to use other platforms (e.g. social media like Facebook, specialist sites like Tripadvisor) for the majority of this kind of information. It should in any case be optional. There were also mixed opinions about advertising, with some feeling that targeted advertising was important for monetising the TC, while others thought that it would be a distraction and frustrate users.

In addition to the information listed above, relevant non-transport related information could include:

- Destination information e.g. language, emergency phone number, hospitals, ...
- Facilities in stations
- Toilet locations
- Potential shopping options.

Q15: The Travel Companion will be able to offer context-dependent information, based on the current location of the traveller (using the GPS and possibly the accelerometer in the user's smart device). Could this be a barrier for using the TC or do you think it will more likely be an incentive?

The majority of interviewees felt it wasn't a problem: customers are used to smartphones using location services and it could provide context-related information. But it should be filtered for relevance and not be too intrusive. Others suggest that it should be possible to switch off the location services. If people want to know about "everything near my current location", they can use Google Maps. The question was raised whether the Travel Companion wants to be compete with that.

7. Disruption

Q16: Which kind of assistance should be offered by the Travel Companion in case of a disruption? (planning an alternative route, offering the possibility to 'buy' a new ticket, offer also non-transport related information e.g. on accommodation, food & drinks nearby or entertainment etc.).

Types of assistance suggested include:

- Alternative route planning
- Flexibility of payment options / ticket validity / possibilities to get new tickets
- Accommodation
- Rights and compensation / discounts / insurance
- Entertainment
- Delay information
- Effect of delay on connections
- Tourist information
- Contact form
- Information on reason for delay.

Alert services (simply informing the user about a delay) are not new, look-ahead information is more helpful: the user needs to know what the impact will be on the trip. In case of disruptions, travellers get cross or worried, or both. The TC should give them the impression of having control over fixing the problem, by giving the best alternatives right away, based on real-time info. Ideally, the customer doesn't have to do anything, the TC sorts everything. It was noted though that in reality, sometimes there may be no easy fixes other than "take the next one" or "get a cab".

Q17: Should the Travel Companion only communicate about how the journey is going in case of disruptions or also reassure the user during the journey if everything is going according to plan?

The responses to this question were fairly evenly mixed between those who felt additional information could be annoying and useless, those who thought that it may be reassuring, and those who thought it should be optional.

8. After trip

Q18: Should the user be able to provide feedback at the end of the trip and/or during the journey?

The majority of interviewees thought that users should be able to provide feedback and that it is important to collect this feedback. However, some responded that it should be optional and simple e.g. smileys. Also users might want to see the aggregated feedback from all users for particular services, to use like reviews. One interviewee thought that it is only relevant to collect feedback if something has gone wrong and another interviewee thought it was not useful to collect feedback.

Q19: On which aspects of the journey should it be possible to provide feedback?

Users should be able to give feedback especially on the following aspects:

- Feedback about the trip itself / journey quality / delays
- Feedback about the TC tool – technical errors / service of TC / finding and buying tickets

- Rights in case of disruption / compensation
- Help and guidance during journey
- Alternative schedule / connections in the case of delays
- Reciprocal feedback e.g. passenger and driver provide feedback on each other
- Ancillary services.

Q20: What kind of information should the TC offer the user after the trip has finished? (e.g. lost property, how to file a complaint, information on passenger rights, how to claim a reimbursement)

Many interviewees suggested that the TC should store information from the trip so that users can check how the actual journey went compared to the planned journey and have the ability to claim compensation – if applicable. The TC should provide information on:

- Contact details of the transport company
- Passenger rights
- How to file a complaint?
- Helpdesk (lost and found)
- Travelling statistics for user (km travelled, travel time, average speed)
- Information about increased safety risk at the destination
- Accommodation.

9. On-going Communication

Q21: Do you think it is necessary for users to be able to ask for help or assistance at any time during the trip? Can you think of any user groups for whom this may be an extra incentive to use the TC?

Interviewees unanimously agreed that users should be able to ask for additional assistance. In case of problems with other passengers / violence, it would be useful to be able to contact police or the service provider. Groups that may need special support include PRM, infrequent travellers, unaccompanied children, older persons, non-native speakers etc. Whether the TC will be able to address all these needs efficiently, and is trusted to do so, is another question. For example, some groups that would benefit most from assistance, e.g. elderly passengers, are less technically able and may not be capable of using the TC; hence for such passengers, phone assistance or personal contact (with a specialised service) may be more appropriate. One interviewee suggested that the additional cost of assistance should be paid for by the user as an additional service.

Q22: Which options for on-going communication should be offered by the TC? (e.g. chat functions – social media – hotline (phone number) – scan QR codes in the vehicle – directions to the nearest personal assistance – SMS – notifications on the TC)

People increasingly have their own, very diverse, set of preferred communication platforms. Most interviewees agreed that users need to find their information through the means which suits them best. Text based chat can be good if linked to real people, but respondents were concerned about the quality of bots. Social media were also highlighted for on-going communication. Hotlines, although useful, were found to be resource intensive. It was noted that hotlines and SMS are useless if there is no connection to the phone network and that SMS is decreasingly used by young people. There seems to be a general drift towards Twitter for tactical disruption information. Finally, a 'contact us' option would be useful as well as a translation tool to eliminate language barriers.

Q23: Should users be able to communicate with other travellers on the same route (e.g. to find out where in the vehicle there are any free seats left)? Why (not)?

The responses to this question were fairly evenly mixed, with some interviewees seeing no benefit to such communication with other travellers and concerns that it could glut the app and the communication could degenerate and be open to misuse. It was also suggested that such communication between passengers should only be available to registered users.

More positively, it could be used to share parts of the trip e.g. persons could share taxis, give advice and share experiences. It could also be potentially useful for groups travelling together.

In general, respondents felt that other social media platforms could provide this functionality.

Q24: Looking at the above picture (interaction points, cf. p.9), do you think that it captures all the relevant interaction points / Travel Companion functionalities? If you think that any interaction point is missing, please specify.

Most interviewees felt that all interaction points / functionalities of the TC were covered. Additional points identified included:

- Re-planning (after initial planning phase)
- Insurance provision
- Sharing of information before, during and after the trip
- Communication of long-term disruption
- Manage 'disorganised' transport and incentivise local transport
- Have an 'easy' system for extended audience e.g. older persons.

Others noted that they would change the order of the interaction points: it should be possible to plan a journey before needing to register.

Q25: Which travel apps are now used most in your country? Which features should the TC offer to the customer that are an added value compared to existing travel assistance apps?

The interviewees mentioned a large number of apps that are currently being used. Some of them are single-mode (e.g. NRES) or even single-operator (e.g. Arriva, Uber), but there are also broader services such as Traveline, GoEuro, Qixxit and Google Maps. One interviewee noted that there is an increasing range of services addressing issues such as planning, information and ticketing, and that the space in which the TC can build a unique selling point is small and shrinking. Added value of the TC approach, according to the interviewees, concerns mainly:

- The ability to buy tickets
- Intermodal service planning
- Information about compensation
- Offline working app
- Connection to social media
- Document storage
- GPS (navigation & context-dependent information)
- Restaurant / accommodation suggestions.

Q26: What do you think are the most important benefits for customers using the TC? (e.g. time gained, more environmentally friendly behaviour, health benefits)

The top 5 of most important benefits to customers, according to the interviewees, were:

- Time-saving
- Help during disruptions / reduce risk and decrease stress
- User-friendly / clear and simple
- Multimodal all in one ticket / all services on the same platform
- Cost-saving.

Q27: Do you think that some of the functionalities discussed are more relevant for certain user groups? (e.g. PRM, frequent /v/ occasional travellers, short /v/ long-distances). Please explain.

The interviewees agreed that the TC functionalities would be especially useful for long-distance travellers, non-frequent travellers and PRM. The requirements of travellers vary widely though and care should be taken not to provide unwanted or irrelevant information to those who don't need it.

Q28: Do you think customers would be willing to pay for these extra services?

Opinions were mixed on this question. In general, it was felt that people may be willing to pay for additional services, but basic services should be free. Users may be willing to pay a small initial cost to purchase the app if it is high quality. Or, if there is also a free version with advertisements, people may choose to purchase a paying version without advertisements.

3.2 CONCLUSIONS

The interviews have provided valuable feedback on the design and recommended functionality of the Travel Companion. From these the following design considerations should be implemented:

- Registration may form a barrier to use the TC. Issues raised include the time it takes to register as well as concerns with regard to security and privacy. Similarly, setting preferences should not be onerous and take up too much time. It should be possible to use basic functions such as journey planning without registration or setting preferences.
- Registration and setting preferences should be kept simple and information should only be requested when it is relevant and has a purpose, so users can understand the benefits.
- The TC should be 'smart learning' and be able to 'remember' preferences. However, this should be an optional setting and users must be able to easily clear or edit their preferences.
- A user might want to have multiple profiles with different preferences.
- The TC should be transparent on options you get when you plan a trip (linked to preferences).
- Complexity of the tool was identified as the greatest barrier, so simplicity should be prioritised.
- Another primary barrier is trust: the TC must provide a trusted platform for e-commerce and build up trust in providing the most appropriate ticket prices and real-time info.
- The opinions were mixed regarding whether payments should be pre- or post-trip. The advantage of post-payment is that it is easier to provide compensation / discount in case of disruption. But customers are used to pre-payment for purchasing public transport journeys. Post-payment could be an option for business users or frequent travellers.
- The TC should allow for users to buy tickets for others.

- Most respondents felt there is no benefit to storing tickets on the NFC chip of the E-passport. Instead, they prefer QR codes which could be printed or displayed on a mobile device.
- Flexibility was highlighted as a key user requirement and the ability to cancel or change tickets, although charges may apply for increased flexibility. There was concern that although a single ticket may be simpler, it may result in less flexibility to change sections of the journey.
- Non-transport related information may be useful, as long as it does not overcomplicate the tool. Its value seems limited as most people use other sources to find such information.
- In case of disruptions, it is important that the TC does not simply alert users on a delay, but informs them on the impact this will have on the journey and finds the best alternative.
- The ability to provide feedback on the tool and journey was considered a useful functionality.
- After the trip, the TC can provide useful information especially if something has gone wrong, e.g. contact information of the transport company, information about passenger rights, how to file a complaint or claim compensation, where to find lost property etc.
- On-going assistance could be provided through the tool, and would be particularly useful for PRM, children and the elderly. However, it may come at an additional cost.
- There were mixed reactions on passenger to passenger communication. This could be useful e.g. to share a taxi, but could also degenerate.
- Value added by the Travel Companion would be mainly:
 - The ability to buy tickets
 - Intermodal service planning (all info on one platform)
 - Information on compensation (protection and assistance if something goes wrong)
- The main incentives for users to take up the TC, according to the interviewees, are that it is a user-friendly tool, offering all services on one platform, thus saving the user time and money, and that it offers help (protection and assistance) during and after disruptions.
- Using the Travel Companion should be free of charge, unless it offers additional services.
- The Travel Companion should be available in the language of the user.

4. ETHNOGRAPHIC WORKSHOPS

In order to collect further information on factors that could influence the uptake and use of the Travel Companion (building upon the findings of the interviews), and also to detect possible cultural / ethnographic differences (East/South/West-Europe), five workshops were organised.

Date	City & country	Number of participants	Responsible partner
30/10/2017	Ghent (Belgium)	12	EPF
07/11/2017	Žilina (Slovakia)	18	UNIZA
07/11/2017	Milano (Italy)	28	PoliMi
20/11/2017	Brno (Czech Republic)	12	UNIZA
22/11/2017	Bratislava (Slovakia)	18	UNIZA

Table 2: Overview of the workshops

To ensure basic information, uniformity and comparability of results, workshop guidelines were developed including tips on how to select participants, how to organise the workshop, themes to be addressed, workshop methods to be used and reporting instructions.

The target number of participants was 15/20 per workshop. The method used for selecting participants is the so-called ‘purposive’ or ‘convenience’ sampling. The focus group approach being a qualitative methodology, does not aim to describe how an entire population would respond to the same questions, but aims to achieve a better understanding on how users relate with a certain topic, through a discussion and a comparison between participants’ personal attitudes towards the theme.

In selecting participants to be invited to the workshop, attention was paid to the following criteria:

- Balance between men and women,
- Balance between younger and elderly people,
- Inclusion of at least one person with reduced mobility,
- Balance between experienced and non-experienced travellers,
- Balance between digital natives and digitally impaired travellers,
- Inclusion of people that travel for different purposes (business, leisure, other),
- Inclusion of people that travel both within their own country and outside their own country.

The workshops all lasted 2-3 hours, were held in the local language and followed a similar structure:

- Introduction
- First round: discussion on three topics (preferences, travel related & non-travel related information, disruption & feedback) using the World Café method
- Second round: discussion on barriers and incentives to use the TC.

Each workshop started with a brief introduction of the GOF4R project, the workshop objectives and a description of the Travel Companion and its functionalities, followed by a short round of acquaintance (20’ in total). Then, the participants were divided into smaller groups.

During the first round of discussion (ca. 50’), the World Café method was used to tackle three topics. A “World Café” is a great way of fostering interaction and dialogue within large or small groups. It is particularly effective in surfacing the collective wisdom of large groups of diverse people. The format is very flexible and adapts to many different purposes – information sharing, relationship building, deep reflection, exploration and action planning. The host begins by putting participants at ease. The process then consists of rounds of ca. 20 minutes of conversation for each group on a specific question or item that needs to be explored and discussed. At the end of each round, everyone moves to another table. The moderator summarises after every change what was said in the previous group. One group continues on the findings of the previous group. Afterwards, insights gathered by each table are shared with the larger group and presented visually, for ex. by means of graphics.³

The three topics discussed during the first round in each workshop were:

1. Preferences

- Do you think that the ability to indicate their preferences will be considered by users as an incentive to use the Travel Companion and/or could it be a barrier? Please explain.
- Do you think more people would use the TC if it is not necessary to set preferences first?
- Which preferences do you think are most important?

³ Cf. Brown & Isaacs, 2008 and Fenton, n.d.

- Do you think the Travel Companion should ‘remember’ preferences from previous choices the user has made when planning / booking a trip?

2. Travel related info vs. non-travel related info:

- Travellers especially need information on cost, travel/transfer time, travel modes and transfer points. Are any important items missing from this list? If so, what is missing?
- Is it useful that the Travel Companion provides non-transport related information too? If so, which are most relevant?
- The Travel Companion will be able to offer context-dependent information, based on the current location of the traveller (using the GPS and possibly the accelerometer in the user’s smart device). Could this be a barrier for using the TC or do you think it will more likely be an incentive?
- Should users be able to communicate with other travellers on the same route (e.g. to find out where in the vehicle there are any free seats left)? Why (not)?

3. Disruption / feedback:

- Which kind of assistance should be offered by the Travel Companion in case of a disruption? (planning an alternative route, offering the possibility to ‘buy’ a new ticket, offer also non-transport related information e.g. on accommodation, food/drinks, ...).
- Should the TC only communicate about how the journey is going in case of disruptions or also reassure the user during the journey if everything is going according to plan?
- What kind of information should the Travel Companion offer the user after the trip has finished? (e.g. lost property, how to file a complaint, information on passenger rights)
- Which options for on-going communication should be offered by the TC? (e.g. chat – social media – hotline – personal assistance – SMS – notifications on the TC)

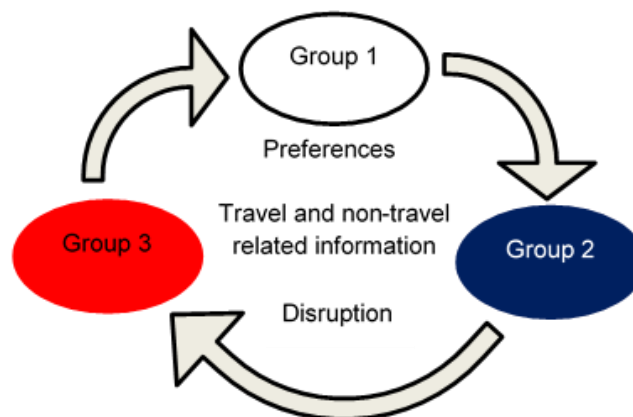


Figure 4: The World Café method was used to discuss three topics⁴

In the second round of discussion (ca. 40’), workshop participants were asked to discuss potential barriers for the use of the Travel Companion. They were presented with a map showing the most important barriers detected in the interviews (cf. above) and asked how to take these barriers away.

⁴ In the Milan workshop, four teams each discussed two topics.

Barriers for the use of the Travel Companion

Personal information / preferences

- Time-consuming
- Privacy and security
- Ease of change
- Transparency (options you get)

Information provided by TC

- Reliability (are all options integrated)
- Accuracy (realtime info, up-to-date)
- Transparency (options you get)
- Complexity (too much info)

Communication / feedback

- Bad support
- Reliability (help function)
- Privacy

Payment / transaction

- Trust
- (Cyber)security
- Complexity
- Habits

Tool / app

- Complexity
- Habits
- Added value compared with other apps
- Extra cost / savings
- Use by family and friends

Providers

- Trust
- Reliability

Figure 5: Barriers for the use of the TC

In a final part (ca. 15'), each group was asked to think about incentives to use the TC. Which functionalities / characteristics would they highlight? How would they try to reach certain target groups? Which communication channels would they use? What type of campaign would they propose? What are the main advantages of the TC compared with existing travel apps?

A summary of the results from each workshop is presented in the following section of this report.

4.1 GHENT (BELGIUM)

The first workshop was organised by EPF in Ghent on October 30th (6-9PM). The workshop was attended by 12 external participants.

Preferences

Users should be able to choose the amount of information they wish to receive. The information provided by the TC should be based on the user's preferences and be presented in a neutral way, i.e. not favouring any specific transport service provider for commercial reasons. The app should be 'smart learning', i.e. learn from previous choices the user has made. However, it should be transparent at any time how the user's data is treated and privacy is a cause for concern, especially for elderly users (for younger people, it appears to be less of an issue). Users should be able to define preferences and alter them at any time (not only when using the tool for the first time).

The most important preferences mentioned during the workshop include PRM needs, modal preferences, transfer time, price and travel time. It was also mentioned by some of the younger participants that they would like to be able to switch between different profiles and that they would like to be able to choose whether they wish to have contact with fellow-travellers on the route or not.

Travel related vs. non-travel related info

There was a consensus among all groups that travel information should be real-time, but that some information should also be available offline. Less is more: basic information should be provided for

each travel request and additional information should be provided based on user preferences. The following information is considered most important: tariffs, transfer time, frequency, information on environmental impact, level of crowdedness, type of vehicle (e.g. can a bike be brought along?), facilities at transfer hubs (Wi-Fi, parking, sockets, ATM machines, toilets, seating available, ...).

During the trip, information on transfers (How much time do I have left? When do I need to get off the train? Do I need to hurry? Which platform do I need to go to? Where is my seat located? etc.) is considered useful. Non-transport related info should be limited (e.g. referral to the local tourist office).

Disruption / feedback

In case of disruption, users should receive information about travel alternatives and also be offered the possibility to buy a new ticket (and receive information on how much it costs to rebook at an earlier or later time).

If needed, information on available accommodation, the phone number of a local taxi company, or tips on how to use the extra time (for sightseeing or meeting people for ex.) may be relevant as well.

Compensation, an explanation of the cause of delay, an apology and/or a 'consolation prize' e.g. a free coffee in a nearby coffee shop, would be welcome as well. The TC could offer a kind of 'travel insurance' as an extra service and in any case, give guidance to travellers on how to get a refund or claim a compensation and give the contact details of the responsible transport service provider.

If there is a disruption, users should receive a notification on their smartphone, or – if there is no internet connection – via SMS. If it is really busy, the tool may suggest a less crowded alternative. Travel information (route plan) should still be available even in offline mode (in that case of course, not updated in real-time).

Users should be able to give feedback on their trip in different languages. Feedback could be given by means of a questionnaire. However, this should not be too long and not take up too much time. Giving feedback should be easy e.g. thumbs up or thumbs down, green = everything went fine, red = there was a problem, 1-5 star ratings etc. Users could be stimulated to give feedback by organising a lottery or competition whereby they can for ex. win a trip. Giving feedback should not be compulsory! Finally, the workshop participants felt that giving feedback would be more effective if this can be done in real-time, so not just after the trip has finished.

Feedback is good because it may lead users to try out some alternatives they would otherwise not consider (e.g. take the train instead of a plane, take a fast bus to the airport, try a bike-sharing system or a shared taxi etc.). After a trip, the user should also be offered the opportunity to reset preferences based on their recent experiences.

Barriers

The most important barriers identified during the workshop were:

- Tool/app – complexity
- Info provided by TC – accuracy & reliability
- Profile – time-consuming to enter personal data and preferences
- Disruption / after trip – bad support.

Incentives

The most important incentive to use the TC, according to the workshop participants, is its usefulness compared to other apps. Especially for non-frequent travellers, the TC could make sure travelling comes with less stress and worries (reassuring especially when something goes wrong), and more comfort. Personalised information is considered a great motivating factor. The TC could also save the user time and money. Using the TC should be free of charge, at least during a free trial period.

4.2 ŽILINA (SLOVAKIA)

The second workshop was organised by UNIZA at the University of Žilina on November 7th (3-5:30PM). The workshop was attended by 18 external participants.

Preferences

All groups agreed that the possibility to indicate preferences is a great motivator for using the TC. Besides 'fixed' preferences, it should be possible to have 'variable' preferences for each new search. Some participants would like to have several profiles, for instance for school, work, vacation etc.

Indicating preferences could become a barrier, if it is too complicated or time-consuming. It should not be obliged; the TC should allow a fast search without indicating preferences, but in this case, more alternative connections with different characteristics (time, price, vehicle changes) must be shown. The TC should recommend one of these, based on general habits of travellers' behaviour.

The most important preferences mentioned in all groups were mode of transport and minimising travelling time. The 18-25 age group included minimising vehicle changes and choice of the place where to change the vehicle. The 30-40 age group also mentioned environmental impact. The 45-60 age group required barrier-free access to vehicles and stops, stations and terminals.

Faster search of connections should be based on remembered preferences from previous trips. However, some people (especially from the 45-60 age group) thought that users should be free to choose whether the TC 'remembers' previous preferences and search history or not.

Travel related vs. non-travel related info

All groups agreed that besides information on price, travelling time, mode of transport and transfers, they would like to be informed about seat occupancy. Two groups agreed there must also be information about (history of) delays. The 45-60 age group (including one PRM) required information about barrier-free access, extraordinary events during travelling, facilities (e.g. toilets) in vehicles and at terminals, and information on when to get off the vehicle.

Non-travel related information requirements were related with actual life needs. The 'youth' group required waiting rooms with sockets and Wi-Fi, the 'middle generation' group required waiting rooms with space for moms with children, while the 'older people' group required information about barrier-free access and facilities. Other non-travel related information that could be useful include contact information for ambulance and police services, taxi services, tourist offices, car and bike rental.

All three groups agreed that offering context-dependent information based on the current location of the traveller was positive and they thought that it is a motivator for using the TC.

The possibility of communicating with other travellers on the same route was agreed by all three groups, but only when travellers want to use it, e.g. it could be useful in order to find a free seat.

Disruption / feedback

All groups agreed that the TC should in case of disruption inform passengers about its cause and expected duration (as early as possible, if possible before the journey has started), alternative travel options and accommodation. They also recommended that users should be able to choose whether they want to receive information during travel (e.g. on current location and time) if there are no extraordinary events. Always, there must be information about vehicle changes and connections.

After finishing the trip, travellers should have the opportunity to evaluate the quality of travel. They must also receive information about their rights and possibilities to file a complaint. On-going communication was preferred by the 'youth' group through chat and social networks. 'Middle age' group members required simple notifications in the application. The 45-60 age group required also language assistance abroad and simple communication through hotline or chat in the vehicle.

Barriers

At least two of the three groups identified these issues as key barriers for using the TC:

- personal information/preferences – time-consuming
- info provided by TC – accuracy (real-time info, up-to-date)
- communication/feedback – bad support.

Other barriers were not agreed upon by all groups, but mentioned only once:

- personal information/preferences: privacy and security, flexibility (ease of change)
- info provided by TC – complexity, reliability of providers
- payment/transaction: trust, cyber security, complexity
- tool/app – complexity.

The following solutions were proposed during the workshop by the participants.

Personal information/preferences:

- Ensure a choice (in one click) from more predefined alternatives
- Possibility to turn on/off autocomplete function
- Possibility to repeat favourite travels
- Possibility to have several accounts each with its own preferences and settings
- Possibility to export and import all general user parameters to another device
- Ensure login with password (or other means, for ex. finger print). Without login, the application should only function as a timetable without personal information and preferences.

Info provided by TC:

- Ensure updates / notifications about changes the user wants to be informed about
- Ensure monitoring the device through GPS
- Possibility to customise the application – show only information that is interesting for the user

- Contractually ensure reliable information from transport companies and infrastructure managers; in case of infraction: penalty or exclusion from the TC

Communication/feedback – bad support:

- Ensure language assistance abroad
- Include as many operators as possible in the system
- Ensure wireless internet on the whole transport infrastructure and in all towns and villages

Payment/transaction:

- Using electronic wallet, buying credit to the application, possibility to disconnect the application from bank account or credit card
- Payments and information about realised payments by independent company (cf. PayPal)

Tool/app – complexity:

- Create a campaign explaining all features in the TC application to potential customers
- Ensure intuitive setting of basic parameters and exclude contradicting settings.

Incentives

There was a consensus that the main advantage of the TC compared to other travel apps is that it is a complex system that considers all modes of transport. Other important advantages mentioned:

- tickets can be bought quickly, personalisation of travel, reliability, information about transport situation in real-time, information about extraordinary events in real-time, access to additional information (accommodation, restaurant services, tourist office etc.) (18-25 age group)
- simplicity of use, complexity of information, minimises stress during vehicle changes, offers non-travel related information, up-to-date info on extraordinary events, saves the user time and money (30-40 age group)
- complexity of information, saving time, certainty of finding the best connection based on actual information, TC will be available 24/7, can be customised by users according to their own preferences (45-65 age group).

4.3 MILANO (ITALY)

The third workshop was organised by PoliMi at Politecnico di Milano on November 7th (6-8:30PM). The workshop was attended by 28 external participants, divided into four groups based on age.

Preferences

A registration process that lasts (too) long can be very disturbing and should be avoided. Entering preferences could be a barrier if it takes too much time to enter them and if information is asked that is not relevant. This problem can be avoided if the TC ensures flexibility in modifying selected preferences through a simple interface.

The groups had contrasting visions on which preferences are required. Some argued that the TC should distinguish between constraints/fixed preferences and ancillary/flexible preferences: at the

beginning, the user should indicate which preferences are *essential requirements* (e.g. a person in a wheelchair will require barrier-free access). Other preferences are related to what users *like* and should not be mandatory (such information could be gathered from social profiles).

The relevance of preferences depends on how much they affect the selection of the alternatives provided. If a user for example prefers an aisle seat, the TC should be able to show solutions that do not match this preference, if these are faster or cheaper.

Finally, preferences should be saved automatically in order to outline a user profile considering the history of data entered. Some suggested that the TC should ask specific and direct questions through an optional questionnaire managed through filter insertion. Generally, participants were convinced that the TC should be able to learn by itself, showing its strength to users, allowing saving time.

Travel related vs. non-travel related info

The relevance of information about disruptive events, especially delays, was highlighted. For example, the TC could notify travellers when the threshold to ask for a reimbursement has been reached. Peer users could provide updated and real-time information additional to that provided by official communication channels, for ex. to give feedback on how transport service providers usually manage delays and on how often a certain route is subject to delays, or to give timely information on what is happening along the trip (e.g. weather information, natural disasters). Such peer-to-peer information should be checked and moderated to avoid misinformation.

There was a consensus that travel related information (cost, travel time, transfer time, travel modes, transfer points) is essential and that non-travel related information should be optional because such information, especially if it can be retrieved from other websites, is sometimes redundant. However, it could be useful as well, for ex. to inform the traveller on what is going on at the destination (e.g. weather, strikes, ...) and what (s)he can do (e.g. food / drinks) while waiting for a connection / transfer. Similarly, context-dependent information based on the user's location should be presented but only if users decide to activate this functionality. Privacy issues can arise as not all users want to be traced. It was also advised not to show sponsored restaurants or other services, because this could reduce credibility of the services provided by the TC.

During the planning phase, information about services available on the vehicle or at interchanges can be helpful, as well as a memo on required documentation for the destination. It was also suggested to add the option to set waiting times in between different legs of the journey. That would allow users to introduce stop-overs along the journey to visit many locations during the same trip.

During the journey, the users could appreciate real-time information both concerning external events (e.g. weather, alternative accommodation) and concerning the trip itself (e.g. delays, which is the stop the user has to take, navigation at interchanges).

Finally, it was stressed that information should be communicated in the user's own language.

Disruption / feedback

One group had high expectations and felt the TC should offer full assistance, providing an alternative planning if needed, and information about reimbursement practices. Some participants also claimed

that the TC should take on the responsibility in case of delay / cancellation. The other group had significantly lower expectations in terms of assistance. They considered that it is up to the user to re-plan the trip, using (or not) the TC. They also highlighted the complexity for the TC of providing information about reimbursement practices due to the need of dealing with different operators.

On the other hand, the groups did agree on the type of information that should be provided during the trip. In detail, the TC should provide basic information about the regularity of the subsequent steps of a planned trip and after trip communication should be limited.

The two groups mostly agreed on the main channels for on-going communication: TC notifications, peer-to-peer chat function (should be optional but can be interesting for ex. for sharing a taxi for part of the trip, or to create a sense of community), and an evaluation function (Tripadvisor-like). One group highlighted the potential relevance of having a Call Center.

Barriers

All groups agreed that the complexity of the tool / app is an important barrier and that it is key to provide a smart and intuitive interface, avoiding complex and too technical issues.

The following barriers were detected by 3 groups:

- Accuracy, related to information provided by TC
- Reliability related to information provided by TC: The TC should ensure a degree of reliability that is at least the same as that of competitors. The TC should be able to consider all options showing them to users who would have the possibility to check and to choose the best.
- Personal information/preferences: time-consuming: Users should be able to decide which information they want to register and it should be possible to enter only very little information; it is strictly linked to ease of change/flexibility that is taken for granted.

Barriers mentioned by 2 of the 4 groups:

- Cyber security: The TC should be as reliable as competing applications in terms of online payment. It may be a problem if a user is generally reluctant to any form of online payment.
- Habits: TC has several competitors from which it has to differentiate clearly showing what is its added value. Habit is a problem when a user has a loyalty with a specific company that guarantees him benefits. The platform could also release a fidelity card to avoid the issue.

Barriers detected by one group:

- Complexity of information provided by TC
- Reliability of communication: critical, because if the TC fails, the client will be lost
- Reliability of providers: the TC should integrate a broad range of providers and give information about their reliability
- Bad support
- Potential cost / fee: An extra cost could be required for using the TC, however this cost cannot be higher than the fee that is currently requested by other similar platforms and should necessarily account for a very small percentage of the total cost of the travel.

Concerning the 5 main barriers identified, the following solutions were suggested to eliminate them:

Complexity (tool/app):

- Ease of use and the option to decide the amount of information to be received are key issues.
- All groups agree that the interface should be captivating, intuitive and simple to be used.
- Some participants argued that such a tool would allow the option to work with different levels of detail: the TC should have a minimum configuration and more advanced one.

Accuracy (information provided by TC):

- Opportunity of collecting real-time information from the users, even after having filtered them
- The TC should provide information updated as often as possible.
- It would be useful to have direct links to official providers' websites to allow users to check quickly and easily the official channels of information.
- One group suggested a flexible scheduling in addition to standard options.

Reliability (information provided by TC):

- Information should be coherent both within the TC and also with official providers' websites.
- The TC should convince users of its capacity to select the best option for him/her. In order to avoid disappointed expectations and errors, the TC should require several checks and confirmations by the user in order to allow them to modify and/or confirm their choices.
- A fundamental issue is the amount of partners involved (allowing users to choose between a wide range of providers) and the communication of such information to users.

Time-consuming (personal information/preferences):

- Only very little information should be mandatory and users should be able to decide which information they want to register.
- Users must have the option of modifying their profile/preferences easily.
- Creation of a datamining system able to store and to propose, on subsequent trips, information entered in previous travels (or in other systems that can be connected with the user's permission – e.g. fidelity cards of other operators or social networks)

Cyber security:

- Could be overcome by introducing the option to pay through PayPal or pre-paid cards.

Incentives

The workshop participants believe the TC is an interesting tool, but they also believe it needs a proper marketing campaign as it has to compete with many other applications that offer similar services and are already widespread. The most important benefits of the TC that were mentioned:

- it allows to integrate several services in a single tool that is easy to be used
- speed / simplification of the planning process
- single and unified payment (planning is already possible with Google Maps)
- problem solver
- available in the user's own language.

4.4 BRNO (CZECH REPUBLIC)

The fourth workshop was organised by UNIZA at Masaryk University in Brno on November 20th (3-5:30PM). The workshop was attended by 12 external participants.

Preferences

Most participants considered indicating preferences as a motivator for using the TC. They favour indicating preferences and creating an account with first usage of TC. The system should remember preferences, but allow users to edit them to adapt to actual conditions. A minority of participants would like to have a simple application that does not require indicating preferences. The application should then find many alternative connections and recommend one of them.

The most important preferences according to all groups were price, duration, mode of transport. There was no agreement on preferences like environmental impact, Wi-Fi, sockets, wagon class etc.

Travel related vs. non-travel related info

Besides price, travel time, mode of transport and vehicle changes, it could also be useful to provide info on: luggage, travelling with pets, on-board catering, waiting time, terminals navigation and visualisation, equipment of vehicles (comfort), (average) delays, PRM facilities, actual speed and location of vehicles, bike transport, internet connection, location of reserved seats.

All three groups agreed that non-travel related information should be about possibilities for passing time in terminals adapted to the type / profile of the passenger (student, mum with children, PRM etc.). Other information requirements were: accommodation, local tourist attractions, information offices, ATMs, exchange office, opening hours, police and ambulance services, reviews of other passengers on each transport company or terminal.

All three groups agreed that context-dependent information based on the current location of the traveller is very useful and it is a motivator for using TC. They suggested that this function should be optional (GPS module activated for a limited time, otherwise risk of empty battery)

Communication with other passengers on the same route is considered unnecessary by most. One group suggested that people could use it to solve problems during the travel.

Disruption / feedback

All three groups agreed that the TC should inform passengers during extraordinary events about cause of the event, duration, alternatives for travel, accommodation and restaurant services. The majority of respondents recommended that receiving information during travel when there are no extraordinary events should be optional.

After the travel, passengers should receive information about their passenger rights, how to find lost property, how to file complaints, how to contact the transport service provider. Passengers also want to have an opportunity to write a review of the transport company and the terminal. There was disagreement about on-going communication. Suggested methods of communication with the transport service provider include: personal contact in the vehicle, a phone hotline, SMS, social networks, QR codes in vehicles and at stations.

Barriers

All three groups agreed that the most important barrier is the complexity of the tool/app.

At least two groups considered these barriers:

- info provided by TC – reliability (are all options integrated)
- info provided by TC – accuracy (real-time info, up-to-date)
- payment/transaction – (cyber) security.

These barriers were considered only once:

- personal information/preferences – time-consuming
- personal information/preferences – privacy and security
- info provided by TC – transparency (options you get),
- payment/transaction – trust.

The following solutions were proposed during the workshop by the participants:

Personal information/preferences:

- Require login and password when using the full version of the TC
- Basic version should be quick and without any preference indication

Information provided by TC:

- Information should be added only by direct stakeholders (PTOs or others impacting transport)
- Local time zone on route must be mentioned.
- Ensure update of the app based on user requirements, when the content is changed regularly
- Ensure participation of all transport companies. Ensure online automatic updating
- Ensure user reviews for noticing mistakes

Payment/transaction:

- Always require authorisation code for example through phone, not only credit card number. The application should not remember the credit card number.
- Covering payments by independent organisation (similar as PayPal), ensure detection if the payment was successful

Tool/app – complexity:

- Basic version of TC should be simple and easy and quick to use.
- Ensure intuitive and chronological use of the TC; make a structure of the application by the process of development
- Use history of using the icons – most used icons should be first.
- Consult graphics and design with potential customers
- The TC should not require much writing of text, using click is better choice
- Output of the application must be simple with possibility to click for more details
- The application should not allow contradictory requirements.

Incentives

All groups agreed that overall, the main advantage of the TC compared to other apps is that it covers all modes of transport, and that its information is reliable and up-to-date. The main advantages mentioned during the workshop included:

- (group 1) all information together in one application, simple usage, more alternative connections, online support during travel, reliability, actual information
- (group 2) clarity, actual information, reliability, optimisation of price, optimisation of travel, complex information together in one application, less stress in case of extraordinary events, elimination of language barriers
- (group 3) complexity, multimodality, simplicity of use, reliability, information about international connections, connectivity with information systems of transport companies, more alternatives according to personal preferences, actual data, possibility to buy tickets.

4.5 BRATISLAVA (SLOVAKIA)

The fifth workshop was organised by UNIZA at the General Directorate of Slovak Railway in Bratislava (monthly meeting of Slovak Science and Technical Society for Transport Bratislava) on November 22nd (4:30-6PM). The workshop was attended by 18 external participants (mainly 65+).

Preferences

More than 80% of the participants preferred the TC without indicating preferences – the TC should suggest travel alternatives, then the user will choose one of these alternatives, which is most suitable. All participants agreed that indicating preferences should be voluntary and optional.

The TC should offer a broad range of alternative connections, while one of these alternatives would be recommended according to general behaviour of passengers. The user should be able to sort alternative routes based on different criteria, for instance: duration, price, vehicle changes etc. Users could choose using the TC with or without indicating preferences for a quick search.

Group members considered that the most important preferences / personal characteristics are:

- Gender,
- Health condition,
- Restrictions.

The TC should remember at least approx. 5 journeys or the most frequent journeys of travellers. This would quicken using TC and therefore make this application more attractive for users.

Travel related vs. non-travel related info

Besides information like price, travel time, mode of transport, vehicle changes, other information considered useful are also operator and carrier, waiting time, congestions, next connections and terminals navigation.

Non-travel related info: If possible, participants would like info about accommodation, restaurant services, ATMs and exchanges in transport hubs, local tourist attractions and tourist offices.

Offering context-dependent information based on the current location of the traveller can be positive and it is a motivator for using the TC. It must be only optional though; some people might object because of privacy concerns.

Communication with other travellers on the same route should be an optional function. People could use it for solving problems during travel or to chat with other travellers.

Disruption / feedback

Respondents would require these types of assistance in case of disruption (extraordinary events):

- Alternative routes
- Alternative connection
- Alternative transport modes
- Information about delay
- Information about accommodation, restaurants etc.

Workshop members did not agree on receiving information from the TC when the travel is without any extraordinary events. Only one member wanted it in some periodic time (every half hour). Other members wanted it only as optional possibility.

After the travel, passengers should receive information about the quality of transportation, how to file complaints and final cost calculation.

Participants preferred on-going communication with audio communication (non-stop hotline) or live communication with operator's employees. They did not consider using SMS and QR codes, because they have problems to use small devices with small words.

Barriers

Participants defined a set of 3 main barriers:

- personal information/preferences – privacy and security
- tool/app – complexity
- info provided by TC – transparency (options you get).

Participants recommended these possibilities to eliminate barriers:

- Require login and password when using full version of the TC
- Graphics of the TC should be modified into form, which affect that there is not much data required. Simple colours are recommended for clarity. Advertisement should not cover data. Output of the application must be simple with possibility to click for more details.
- Make a structure of the application by the process of development, consult graphics and design with potential customers, ensure intuitive and chronological use of the TC.

Incentives

Main advantages of the TC are: complexity – all information together in one application, simple usage, online support during travel in own language. The TC should consist of all modes of transport, should be easy to use and be on top of technological level.



Figure 6: The workshop in Ghent

4.6 CONCLUSIONS

The most important outcomes of the workshops as a whole with regard to the topic ‘preferences’ can be summarised as follows:

- The possibility to set preferences is generally considered a great motivator for using the TC.
- However, if setting preferences takes up too much time or is too complicated, it can be a barrier to use the TC.
- Users should be able to define preferences and edit them at any time. Flexibility is important.
- Some participants mentioned they would like to be able to switch between different profiles, each with its own preferences.
- The TC should be ‘smart learning’ i.e. learn from previous choices. It should be transparent at any time how the user’s data is treated. Privacy is a concern, especially for elderly users. Remembering preferences should be a setting the user can turn on or off.
- Setting preferences should not be obliged; a fast search without setting preferences should also be possible. In that case, the TC should show a list of alternatives and recommend one, based on general habits of travellers’ behaviour.

These are the main outcomes of the workshops on the theme ‘Travel related /v/ non-travel related information’:

- Travel information should be real-time, but some information should also be available offline.
- Less is more: basic information should be provided for each travel request and additional information should be provided based on user preferences.
- During the trip, information on transfers is considered useful.
- There was a general consensus that non-travel related information should be limited and that it can be found through other sources.
- Context-dependent information can be a motivator to use the TC but users should need to activate it (some people may have concerns regarding privacy).
- The possibility to communicate with other passengers on the route could be optional.

- The following information is considered most important (besides price, travelling time, mode of transport and transfers): facilities at transfer hubs and on board, transfer time, crowdedness / seat occupancy, barrier-free access, (history of) delays.

With regard to the topic ‘disruption / feedback’, these were the workshops’ main conclusions:

- In case of disruption, users should receive information about travel alternatives and also be offered the possibility to buy a new ticket / entitlement.
- It would also be useful to inform passengers of the cause of delay and, if needed, on additional services such as where to find meals, entertainment or accommodation.
- Peer users could provide updated and real-time information additional to that provided by the official communication channels. Such information should be checked and moderated.
- The best way to be informed is through notifications on the smartphone or, alternatively, via SMS. A hotline / call center is also an option, especially for older people.
- If there are no extraordinary events, information throughout the journey should be limited.
- The Travel Companion could offer a kind of ‘travel insurance’ as an extra service. In any case, it should inform passengers on their rights and give guidance on how to get a refund, file a complaint, and contact the transport provider.
- Users should be able to give feedback on their trip, e.g. by means of a (short!) questionnaire. Giving feedback should be easy and not take up too much time. Feedback should be possible in different languages.

The main barriers to use the TC, identified during the national workshops, were:

- **Accuracy, related to information:** The tool should be able to manage extraordinary situations in real-time, signalling (as some existing apps already do) delays, strikes, changes in the status quo. Information (in particular, related to disruption) should be updated as often as possible and the re-planning should be guaranteed and timely.
- **Reliability related to information provided by the TC** has been detected as a key issue. The TC should be able to consider all possible options (first and last mile, special deals and prices) and show them to users, so that they can check and choose the best alternative.
- **Profile / preferences: time-consuming:** Users should be able to decide which information they want to register and it should be possible to enter only very little information. It should be possible to use the TC without creating a profile or setting preferences first.
- **The complexity of the tool / app:** Participants agreed that it is a key issue to provide a smart and intuitive interface, avoiding complex and too technical issues.
- **Bad support during and after trip** is also indicated as a barrier. Users want to communicate with the tool when necessary and get personal assistance. Giving feedback should be as easy as possible. A simple yes/no question, choosing a smiley face or a sad face, thumbs up or thumbs down, ... are preferable over long questionnaires. Gamification and rewards could help to incentivise travellers to give feedback on the services. It would be useful if user feedback could also be given during the journey.
- **Cyber security:** The TC should be as reliable / safe as competing applications in terms of online payment. The system must offer the payment method(s) that people prefer (which can differ from country to country). It may be a problem only if the user is generally suspicious of using any form of online payment.

- **Existing habits:** Most people already use an alternative app. TC has several competitors from which it has to differentiate clearly showing what its added value is. Habits become a problem when a user has a loyalty with a specific company that guarantees him some benefits. The TC platform could also release a fidelity card to avoid the issue.
- **Privacy:** Privacy concerns are related specially to profile (personal data) and buying (card details); however, this is not considered as one of the most important barriers.

The main incentives that were found in the workshops that can facilitate the uptake of the TC:

1. **Usefulness of the TC:** Today, organising complex, multimodal, European wide trips requires a lot of effort and is time-consuming. Travellers must adjust to a variety of interfaces, devices, tools etc. The IF and the TC could make the planning & buying process a lot easier.
2. **Better protection and passenger rights:** In case of disruption, the TC should offer full assistance, informing the user on alternatives, if the original plan is no longer feasible, and also on passenger rights and reimbursement procedures. Currently, passenger rights apply independently to each individual transport mode and only under a single contract of carriage.
3. **Accurate and reliable information:** Consumers need to feel confident that they receive an overview of the best travel solutions, taking into account preferences and needs. Reliability (of data, information) and transparency (e.g. how will the user's personal data be stored and processed) are two important aspects that will determine whether a traveller will use the TC. Crowdsourcing can be a good tool to complement information from 'official' sources.

5. INTERNATIONAL EXPERT WORKSHOP

An international expert workshop was held in Brussels (UIC premises) on December 5th 2017. The workshop had the following objectives:

- Exchange knowledge between different IP4, S2R and other experts
- Validate findings of end-user research done so far in task 2.1
- Detect the (potential) implications of the user requirements on the IF and its governance.

24 people attended the workshop, including 14 external experts (from outside the GOF4R consortium) from different countries and different fields of expertise:

Name	Organisation	Country
Yves Amsler	UITP	Belgium
Nathalie Berny	NMBS	Belgium
Freek Bos	Rover (Dutch passenger organisation)	Netherlands
Martin Brennan	RSSB	UK
Rodrigo Castineira	Indra	Spain
Guido di Pasquale	UITP	Belgium
Delphine Grandsart	EPF	Belgium
Martin Kendra	Žilinska University	Slovakia
John Lutz	UIC	France
Katarin Magdechov	Wagon Service Travel	Slovakia

Elena Mantouka	Aethon – My TRAC	Greece
Evelien Marlier	EPF	Belgium
Jaroslav Masek	Žilinska University	Slovakia
Klaus Moessner	University of Surrey	UK
Beate Müller	VDI/VDE Innovation und Technik GmbH	Germany
Marije Nouwen	Mintlab	Belgium
Jonathan Paragreen	Sheffield University	UK
Thomas Rossi	Waynout	Italy
John Stafford	RSSB	UK
Ismini Stroumpou	Aethon – My TRAC	Greece
Stanislav Styan	BID (Integrated Transport of Bratislava)	Slovakia
Willie de Swart	RET Rotterdam	Netherlands
Antonio Turrone	Bepooler and Covisian	Italy
Bruno Van Zeebroeck	TML Leuven	Belgium

Table 3: Expert workshop participants

To start with, the participants were introduced to the Shift2Rail programme and the GOF4R project. The Travel Companion’s objectives and functionalities were presented as well as the main findings obtained so far from the interviews and national workshops. A ‘tour de table’ followed in order for all meeting participants to present themselves.



Figure 7: The expert workshop in Brussels

5.1 PART 1: BARRIERS

During the first part of the workshop, the main barriers to use the TC, as identified during the interviews and the workshops conducted previously within Task 2.1, were presented (cf. above).

Main barriers to use TC

Barriers	Interaction point	Votes
ACCURACY (real-time, up-to-date, fit to needs)	Information provided by TC	
RELIABILITY (prices, all modes integrated..)	Information provided by TC	
TIME CONSUMING	Preferences/Profile	
COMPLEXITY	Tool/app	
CYBER SECURITY	Payment / transaction	
BAD SUPPORT	Disruption/After trip	
HABITS	Tool / app	
PRIVACY	Profile	

- ⇒ Privacy is not considered as a main barrier
- ⇒ TC should be free to use/try

Figure 8: Main barriers to use the TC

Experts were divided into three groups and asked to answer the following questions: *Do you agree with the main barriers found? Are any barriers missing? Do you agree with the sequence?*

The experts were then asked to ‘vote’. The 3 most important barriers (that got the most votes) were further discussed. The experts were asked to estimate the consequences of these barriers for TC developers, PT operators, service providers and policy makers. The following questions were asked: *How can we take these barriers away (see explanation of barriers)? What are possible solutions? What is the (potential) effect of these barriers on the IF and its governance?* The aim is to deduce from these conditions the impact on the interoperability framework and its governance:

- legal issues: IPR (intellectual property rights)
- commercial issues: business model
- privacy issues
- technical issues: data mining, standardisation
- data issues: open data, accessibility
- ...

This is how the participants ranked the barriers listed above:

Group 1	Group 2	Group 3
1. Accuracy and reliability	1. Accuracy	1. Accuracy and reliability
2. Complexity	2. Complexity	2. Cyber security
3. Privacy	3. Bad support (disruption and after trip)	3. Complexity

Table 4: Expert workshop – voting for the most important barriers

Next, possible solutions were discussed and the effect on the IF and its governance. The main conclusions are summarised below.

Overall, there was a consensus that transport service providers (TSPs) should be stimulated to share data. In practice, large transport providers already have detailed data available via API. On the other hand, many PTOs are still not that eager to share data. PTOs that do share data can be seen as 'best practices', having a pioneer role. Operators should be pressured more to release data, for ex. the PTA could include this as a contractual obligation in Public Service Contracts.

It is important to integrate the data of small service providers and cycle infrastructure too: at this moment, for ex. bicycle information is missing. The information that is given should be complete. Now, it isn't always clear what the best option/price is overall (for ex. the flight is cheap but you need a taxi that costs 100 euro from and to the airport).

Guidelines can be useful for third-party players (e.g. Travelfusion) that provide data by aggregation (and maybe also scraping) of different services. Now developers "waste" time trying to integrate third party players, because not all APIs include data on all necessary fields (e.g. seat number) for all the providers. It could be useful to have a quick way (certificate?) to check that a data format is compliant (i.e. that it has all the concepts needed to provide a complete search and book experience). Something similar is the NDC IATA format for flights, airlines are rolling out their own self-agreed format to describe flight tickets and the ancillaries (meal on board, etc.).

Regulation can make it easier to exchange data. The EC could for ex. provide guidelines on standardisation, to make data exchange easier. Still, the process shouldn't be overregulated.

From the developer's point of view, it is really important to have clean datasets available, in order to create innovative services. The datasets should have a good integrity/quality.

New business models can be developed to incentivise TSPs to share data and to provide good data sets. They could get more user data (which they can use to optimise their services and efficiency) and more/happier customers (which increases their profits), which is a win-win situation. They could reduce costs that they need to pay now for advertisements (which are very expensive). One of the biggest barriers for a small scale developer is the economics balance between marketing costs and ticket revenues. Large OTAs (online travel agencies such as Expedia, lastminute) purchase data on internet traffic tuned on keywords (for ex. through Adwords or Facebook). Such data is very expensive but the margin on flight + hotel is enough to justify this cost. However, if such OTAs end up selling a bus ticket to a user they acquired via Adwords (e.g. someone who googled "Berlin Rome") they are very likely to lose money because the margin on trains and buses is way lower. The Expedia approach is interesting because they package train + hotel, hiding the price Expedia pays for the train ticket, which is different from the retail price. This is important for train operators that don't want to lose the trust of their customers by showing different prices in different places.

Accurate information and support (in case of disruption and after the trip) are connected. When the information isn't up-to-date and real-time, travellers don't know whether they will be on time to catch the next train/bus... Users should be informed on whether the data is real-time or not: when people know that the information isn't real-time, they are more tolerant of aberrations – even though this 'tolerance' can differ from country to country, as well as from person to person.

Users should be able to indicate what type of information they want to access and not be overwhelmed by too much information they don't need. Segmenting the data set (e.g. based on the trip: local, national, international and/or based on type of user: tourist, student, PRM, daily commuter, business traveller etc.) can facilitate that the data fit the user's personal needs.

Exchanging data should not violate people's privacy. The individual datasets should not be published. The EC could provide guidelines for the Privacy Terms. The GDPR (General Data Protection Regulation) is considered a good initiative. Some experts indicated that it would be good to have concrete 'interpretative guidelines' on how this regulation needs to be implemented in practice (this could save developers and TSP a lot of time and money). Similarly, the EU (or national governments) could prepare rules on financial operations (safety, cyber security).

Another barrier discussed during the workshop is complexity of the tool/app. A TC-tool should be user-friendly and work at least as well as other apps that already exist, otherwise it will not be attractive to use it. A large amount of work has already been done on UX (user experience) research and Human-Machine Interaction. Small start-ups don't have the budget to interview hundreds of travellers. This type of information is really interesting for them. It could be useful if this research is shared between all the IF-stakeholders. This can also be an incentive to cooperate. The TC must also be smart learning. The experts suggest to make the Travel Companion a modular tool so the users can start with the simple version and then upgrade/expand if they want to. Finally, also persons with reduced mobility (PRM) should be able to use the TC. Therefore, developers should, if feasible, adopt the principals of 'universal design'.

5.2 PART 2: INCENTIVES

During the second round of the workshop, the World Café method was used⁵ to discuss the three most important incentives to use the TC, as identified during the national workshops (cf. above):

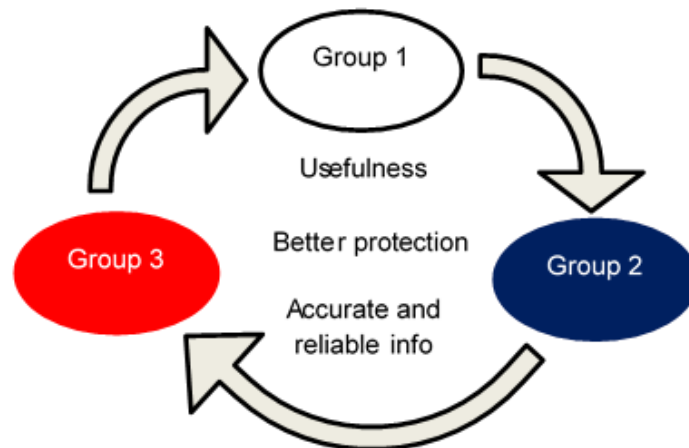


Figure 9: Three incentives discussed during the expert workshop

The participants were asked to think about these factors and how they could possibly impact on the interoperability framework and its governance:

⁵ Cf. p.22

- legal issues: IPR (intellectual property rights)
- commercial issues: business model
- privacy issues
- technical issues: data mining, standardisation
- data issues: open data, accessibility
- ...

Incentives	Interaction point	Benefits
Usefulness of the TC (find all information in one place, integration of first and last mile solutions, ...)	Tool/app	Save time
Better protection (re-ticketing, reimbursement...)	Disruption and after trip	Less stress, save costs
Accurate and reliable info (overview of best options – price, modes, time, ... - in line with personal preferences, in real time, ...)	Profile, information	Save costs, save time

Figure 10: Main incentives to use the TC

Usefulness of the TC

Usefulness depends on user preferences/needs (that may differ according to e.g. type of trip, distance, periodicity of trips, local, national or international trips, travel purpose, PRM status etc.).

The TC should offer more options to choose from, integrating (good quality) data sources from all travel market players. It can also help users to save time and money (reduce travel cost and time) and make travelling more comfortable / convenient. The TC should offer some extra functions as well, for ex. ask for user feedback after trips, or provide real-time info shared by other travellers (full train, problem with services, delays, etc.). Such crowdsourced info coming from other travellers needs to be verified though to be trustworthy.

The TC can also help to find a solution (taking into account user preferences and needs) in case of disruptions and problems along the way. A necessary condition is using verified, real-time information from transport operators.

Finally, the TC could also give additional information or stimuli e.g. suggest to walk in order to reach a daily minimum of physical activity, or on CO₂ emission of different modes.

Better protection in case of disruption

When a disruption occurs, transport providers should be forced to cooperate. Let’s say there is an airport strike, the airline is willing to send its customer to a rail company because there is no other way the customer can be served and if not served she/he can file a complaint, leave negative feedback, etc. Say the metro gets stuck and it is likely for the passenger to miss the airport

connection, this is an opportunity for a taxi to provide its service (maybe pick her/him up at the next metro station). The problem of one player thus becomes an opportunity for another.

A harmonisation of passenger rights across transport modes is desirable. The regulatory framework needs to be respected by all players, no matter if it is a private/commercial contractor or a transport service provider operating under a Public Service Contract.

New business models and regulation could be developed in order to stimulate TSPs to guarantee passenger rights when a disruption occurs. As an extra (paid) service, the TC could offer users an insurance: Travelers purchasing it are “guaranteed” reschedules in case of disruption. This framework would be based on an agreement between all travel providers. A user experiencing a disruption is very interesting to target because he/she has immediate needs: new tickets, new accommodation, etc. An insurance paid for in advance could be economically feasible and is interesting for GDS players such as Travelport and Amadeus (who mainly consider it as a way to help airline clients in case of disruption).

It must be made clear to the customers who is responsible if something goes wrong. A virtual operator that handles the whole journey (from A to B) can be a good solution.

Accurate and reliable information

The absence of accurate and reliable information had been identified as an important barrier for using the TC. The quality of the data sources is very important. Crowdsourcing could be a good tool to improve reliability – *if* this is seen as an additional source of data to provide extra info that is not available at the moment (for ex. to see if a vehicle is crowded). Cross-reference with official channels should be made. A critical mass is also needed in order to yield reliable results. If those conditions are fulfilled, then crowdsourcing can have benefits for different groups (for PTOs: happier customers, for PRM: they can communicate with other passengers etc.).

Various technical methods could be used to improve data provision, including to detect issues on trains and at stations. If mobile phone sourced data is to be used this means some form of contractual relationship with the providers (the mobile phone companies). The purposes for gathering the information must be clear – what will it be used for? – not least to create the appropriate specification.

Possible types of business models were discussed, based on examples from other sectors, which exploit the commercial value of data. One of the examples that was mentioned and seen as a good example is the ‘roaming’ principle from the telecom sectors: Roaming is possible in the whole of Europe. Consumers don’t need a contract with different operators, there is just a virtual operator, a broker who takes the worries away. Another example that was given was to assign this task to a broker who can handle the business contracts. This would make it easier for new players to access the IF. Additionally, an insurance can take some obstacles away.

The use of the IF and the development of TC-like tools can contribute to more multimodal journeys made by European citizens. This is interesting not only from the point of view of developers and operators (commercially driven) but potentially also for Transport Authorities who are looking to change citizens’ travel behaviour and reduce societal costs (congestion, pollution, etc.).

A key issue identified was the speed and accuracy of the process to investigate the data and turn it into useful information for customers in timescales that would provide maximum benefit to the

customers (for ex. 5G internet connection). The application needs to have this as an automatic and fully integrated process, which the new technology needs to deliver. It was suggested that Uber has demonstrated that similar types of functionality can be made to work.

The groups identified the issue of different (or absent) standards and approaches to ‘open data’ in different European countries. The Netherlands was given as an example where obligations already exist in this area through regulation at both national and regional level. This is known as 9292. This and other similar regulatory capability could help with the deployment of demonstrators at the early stage, before it is possible to deploy widely.

Similarly, whereas contractual relationships are needed relating to the whole journey, rules might vary from one country to another. Also local, regional, national and international journeys have different characteristics.

Underlying these issues is a fundamental question: who owns the ‘accurate reliable information’? The base data was considered to be publicly available and not part of the assets. The conclusion of this discussion seemed to be that there remains much to be clarified or resolved in this area.

6. SUMMARY AND CONCLUSIONS

In order to design and develop a sustainable and successful governance for the Interoperability Framework (IF) semantic technologies that are being developed under the IP4 Shift2Rail programme (which is the overall objective of the [GOF4R](#) project), the requirements from the different actors in the transport chain need to be mapped and analysed. This Deliverable presents the outcomes of Task 2.1 within GOF4R, which focuses on the “Analysis of the consumer demands and interest in using the TC capabilities”.

Travellers do not interact directly with the Interoperability Framework. Instead, they can access the different functionalities developed based on or thanks to the IF through their ‘Travel Companion’ (TC), which functions as a ‘front end’ user interface, giving users full control of their door-to-door travel experience. This report identifies and describes conditions for a large market uptake of the Travel Companion approach by the end-users: the travellers.

As a first step, the Travel Companion has been ‘deconstructed’ into its consumer-oriented capabilities and interaction points, i.e. all those situations in which the Travel Companion may assist the user in different phases of the travel experience. The main consumer interaction points identified are: User identity, Preferences, Planning, Buying, Receiving entitlement, Information, Disruption, After trip and On-going communication.

For each interaction point, a series of assumptions have been formulated with regard to factors (incentives, needs, constraints, barriers) that could (positively or negatively) influence the consumer uptake of the TC approach. In order to validate these assumptions, interviews were conducted with (UX) experts from different countries. In order to collect further information on and better understand the factors that could influence the uptake and use of the Travel Companion (building upon the findings of the interviews), and also to detect possible cultural / ethnographic differences, workshops were organised in Belgium, Italy, Slovakia and the Czech Republic.

The interviews and workshops have provided valuable feedback on the design and recommended functionality of the Travel Companion. Their main outcomes can be summarised as follows.

User identity & Preferences: Registration may form a barrier to use the TC. Issues raised include the time it takes to register as well as concerns with regard to security and privacy. Similarly, setting preferences – even though this is generally considered a great motivator for using the TC – should not be onerous and take up too much time. A user might want to have multiple profiles with different preferences. Registration and setting preferences should be kept simple and information should only be requested when it is relevant and has a purpose, so users can understand the benefits. It should be possible to use basic functions such as journey planning without registration or setting preferences. The TC should be ‘smart learning’ and ‘remember’ preferences. However, this should be an optional setting and users must be able to easily clear or edit their preferences. It should be transparent at any time how the user’s data is treated. Privacy is a concern, esp. for elderly users.

Planning: Complexity of the tool/app was identified as the greatest barrier to use the TC, so simplicity should be prioritised. It is key to provide a smart and intuitive interface. The TC should be transparent on options you get when you plan a trip (linked to preferences). Less is more: during the planning phase, basic information should be provided for each travel request and additional information should be based on user preferences. Reliability of the information provided by the TC has been detected as a key issue. The TC should be able to consider all possible options (first and last mile, special deals and prices) and show them to the users, so that they can check and choose the best alternative. It is important that users feel confident and trust that the TC will effectively be able to offer them the most appropriate travel options and ticket prices.

Buying & Receiving entitlement: In general, it was considered a great advantage to be able to not only plan a whole (long-distance) multimodal journey, but also to buy tickets / entitlements for each leg of the journey through one platform. Flexibility was highlighted as a key user requirement and the ability to cancel or change tickets, although charges may apply for increased flexibility. There was concern that although a single ticket may be simpler, it may result in less flexibility to change sections of the journey. With regard to payment, (cyber) security was a cause for concern. The TC should be as reliable / safe as competing applications in terms of online payment. The system must offer the payment method(s) that people prefer (which can differ from country to country). It may be a problem only if the user is generally suspicious of using any form of online payment. Opinions were mixed regarding whether payments should be pre- or post-trip. The TC should allow for users to buy tickets for others. Many felt there is no benefit to storing tickets on the NFC chip of the E-passport. Instead, QR codes which could be printed or displayed on a mobile device are deemed preferable.

Information: Travel information provided by the TC should be real-time, but some information should also be available offline. The following information is considered most important (besides price, travelling time, mode of transport and transfers): facilities at transfer hubs and on board, transfer time, crowdedness / seat occupancy, barrier-free access, (history of) delays. During the trip, information on transfers is considered useful. But otherwise, if there are no extraordinary events, information throughout the journey should be restricted. Non-transport related information may be useful, as long as it does not overcomplicate the tool. Its value seems limited as most people use other sources to find such information. Context-dependent information can be a motivator to use the TC but users should be able to (de)activate it (some people may have concerns regarding privacy). The possibility to communicate with other passengers on the route could be optional.

Disruption: In case of disruptions, it is important that the TC does not simply alert users on a delay, but informs them on the impact this will have on the journey and finds the best alternative. Accuracy of information was recognised as very important. The tool should be able to manage extraordinary situations in real-time, signalling (as some existing apps already do) delays, strikes, changes in the status quo. Information (in particular, related to disruption) should be updated as often as possible and the re-planning should be guaranteed and timely. Users should receive information about travel alternatives and also be offered the possibility to buy a new ticket / entitlement. It would also be useful to inform passengers of the cause of delay and, if needed, on additional services such as where to find meals, entertainment or accommodation. Peer users could provide updated and real-time information additional to that provided by the official communication channels. Such information should be checked and moderated. The Travel Companion could offer a kind of ‘travel insurance’ as an extra service. In any case, it should inform passengers on their rights and give guidance on how to get a refund, file a complaint, and contact the transport provider.

After trip: The ability to provide feedback on the tool and journey was considered a useful functionality. Giving feedback should be easy and not take too much time. A simple yes/no question, choosing a smiley face or a sad face, thumbs up or thumbs down, ... are preferable over long questionnaires. Feedback should be possible in different languages. Gamification and rewards could help to incentivise travellers to give feedback. It would be useful if user feedback could also be given (real-time) during the journey. After the trip, the TC can provide useful information especially if something has gone wrong, e.g. contact information of the transport company, information about passenger rights, how to file a complaint or claim compensation, where to find lost property etc.

On-going communication: On-going assistance could be provided through the TC, and would be particularly useful for target groups with special needs such as PRM, children and the elderly. However, it may come at an additional cost. Users want to communicate with the TC when necessary to get personal assistance. If there are no extraordinary events, information needs are limited. There were mixed reactions on passenger to passenger communication. This could be useful e.g. to share a taxi, but could also degenerate and lead to abuse.

Concluding from the interviews, the main incentives for travellers to use the TC are that it is a user-friendly tool, offering all services on one platform, thus saving the user time and money, and that it offers help during and after disruptions. The workshops generally confirmed these findings and concluded on three main advantages of the TC approach:

1. **Usefulness of the TC:** Today, organising complex, multimodal, European wide trips requires a lot of effort and is time-consuming. Travellers must adjust to a variety of interfaces, tools etc. The TC could make the planning & buying process a lot easier.
2. **Better protection and passenger rights:** In case of disruption, the TC should offer full assistance, informing the user on alternatives, if the original plan is no longer feasible, and also on passenger rights and reimbursement procedures.
3. **Accurate and reliable information:** Consumers need to feel confident that they receive an overview of the best travel solutions, taking into account preferences and needs. Reliability (of data, information) and transparency (e.g. how will the user’s personal data be stored and processed) are two important aspects that will determine whether a traveller will use the TC. Crowdsourcing can be a good tool to complement information from ‘official’ sources.

An international workshop with IP4 and other experts was held in Brussels on December 5th 2017, in order to validate the findings of end-user research done so far in Task 2.1 as well as to detect (potential) implications of these user requirements for the IF and its governance. Some interesting issues addressed during this expert workshop are listed below.

- Transport Service Providers should be stimulated to share data. For example, PTAs could include this as a contractual obligation in Public Service Contracts with PTOs.
- It is important to integrate the data of small service providers and cycle infrastructure as well, in order to get a complete picture of what overall, the best travel options are.
- For third-party players that aggregate (or sometimes scrape) data from different sources, it is important to have good quality datasets.
- Various technical methods can be used to improve data provision, including the use of mobile phone sourced data (which implies a contractual relationship with providers).
- Different (or absent) approaches to open data exist in EU countries.
- Regulation can make it easier to exchange data. The EC could for ex. provide guidelines on standardisation.
- New business models can be developed to incentivise TSPs to share data and provide good data sets. The ‘roaming’ principle from the telecom sector was mentioned as a good example.
- One of the biggest barriers for a small scale developer is the economics balance between marketing costs and ticket revenues.
- A key issue is the speed and accuracy of the process to investigate the ‘raw’ data and turn it into useful information for the customers.
- Segmenting the data set (e.g. based on the type of trip or the type of traveller) can facilitate that the data fit the user’s personal needs.
- Individual datasets should not be published. The GDPR is seen as a good initiative. It would save developers and TSPs time and effort if the EC could prepare clear guidelines on how to implement this Regulation in practice.
- If existing UX research could be shared between all IF-stakeholders, this could be an incentive to cooperate (especially for start-ups who don’t have large research budgets).
- The experts suggested to make the TC a modular tool so that users can start with a ‘simple’ version and if needed afterwards upgrade/expand.
- If possible, developers should adopt the principles of universal design to make sure also PRM can use the TC.
- When a disruption occurs, TSPs should be forced to cooperate.
- A harmonisation of passenger rights across all modes is desirable.
- As an extra (paid) service, the TC could offer users an insurance that guarantees rescheduling in case of disruption. Paid in advance, this could be economically feasible.
- Crowdsourcing could be a good way to improve reliability of data, on the condition that there is a critical mass and that cross-reference with official channels is made.

The insights obtained during the expert workshop, and this report as a whole, provide input for the next task within GOF4R: “Analysis of impacts on the governance solution” – and for its relevant Deliverable D2.3 (same title). Linking the research done in Task 2.1 and 2.2, D2.3 will formulate recommendations that can be used in other GOF4R Work Packages, especially WP5: Governance and management structure for interoperability framework, as well as subsequent IP4 projects.

REFERENCES

- Brown, J. & Isaacs, D. (2008). *The World Café. Shaping Our Futures Through Conversations That Matter*. Oakland, CA: Brett-Kohler
- COM (2011) 898 final. [A European vision for Passengers: Communication on passenger rights in all transport modes](#)
- Davis, F. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319–340
- Fenton, A. (n.d.). *What is a World Café?* Retrieved from <http://amandafenton.com/core-methods/what-is-a-world-cafe/>
- Gogos, S. (2016). [IT2Rail: Transforming Real-Time Passenger Information and Ticketing](#). *European Railway Review*, 22(3), 60-62
- IT2Rail Grant Agreement, Annex 1: *Description of the action* (2015)
- [IT2Rail Newsletter](#) (September 2016)
- IT2Rail D7.8 *White Paper on IP4 concepts End-user applicability* (2017)
- Pura, M. (2005). Linking perceived value and loyalty in location-based mobile services. *Managing Service Quality*, 15(6), 509–538
- [Regulation \(EU\) 2016/679](#) of the European Parliament and of the Council 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation)
- [Regulation \(EU\) 2017/1926](#) of 31 May 2017 supplementing Directive 2010/40/EU of the European Parliament and of the Council with regard to the provision of EU-wide multimodal travel information services
- [Rights of passengers in multimodal transport: Inception Impact assessment](#) (DG Move unit B.5, December 2016)
- [Shift2Rail Master Plan](#) (31 March 2015)
- [Shift2Rail Multi-Annual Action Plan](#) (November 2015)
- Sintras (2017). [Towards a Single and Innovative European Transport System. Barriers Analysis and Action Plans. Final report](#)
- Slade, E., Williams, M., & Dwivedi, Y. (2015). Exploring consumer adoption of proximity mobile payments. *Journal of Strategic Marketing*, 23(3), 209–223
- TRL (2016). [Study on ITS Directive, Priority Action A: The Provision of EU-wide Multimodal Travel Information Services – Final report](#)
- Venkatesh, V., Morris, M., Davis, G., & Davis, F. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly*, 27(3), 425–478

Venkatesh, V., Thong, J., & Xu, X. (2012). Consumer acceptance and use of information technology: extending the unified theory of acceptance and use of technology. *MIS Quarterly*, 36(1), 157–178

Wang, H., Liao, C., & Yang, L. (2013). What affects mobile application use? The roles of consumption values. *International Journal of Marketing Studies*, 5(2), 11–22

The World Café Community Foundation (2015). *Café to Go. A Quick Reference Guide for Hosting World Café*. Retrieved from: <http://www.theworldcafe.com>

W3C (2017). [Web Content Accessibility Guidelines \(WCAG\) Overview](#).