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Designing effective pre-flight airport security information in electronic format
Case study: Vilnius International Airport

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2015 Laurea Leppävaara

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Degree Programme in Security
Bachelor's Thesis
May, 2015

Laurea University of Applied Sciences **Abstract**
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Year 2015 Pages 50

Origins of the thesis come from my second work placement, which was done at Vilnius International Airport. Aviation security experience gained at the airport indicated inadequate level of knowledge by passengers regarding aviation/airport security and obsolete ways of information provided by airport.

The general purpose of this thesis is to advocate expanding of focus from strictly airport terminal development towards inclusion of cost effective pre – flight (before passenger reaches security checkpoint) information, so the airport, would prepare passenger for airport operations, benefiting both parties – airport and the passenger. Interactivity is emphasized as a vision for future development.

This particular document outlines effective ways of informing airline passengers, regarding aviation security rules and regulations in electronic format interactive informational content. Passenger – to – airport (P2A) communication concept is presented as a vision to follow by Airport Managing Bodies, while developing their infrastructure.

Thesis describes main positive effects of implementing correct passenger information. Positive effects and their contribution to the overall operational efficiency of the airport are presented.

To prove my ideas, thesis explains background of the effective information. Theory of individual learning styles and information perception is described, allowing reader to track origins of my assumptions. Positive and negative elements of information display are thoroughly explained.

As a product of the thesis, airport security webpage development idea, phases and prospect layout for Vilnius International airport is presented in co-operation with Safety and Security Managing Coordinator. What information airport channels of communication must contain and how it must be designed, to provide clear and consistent security information for passengers. Moreover, alternative version of Item Recognition Tool's idea is presented.

In the end document contains informational display effectiveness assessment of 3 different airport websites according to recommendations described in the study. Each website description contains individual suggestions for information display improvement. Besides that, prospect layout of airport security webpage for Vilnius International Airport is presented in English.

Keywords: airport security, aviation security, passenger information, information display assessment, Item Recognition Tool, passenger to airport communication, interactivity.

Laurea-ammattikorkeakoulu **Tiivistelmä**
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Tehokkaan sähköisen turvatarkastusohjeen suunnittelu lentomatkustajille Vilniuksen kansainvälinen lentokenttä

Vuosi 2015 Sivumäärä 50

Opinnäytetyön alkuasetelma tulee toisesta työharjoittelustani Vilnan kansainväliseltä lentokentältä. Saatu ilmailualan turvallisuuskokemus osoitti, että asiakkailla on puutteellinen tietotaso ilmailu- ja lentokenttäturvallisuudesta ja että lentokentän tiedonanto on vanhanaikaista.

Opinnäytetyön yleinen tarkoitusperä on puoltaa painopisteen laajentamista ainoastaan lentokentän terminaalien kehittämisestä kustannustehokkaaseen tiedon esittämiseen ennen lentoa. Lentokenttä valmistaisi matkustajan lentokenttäpalvelujen käyttöön, mikä hyödyttäisi molempia osapuolia. Interaktiivisuutta painotetaan tulevaisuuden kehittämisen visiona.

Tämä asiakirja hahmottelee tehokkaat matkustajatiedottamistavat koskien ilmailuturvallisuuden sääntöjä ja asetuksia elektronisessa muodossa, käyttäen staattista ja interaktiivista neuvontamateriaalia. Passenger-to-Airport (P2A) tiedotuskonsepti esitellään noudatettavana visiona infrastruktuurin kehittämiseksi lentokentän ylläpito-organisaatiolle.

Opinnäytetyö esittelee tarkan matkustajatiedotuksen myönteiset vaikutukset sekä niiden myötävaikutukset lentokentän kokonaisvaltaiseen tehokkuuteen.

Opinnäytetyö esittelee tehokkaan tiedon taustatekijät, sekä teorian yksilöllisistä oppimistyyleistä että tiedon havaintokyvystä, jonka avulla lukija voi seurata olettamuksieni alkuperiä. Tiedon esittämisen myönteiset sekä kielteiset osatekijät esitellään perusteellisesti.

Koska tuote opinnäytetyön, lentokenttien turvallisuutta verkkosivun kehityksen idea, vaiheet ja mahdollisuus ulkoasun Vilnan kansainvälinen lentokenttä on esitetty yhteistyössä turvallisuus toimitusjohtaja koordinaattori.Tuotoksena opinnäytetyö esittelee esitettävän pakollisen ja valinnaisen tiedon sisällön, kuten sen mitä tietoa lentokentän tiedotuskanavien pitää sisältää ja miten se pitää suunnitella, jotta matkustajille välitettävä turvallisuustieto on selkeää ja johdonmukaista. Tämän lisäksi esitellään "Item Recognition Tool" -työkalun idea.

Lopuksi asiakirja sisältää arvion neljän eri lentokentän verkkosivujen tiedon esittämisen tehokkuudesta, opinnäytetyössä esiteltyjen suositusten mukaan. Jokaisen verkkosivun kuvaus sisältää yksilölliset ehdotukset tiedon esittämisen tehokkuuden parantamiseksi. Sen lisäksi esitellään mahdollinen ulkoasu Vilnan kansainvälisen lentokentän turvallisuusverkkosivuille englanniksi.

Lentokenttäturvallisuus, ilmailuturvallisuus, matkustajatieto, tiedon esittämisen arviointi, Item Recognition Tool, P2A kommunikaatio, interaktiivisuus.

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Introduction

Since the journey starts from the booking of the ticket, traveler is in demand of clear and consistent security related information at that point as well. In my opinion, learning certain rules and procedures upon the arrival at the airport is too late. Popularization of gadgets and widespread of the internet allows to use electronic niche effectively to inform stakeholders. In case of this thesis, it describes the possible ways for the airport to inform stakeholders of the aviation sector regarding the security rules and procedures, starting from their travel preparation, during the trip and at the terminal before security check. Research part of the thesis highlights usability of websites, mobile applications and interactive touch screen kiosks in passenger – to - airport communication.

Taking into consideration scale of innovations outlined in Flightpath 2050 Europe's Vision for Aviation, risk of passenger becoming a ''weak link'' in the airport operational chain is real. Therefore to engage this issue, education of the passenger is necessary act and particularly in aviation security topic. Modern and cost effective ways of information presentation will result in long term profit for airports. Implementing interactivity into passenger-to airport-communication will allow creation of tailor-made solutions, creating a feedback based developing process, benefiting stakeholders of the airline industry. (Flightpath 2050 Europe's vision for aviation, 2011)

The aim of this thesis is to present the possibilities and effective ways of informing the stakeholders about aviation security rules and procedures in electronic format from the point of view of the airport and the passenger. Main idea is, that to improve the current situation, airport should try to provide information during pre-flight period, meaning before passengers will reach security check, where their luggage preparation mistakes will be revealed, partly or fully jeopardizing their trip.

1.1 Origins of the thesis

The starting point for my Thesis process was the internship at Vilnius International Airport during summer 2014. My position was the Executive Assistant of the Security Chief at the Security Department of the Vilnius International Airport. Vilnius International Airport, (coded as VNO) provides aviation and non-aviation services to national and foreign economic entities, as well as natural persons. Since 1992, Vilnius International Airport is a member of the Airports Council International (ACI Europe). Security and Maintenance staff are qualified and trained at regional ICAO training center. (Vilnius International Airport 2015)

While working at the aviation security, I was concerned with few general and some minor tasks. General tasks included whistle blow system development, gathering statistical data prior to Checkpoint of the Future project and minor office tasks.
One of the main issues I was focused on, was the regulating passenger flows and dealing with passengers who had lack of knowledge on security regulations, dangerous and/or forbidden goods to carry on board, liquids, aerosols and gels carriage rules. I noticed that travelers put a great strain on security personnel, jeopardizing the process of security control at the security post and disrupting security processes.

After finishing it, I found that I have developed already existing interest in Aviation Security. This led to conclusion that it would be possible to write my thesis about ongoing security related issues in security field at Vilnius International Airport. Personal working experience and statistical data acts as a basis for my thesis research and assumptions.

1.2 Research and scope of the thesis

Qualitative research method was used encompassing observation of human behavior, communication (interview) with Safety and Security Coordinator and studying of various open and confidential sources.
Main research question thesis provides an answer to is ‘’how to effectively design airport security information for passengers in electronic format?’’, with corresponding sub-questions, such as:

- What is the basis of effectiveness in electronic information dissemination?
- How and what kind of information prospect passenger should receive in order to travel stress-free?
- What kind of disadvantages and gaps airport websites feature at their online airport security information?

Scope of the thesis is to present possible ways of increasing effectiveness of airport security information for passengers in electronic format. Research is mainly based on the observations and personal experience during my time in Vilnius International airport, including studying electronic and printed sources, such as reports produced by various air travel governing authorities, federal and international. Full list of sources can be found in 'References' section of the thesis.

Security department of Vilnius International airport, represented by its Safety and Security Coordinator expressed interest in this research. Airport is interested in possibilities to update their current 'Airport Security for Passengers' information displayed on their website. Chapter 7 provides suggested layout of airport security website, based on recommendations presented in chapters 2, 3 and 4. Feedback received from them, was taken into consideration while designing the possible webpage layout.

Thesis features these abbreviations:

AMB	Airport Managing Body
ACI	Airport Council International
CAA	Civil Aviation Administration
FAA	Federal Aviation Administration
F.A.Q	Frequently Asked Questions
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
LAG	Liquids, Aerosols and Gels
MUFID	Multi-Use Flight Information Display
P2A	Passenger to Airport
WTMD	Walk through metal detector

Figure 1 List of abbreviations used in thesis

2 Learning styles and information perception

In order to be effective, design of clear and consistent information needs to focus towards as large as possible passenger audience. To achieve positive effects in clarity, signs, text, explanations and videos should be designed in a way to connect with all types of learners, whether it's visual, aural or kinesthetic. Consistency is achieved by highlighting necessary minimum informational basis for the reader/learner.

2.1 Learning styles

Each individual person has his own learning style. According to Rita and Kenneth Dunns' learning style is the process where each learner begins to understand new and difficult information in his own personal way. (Dunn and Dunn, 1978)

If information display which is designed in a way to trigger personal ability to concentrate and make associations, it will improve passenger-to-airport (P2A) communication in a long-term. Traveler will understand information better, carrying that information further (universal knowledge). For example, regulations for LAG's (liquids, aerosols and gels) are the same in every airport, so the knowledge he would receive at Airport A (who has implemented effective P2A system in terms of aviation security), later on could be applied to Airport B, C etc.

Main learning styles of the prospect user target group can be divided into Visual, Auditory and Kinesthetic. (Dunn and Dunn, 1978)
They overview and adaptation to aviation security is described below:

Visual learners remember best what they see: pictures, diagrams, flow charts, time lines, films, demonstrations. If something is simply said to them they will probably forget it. In case of the electronic information placement, visual learners would be the most engaged target group. Websites, mobile applications and Item Recognition Tool are mainly visual tools of information display. Color coding is important as well, especially in aviation security area, where people face lots of restrictions. (Dunn and Dunn, 1978)

Auditory learners remember much of what they hear and more of what they hear and then say. They get a lot out of discussion, prefer verbal explanation to visual demonstration, and learn effectively by explaining things to others. It would be possible to make a background voice repeating everything what they see/press on website and Item Recognition Tool. (Dunn and Dunn, 1978)

Kinesthetic learners must touch the subject they are into. In this case it poses a certain challenge, since information display is in electronic format. The biggest ''win'' for kinesthetic learners would be a possibility to scroll and press images on the screen. (Dunn and Dunn, 1978)

2.2 Information perception

What make an information display effective are features of clarity and consistency. One of the main ideas of effective information display is to replace old and obsolete text format of

passenger to airport (P2A) communication. As George Leonard Gropper explains ‘’in paragraph one line uniformly follows another. There are no deviations. Moreover, when the paragraph ends, another one just like it begins. It is a format that is variably effective for the protean purposes to which is usually put. It can be particularly pat in expository writing because of its capacity to carry and reveal the flow of ideas. But in training, with its often different purposes, it is likely to be less helpful. For many instructional purposes, it is even possible to say that is generically unhelpful. One reason is that, even in the light, all paragraphs *look* alike’’ (Gropper 1991, 8).

P2A communication adds an aspect of speed into understanding, since passengers are affected by travel stress to a certain extent. The ultimate goal is to allow passenger to get right information on the move. To achieve consistency designers need to avoid information overflow, ‘’walls of texts’’ and unnecessary quotations of laws and regulations (they should come in the end of text as a reference). According to European Commission guidelines of clear writing positive and negative elements are outlined in the table.

Positive and Negative elements of information display	
Positive	**Negative**
Interactivity	Lack of internationalization
Unification of terminology	Information overflow
Message hierarchy	‘’Walls of text’’
Clear format for audience	Quotations of law and regulations
Color	Wrong target group
Language selection	
Compatibility with impaired users	

Figure 2 Positive and negative elements of information display (How to write clearly, 2014)

Positive elements of information display:

Interactivity

Nowadays, it plays one of the most important roles in modern airport culture. It allows to achieve tailor made travel solutions, increasing passenger experience and customer satisfac-

tion. Strategically, an idea of interaction is the main driver in passenger to airport (P2A) communication concept. Practically, it produces ideas such as self-check-in kiosk, printed bag tags and ultimately Item Recognition Tool.

Unification of terminology

If information is presented using the same definitions, acronyms and abbreviations it helps to achieve effective understanding of situation in a limited time gap. For passengers, it plays the vital role, since connecting flight implies changing from one environment to another, necessity of fast adaptation to the new surroundings and making decisions under certain amount of stress. Therefore, terminology used via electronic platforms must be identic to what passenger is going to face at the airport. Unified information tags helps passenger to understand messages in a more rapid way, without wasting time in figuring out what certain words do mean. It should be straightforward with least possibilities of misinterpretation.

Message hierarchy

While building the idea of the message inside one of the platforms, it would reach positive effect if designers would try to divide it into Primary and Secondary. The important rule is that message hierarchy must resemble the logic pattern of passenger's preparation and progress of travel. Therefore, first of all tips regarding luggage packing are offered, including laws about Liquids, Aerosols and Gels (LAGs), then security procedures at the airport, including all steps and tips how to pass it in a smooth way. Primary message has a priority over secondary and must include unavoidable and unchangeable (at current state) security rules, which are applied to everyone. Primary messages must be seen first and taken into consideration by a passenger. Examples of primary content are LAG's regulations, divesting procedure, security wait times etc. Secondary message helps to reinforce the primary message. In this case, references to CAA/ICAO/IATA directives, laws and regulations might be linked as a proof of actions. Task of airport security is to increase throughput of passengers, without loss of quality, instead of forcing the passenger to study the subject of airport security development over the decades.
(Wayfinding and signing guidelines for airport terminals and landside 2011, 115)

Clear text format

Clear format of text implies that text is easy to read and fast to understand. European Commission has created guidelines 'How to write clearly' (2014), which provides recommendations for clear text writing from there 6 steps of effective text writing can be retrieved:

Step 1 – Author of text must determine reader audience (airline travelers/ airport visitors), purpose of the text (what passengers would have to do after reading), main ideas text will present for them. (How to write clearly 2014, 4)

Step 2 – To make sure that text provides direct information. Passengers are usually in a hurry or experiencing travel stress, therefore information must be obtained immediately. Keep it short and simple. (How to write clearly 2014, 6)

Step 3 – Text formatting will help to avoid ‘’walls of text’’. Topics described in the text must follow logic of actions they are presenting. Informative headings will help to divide text into easy-to-find chapters. (How to write clearly 2014, 5)

Step 4 – Sentences must be structured, with obvious agent. Readers must easily understand to whom information applies e.g. ‘*To make travel stress-free,* ***passengers*** *must arrive at the airport at least 1, 5 hours before check-in will start’.* (How to write clearly 2014, 4)

Step 5 – Concrete messages are clear, while abstract language takes time to read and understand. In such regulated environment like airport, possible misinterpretations lead to disruptions and loss of efficiency in operations. (How to write clearly 2014, 9)

Step 5 – Abbreviations must be explained, and kept to the minimum. Jargon should not be featured in any form. (How to write clearly 2014, 11)

Step 6 – After finishing the text, it should be revised with someone else. Revision would be especially effective if person would be not related to aviation business.
(How to write clearly 2014, 14)

Color coding

Use colors that are commonly interpreted with safety (green) and danger (red). Overall unification of color coding would one of the most desirable implementations from the passenger facilitation point of view. However, some passengers may be color blind and may have trouble distinguishing red from green. In that case, this issue is ‘softened’ by using short text explanations to reinforce images. (Wayfinding and signing guidelines for airport terminals and landside, 2011)

Language selection

Language selection comes as a basic requirement for majority of internationally aimed organizations. It goes without saying that airport implies facilitation of masses with various ethnic and/or cultural backgrounds. Therefore, systems to be used by passengers must include option of language selection. To determine, which languages must be available airport should assess target audience according to cultural predominance. In case Vilnius International Airport decides to create such information system, interface should be available in Lithuanian, English and Russian.
(Wayfinding and signing guidelines for airport terminals and landside 2011, 117)

Compatibility with impaired users

Compatibility with impaired users includes many features listed above. Main idea to follow for designers of interface, is that needs of 3 main groups of persons with disabilities (visually, mobility, hearing impairments) ought to be taken into consideration. Pictures and text must be supported with sound, availability of interface zoom for visually impaired persons. If user interface is designed properly, then impaired uses will benefit from interface adaptation for 3 learning styles. For example, color blind people will still be able to understand that these items are forbidden since there is a text stating that.

Negative elements of information display:

Lack of internationalization

Lack of internationalization applies to airports that are not able to look into opportunities of greater customer service. It has a negative effect on both practical and social sides.

Negative practical aspect is that, if language of one of the main cultural groups is not available for retrieving basic information, such as security it will have deep consequences for an airport operations. For starters, misunderstandings of information disrupt the natural or suggested way finding process, making passengers waste time in searching for destination, instead of shopping or acquiring services. In worst case scenario, if number of wandering passengers will highly increase it will lead increase of flight delays, directly jeopardizing of the airport operations. Missed cultural aspect negatively affects the passenger experience; passenger might feel like he/her is not welcomed at certain airport. (Wayfinding and signing guidelines for airport terminals and landside, 2011)

Negative social aspect of missing focus on large part of the audience, will appear in a sense of not being welcomed for passengers. They might start to feel resentment for the airport, which might evolve into loss of profits. Extreme cases of dissatisfaction might lead to complete avoidance of the airport and alternative route choice. (Wayfinding and signing guidelines for airport terminals and landside, 2011)

Walls of Text

'Walls of text' refer to obsolete presentation of text in form of plain words without any 'eye-catching' feature. Such texts are least interactive option of P2A communication, unfortunately quite typical for topics such as security. Usage of such archaic formats disengages reader from the topic and has a minimal long term value, unless the topic is being studied thoroughly. Only visual learners might have certain benefit from such text, but that is only 1 out of 3

learning groups. In this case, video materials with sound and text subtitles will give the best effect. (How to write clearly 2014, 6)

Information Overflow

To my mind, passengers should have basic knowledge of security rules and procedures, allowing them to pass security without travel disruption. Advanced security information displayed ineffectively, will cause frustration and totally confuse passenger, whether he is just preparing for the trip or already at the airport. References to laws, amendments etc. only makes it more difficult to 'get to the point' of the message. Advanced knowledge is required for AMBs and security staff to serve as a basis for their actions. (How to write clearly 2014, 6)

Wrong audience

Wrong audience accompanies previously listed issues such, as lack or misguided internationality, unnecessary information. Besides that, forgetting that travelers are divided into several segments also applies to that. Missing adjustments for elderly and impaired people, also hints that management of the airport have not done their audience research properly. (How to write clearly 2014, 4)

3 Passenger-to-airport (P2A) communication concept

Guidelines for passenger services at European airports (2015) states that, ''new trends in technologies, individual services and products will appear with shifted success. But there are three clear broader trends which will greatly impact the passenger experience over the next few years: passengers will be more informed, they will want to enjoy a more personalized experience and they will be far more empowered.'' (Guidelines for passenger services at European airports 2015, 20)

At this point of airport industry development, major security related initiatives emphasize a technological development of the on-site facilities, terminals, checkpoints, self-service kiosks, less intrusive security screening techniques etc. building the future airport industry in the innovative way. But what is missing in this chain of security development is the passenger itself. In this thesis, besides presenting effective ways of pre-flight information for Vilnius international airport, thesis author is advocating at least partial expand of focus to include passenger education in security culture, pre-travel instructions and effective information dissemination. Constant development of airport services might have negative consequences as well. Main ''gap'' in the system might become the passenger itself, struggling to ''evolve'' together with the system. Therefore, person to airport communication should meet the needs of a passenger whether it is a first time traveler, experienced flyer, senior or impaired person.

Passenger-to-Airport (P2A) communication definition according to thesis author:
P2A is human, electronic and physical methods of interaction between passenger and the airport or vice versa. P2A communication includes staff, static physical display, websites, mobile applications, interactive info screens, self-service kiosks and MUFIDs. Interactive means are emphasized. Live connection, personalization and innovations are what Passenger-to-Airport (P2A) concept is based on.

Concept can be applied perfectly in case of informing passengers, regarding security affairs. The greater amount of knowledge and information passenger possesses the more confident and empowered he feels. Knowledge of the airport *modus operandi* and connection with real-time information track allows them to save quality time at the airport and use for the sake of their own and the airport (for example, 20 minutes spent in way finding, becomes 20 minutes of duty-free zone browsing).

Since the security is one of the vital components of the airport, effective and up-to-date information is necessary to keep the customer satisfaction level at adequate level. Personalization, in terms of security, provides considerable advantages for passenger if implemented correctly. It stands clear that passenger cannot change aviation security laws and regulations to fit contents of his suitcase. Instead of this, airports can offer a tool, which will allow a passenger to revise his goods at the moment he is preparing for his trip. Passenger might use various types of Item Recognition Tools to clearly see the appropriate ways of packing his personal belongings.

3.1 Passenger categorization in terms of information demand

Passenger demographics are evolving so designers should consider different needs of the various types of travelers passing through their terminals. It is therefore essential that they identify the different categories of passengers in order to provide services accordingly. (Guidelines for passenger services at European airports, 2015)

Following sub-chapter provides information on 4 main categories of travelers, which need to be taken into consideration by information designers, based on the knowledge base and operational capabilities they have or aim to acquire. In this case passengers could be categorized into 4 types, such as, first time travelers, experienced flyers, seniors and impaired users.

First time travelers are one of the most vulnerable and problematic segment of passengers at the airport. Based on my personal experience, they have a vague idea of airport processes and procedures, based on media, movies and literature. They are in maximum demand of knowledge, with a vague understanding what to look for. First time travelers generate the

highest demand to acquire knowledge. Due to the obsolete information placement in majority of platforms, their ‘’research’’ leads to further misunderstanding of passenger related procedures. Consequently, lack of information decreases confidence and increases amount of travel stress. Airport security check is relatively stressful procedure even for experienced users, yet it is even more problematic for novice travelers. It takes longer time for them to familiarize with airport environment. This gap of knowledge presents the perfect opportunity for clear and consistent information to be used.

Experienced flyers travel more often, their life span dictates them to reach variety of destinations, which forces them to use more complicated routes, connecting flights, they tend to ‘’dig deeper’’ into aviation industry to use various benefits. They are not satisfied enough with basic pre-flight information; they demand personalization and grip on the real-time information to make personal decisions during various parts of the journey. Experienced flyers are eager to exploit new technologies; they are already familiar with airport rules and regulations. Information dissemination might be designed in a way to offer them new opportunities to simplify their travel, give them tools to make effective decisions, in case there is a *force majeure* during their journey. (Guidelines for passenger services at European airports, 2015)

Taking into consideration **seniors** as flyers changing demographics plays an important role in nowadays travel industry. In order to understand the need of system adaptation to elderly passengers, statistics of air travel popularity and gadgets usage by seniors should be combined. Rise of a senior tourists are clearly evident.

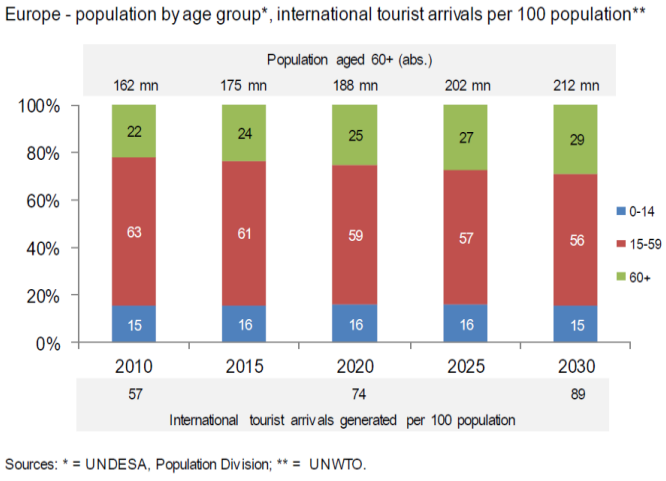

Figure 3 International tourist arrivals in Europe
(Eurostat, 2012)

Statistic data (figure 3) presents a trend of life expectancy increase, followed by a rise of air travel popularity, currently accumulating 24% with prospect of rise to 29% in 2030. To meet

the needs of senior flyers, airports and stateside aviation governing authorities must be ready to provide information shaped in a way of fast and easy understanding, for elderly people. Practical implementations must take into consideration weaker health condition of the elder passengers. Information system designers must consider larger fonts, availability of simultaneous sound and text feature. Besides that, elder people tend to seek human contact and require more time for understanding procedures; therefore staff assistance must be available as well.

Impaired users

European Commission defines disabled person or person with reduced mobility as ‘’any person whose mobility when using transport is reduced due to any physical disability (sensory or loco motor, permanent or temporary), intellectual disability or impairment, or any other cause of disability, or age, and whose situation needs appropriate attention and the adaptation to his or her particular needs of the service made available to all passengers’’ (European Commission, 2015).

According to '*European Commission Regulation 1107/2006 on the rights of disabled persons and persons with reduced mobility when travelling by air*' (2006) PRMs are given:’’

- Non-discrimination during flight reservation and on ticket purchase
- Right to travel on an equal footing with any other passenger
- **Clear and accessible information about safety rules applied by air carriers**
- Free assistance at the airport and on-board aircraft
- Free of charge transport of two pieces of mobility equipment’’

(European Commission, 2006)

Information aspect of regulation is specifically highlighted. With overall airline travel increase, their air movement activity will increase as well. What makes them unique is their execution of regular procedures is different compared to other passengers. Security check poses quite a challenge for such individuals, since it is required to scan medical equipment as well. To build an effective P2A communication on security matters involving person with disabilities, designers should at first, break disabilities into categories then provide customized information for each category.
Main types of disabled passengers to focus on include:

- Visually impaired
- Mobility impaired
- Deaf or hearing impaired

Possible adaptation for **Visually impaired** users must include ability to increase text sizing, brighter coloring, and possibility of audio synchronization to enable such persons to hear the necessary information.

Passengers only with **Mobility issues** have a problem of moving around, rather than understanding the information itself. In this case, information should be aimed at travel companion, implying that's a private person and not an airport provided employee responsible for escort. Knowledge should be provided about air safety regulations, security check procedures, entering/leaving aircraft and seating position. In case of a self-service kiosk, it should be easily accessible for disability chairs.

Deaf/hearing impaired users might have least issues in understanding information in electronic format, since it is screen based. In case there is an instructional video, subtitles have to be present.

Certain PRMs are required to travel with a companion. In that case, information must target both persons; include rules/tips/comments for companion as well.

4 Informational content to be featured in electronic format

4.1 Mandatory content

Airport Managing Bodies should understand the connection between pre-flight preparation and airport operability. One of the most important areas of information to be featured on static and electronic platforms is airport security. Security related information, whether it is displayed via airport websites, smartphone applications or social media should provide clear and consistent information about correct luggage packing, security procedures and passenger rights. The effective way to present the message is by using creative methods, such as instructional videos, step-by-step schemes and various forms of item recognition tools. Text must be divided into primary and secondary messages, to reflect sequence of actions in travel preparation process.

4.1.1 Correct luggage packing

One of the most important activities in travel preparation is organizing your personal belongings, whether they are few suitcases to check-in or hand-held bags only. First of all, general rules about preparing your luggage for the trip (loose straps might stuck in the X-ray machine), on-board baggage carry (depends on the airport), optional name/address attachment, reminder to check size and weight of your suitcase to airline requirements. The effective way of presenting security point of view regarding belongings is to use a video. Video must include

live action, voice and text. Language selection for the video must provide at least English for foreign travelers to understand. Content of the video must include:

Absolutely prohibited items and substances, such as sharp items, projectile firing weapons, stunning and incapacitating devices, tools, blunt instruments, explosives or incendiary substances, flammable or harmful substances (gas, oxidizers, poisons, corrosives, hazardous biological/chemical material), cigarette lighters (ban may vary depending on the country). (British airways, 2015)

Items and substances allowed to carry **only in checked in luggage** are sporting/fishing/camping/ equipment, knives, cutting instruments, firearm replicas. (IATA, 2015)

Items and substances allowed to carry in **hand luggage** involve a bit more complicated rules. To explain them correctly these subjects must be explained:

- 6 centimeter rule of sharp items
- Medication + Prescription
- Liquids, Aerosols and Gels + exceptions like baby food

(IATA, 2015)

Since the introduction of Liquids, aerosols and gels (LAG's) limitations, they are causing confusion among passenger, therefore information regarding them have to provide as well.

4.1.2 Security procedures

Security procedures are one of the most sensitive places of the airport in terms of passenger facilitation. Since every airport is trying to increase passenger throughput, smooth flow at security checkpoint is one of the ultimate goals in terms of operational effectiveness. The best way to learn the process is to see how it is performed. By introducing electronic information dissemination, airport is able to teach, explain and suggest best practices for everyone who is willing to see. Video will contain demonstrations how to perform these actions:

Boarding pass scan is a standard procedure before the approaching security check. Distance to conveyor belt may vary depending on passenger flow facilitation methods. Scanning might be performed either with handheld or static scanner. Main reason of scanning demonstration is to remind passenger that it is necessary to have boarding pass ready at hand. Searching for the boarding pass, wastes precious time of passenger and increases waiting time of the queue.

Divest of items is directly connected with the present aviation security rules in force. Effectiveness of divestment depends on prior knowledge of baggage packing perceived by the pas-

senger; therefore Step-Back approach of informing will be highly effective in preparing the passenger for the flight. Video demonstration must contain step-by-step explanation of the process, including all types of items to be loaded on tray, such as clothing, gadgets and contents of the pockets. Level of divestment may vary depending on the airport. Personal explanation of divestment rules by security staff takes a toll on the flow and increases waiting time.

Walk Through Metal Detector scenarios must be also explained. Video must clearly indicate is it necessary to wait for a signal to pass, what to do if it alarms. Children must be included in the video as well, explaining that they must pass the archway alone. Airport policy on shoes might vary, so it must be outlined is it mandatory to remove them or not.

Composure plays an important role, because items are constantly being forgotten, especially such vital items like boarding passes. Video must emphasize that is necessary for passenger to check their personal belongings, in order not to forget anything.

4.1.3 Security queue waiting times

Knowledge of security line waiting times allows passenger to make decisions regarding his plans at the terminal. Waiting time varies a lot, so the most effective ways to display it would be in a live mode. It is up to the airport what technique they implement to count it, as long as it displays it is current information. Best placement of time indicator would be at these channels:
Website - considering that website will be one of the first web destinations to visit by passenger, early information about security queue waiting time gives a chance for passenger to understand importance of time management at the airport.

Mobile applications – main advantage of gadgets are they size, allowing easy access to information during almost any time of the journey. Passenger will be able to obtain current security queue status via mobile application from any location.

Info screens – info screen allows passenger to receive information, without any effort, only by looking at tit. If possible, placement of screens might be considered. To inform passenger effectively, information system designers, should consider placing first screen at the airport entry to the terminal, so the passenger is able to plan his actions immediately after receiving information. After that, it would be beneficial to place another info screen next to the actual security checkpoint.

4.1.4 Passenger rights

It is highly recommended to include passenger right as a 'Read more' option in the system. Honest approach by the airport informing passenger about his rights contributes to atmosphere of common trust. In case passenger suspects that airport security staff had performed illegal action or overstepped their authority he would have access to review his rights and determine was the situation legitimate or not.

4.2 Optional content to be featured in electronic format

Besides mandatory, read-only security information, Airport Managing Bodies can go further and introduce interactivity as one of the key principles of P2A communication. Finnavia has already accomplished that, by introducing their own item recognition tool described in chapter 8.5.3. Such initiatives make websites to stand out in terms of information dissemination effectiveness.

To help passengers to determine, which items may be taken with them inside the aircraft cabin, which goods belong to the hold luggage and which are completely prohibited, alternative version of Item Recognition Tool is presented. While figuring out different approach, discovery was made that Finnavia has implemented similar technique, yet they have chosen different approach. As describe in sub-chapter 8.5.3 Finnavia's tool is able to show legality of items, which have been already listed in the system. Therefore, it does not provide information regarding goods, which are not listed. My approach towards item legality determination is that, instead of storing a list of thousands of possible objects (requiring constant update), tool will function based on inserted features of the item, which traveler wishes to travel with. More detailed concept is described below.

4.2.1 Theoretical concept of item recognition tool

Item Recognition Tool – electronic software, which would allow passengers to check items from their personal belongings in terms of legality for air carriage, while being at home or during their trip. In best case scenario, instalment of the tool would be possible into any electronic hardware with screen. User would navigate via designated tools (keyboard, mouse, buttons, etc.) or by touching (touch screen).

Tool would be scripted according to current aviation security legislation. It would be focused on item features, rather than presence of the item on the pre-selected list of prohibited items, to show possible ways of airline carriage of the item. To test item, user would have to insert item data regarding physical features of the item. Requirements for item to determine its legality would be: material, size, weight, temperature, packaging, presence and length of

sharp edges, visual resemblance to prohibited items, possible inside content, and type of the inside content. After inserting all possible data, tool would present possible ways of carriage or would show that item is totally prohibited to carry. Interface of the tool must be simple and user-friendly. Considerations towards color-blind persons must be taken. Suggested user-interface can be found in Annex 1.

5 Overview of Passenger-to-airport (P2A) communication channels

Information at the airport can be provided in different ways and platforms, depending on the airports budget, size, scope and type of the information intended for display. Its main purpose is to provide the necessary and usually extensive information about the airport and the airport environment to the passenger. In this chapter, short descriptions of main types of communication platforms, such as websites, info screens, mobile applications and theoretical idea of personal Item Recognition Tool version are presented.

To reach the highest effect, information should be displayed as soon as traveler will start preparing for his trip. It will prevent passenger from packing prohibited items, resulting in their loss at security check. This means that majority of information must be shared when passenger is still at home. Based on personal experience of surveying typical passenger mistakes, there are two appropriate time lines when it should be done – when passenger is at home/workplace before he started packing belongings, limited possibility during trip towards airport, and upon the immediate arrival at the terminal, while passenger has not checked-in his luggage or entered security lane. Chart below illustrates designated interaction timeline with main 3 P2A communication tools: airport websites, mobile applications and Item Recognition Tool.

Figure 4 adapted from Guidelines for passengers at European airports.
Areas of usability for each communication tool
(Guidelines for passengers at European airports 2014, 47)

5.1 Interactive touch screen kiosks

Upon the arrival at the terminal, passenger still has a chance to acquire knowledge regarding security affairs. Depending on gadgets he possesses at hand, website and mobile applications

allows him to do it. Besides them, Item Recognition Tool might be installed as a static info screen, allowing passengers to check their items in terms of legality on board.

Figure 5 adapted from Guidelines for passengers at European airports.
Timeline of effective information at the airport terminal
(Guidelines for passengers at European airports 2014, 48)

Usability of information kiosks at airports can be hardly undermined. It might be used for important areas of information to present including flight information, way finding, shopping/services offers and security information. Placement of the kiosk must be carefully considered, based on each airports design features. Kiosks must stand at places where people would be entering terminal, so the passengers would be able to receive information before they had made any decisions. To inform passengers regarding security affairs, electronic kiosks should contain information listed in chapter 4 or simply copy airport security website layout. Besides that, to improve effectiveness it can feature Item Recognition Tool. To fully utilize kiosk, it should feature various informational content according to information demand. Usually, to use kiosks more efficiently, they might feature various types of information (flight info, way finding, shopping/services offer etc.). Therefore, for airport security management team, it is important to make sure that availability of security information is clearly visible from kiosk surroundings to the main menu of the kiosk.

5.2 Websites

The perfect time to perceive information for passenger is while he is still at home, preparing for his trip. It allows, him to get information before he started packing, so he will pack liquids, aerosols and gels correctly, will not include forbidden goods and will be ready for incoming security checkpoint procedures he is going to face. In case airport has implemented effective information dissemination in electronic format, traveler has a chance to see informational videos, pictures and tips via website, social media or mobile application. Home is also a perfect place in terms of timing, to check items with various versions of Item Recognition Tool, if available.

Figure 6 adapted from Guidelines for passenger services at European airports

Timeline of effective information during travel preparation

(Guidelines for passenger services at European airports 2014, 48)

From effective information point of view, websites are fundamental channel of information, which has ability to provide a wide specter of information. Designers of information might consider taking into consideration, that websites were originally intended and usually accessed from static positions (homes, offices, libraries), using correct hardware (monitors with wide display). Therefore, it allows information to be placed in a large format (but still clear to understand), allowing deep insights into topic by visitor. Wide screen allows website to contain visualizations, schemes, necessary amount of text to thoroughly explain the point. On the other hand, large format prevents effective access to websites while on the move. Rapid crisis messaging via website is somewhat restricted, since the majority of passengers at the airport are out of the reach with its website. So in this case, mobile applications and classic crisis management tools might be used. Despite this, websites can be one of the main crisis communication channels to inform incoming passengers regarding the incidents or crises. Practically it is possible to access website on the move via smartphones, but quality of information might be inadequate, depending on website technical features. Assessment of different airport websites (chapter 6) presents positive and negative features of 4 airport websites, with improvement suggestions.

5.3 Mobile applications

According to ACI Europe, in 2014 there were 51 mobile applications covering 164 airports in Europe. In year 2013 these 164 airports facilitated 73% of air passengers, numbering 1.1 billion people. Rise of mobile applications popularity, will eventually involve airports, who aim to benefit and adapt to current trends of the life style. (ACI Europe Digital Report 2014, 21)

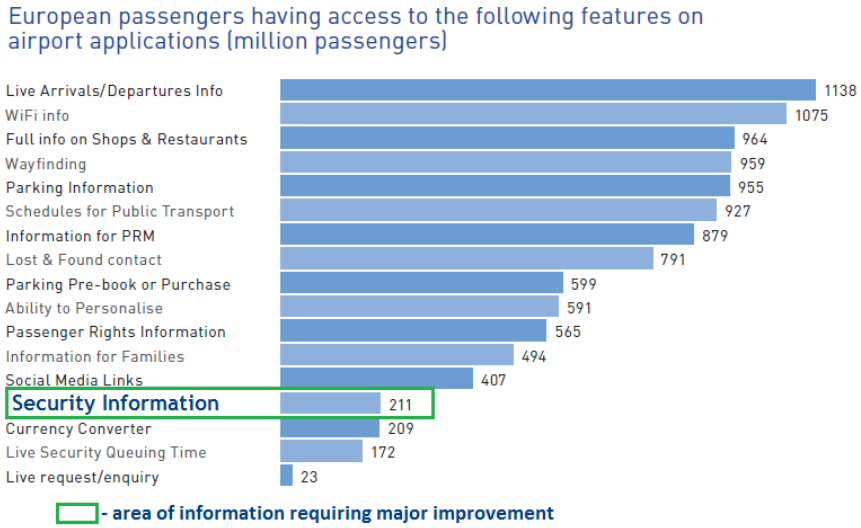

Figure 7 Access to information topics via airport applications by European passengers (in millions)
(ACI Europe Digital Report 2014, 21)

On the contrary to website, the main advantage of mobile applications is the ability to provide live coverage of current affairs using mobile phone or tablet PC as a platform. Applications are used to display wide range of airport affairs. Chart above, created by SITA, displays main areas which are covered by mobile applications nowadays: flight information, shopping offers, way finding, parking and public transportation. Currently, security information is one of the least accessible topics, with only 211 million passengers having access to it via mobile application, compared to live flight or shopping information, 1138 and 964 million respectively.

5.4 Tablets as a multiplier of effectivity

Tablets, because of their technical features provide great opportunity for traveler to access Internet-based information. Tablets enable owner to choose webpage access via classic website view or mobile application. Therefore, access and perception of airport security information would be more convenient via website, rather than mobile application. Currently, Vilnius Airport does not have its dedicated applications, so in terms of electronic information placement only website exists.

6 Airports website assessment from informational point of view

One of the main virtual destinations in seeking knowledge for airline traveler is airport websites. To provide information effectively, website must contain clear and consistent information in a user-friendly design. Effective information helps passenger and airport to benefit

from it. If passenger has a clear idea of his mandatory actions at the airport, he is able to plan his presence at the airport. Such opportunity should be used by the airport to attract passenger, with product and service offers. Before the designing of concept ‘airport security for passengers’ webpage layout for Vilnius airport, websites of other airports were examined and assessed in terms of effective information dissemination.

6.1 Information display effectiveness evaluation criteria

To explain my ideas in practice, assessment of 1 airport and 2 airport managing company websites was performed based on the guidelines and recommendations provided earlier. Evaluation process is followed in such manner:

First of all, starting from the main page, accessibility to security related information is described: How many ‘clicks’ are needed to reach it? Is it visible from the main page? How is it highlighted? Does it follow travel preparation logic?

Secondly, evaluation of message consistency: Does it cover all areas of security information? Is it precise or vague? Is there space for interpretation? Are F.A.Q's featured? Is ‘read more’ option provided?

Thirdly, message presentation ways are assessed: How is it visualized? Are all learning styles engaged? Does material show all possible scenarios? How interactive is it? Is there any visualization, besides text? Is instructional video included? What is the quality of the video?
In the end of each evaluation, suggestions are provided to increase information display effectiveness.

6.2 Riga International Airport (RIX)

Link to the airport security webpage:
http://www.riga-airport.com/en/main/passengers/useful-information/aviation-security-requirements

Accessibility to security information

On 30.04.2015 main page of RIX features term ‘Security’, but it does not imply general information about aviation security. Unfortunately, it only explains situation with certain ‘’security coupons’’ Ryanair passenger had to acquire, but not anymore. To reach actual security information, visitor must go to Passengers – Useful Information – Aviation Security requirements. Therefore, 3 clicks are needed to reach it. ‘’Aviation Security Requirements’’ contains a legislative overview of EU and Latvian state initiatives regarding aviation security and fines

if certain rules are violated. To reach a practical information, visitor must click further to ''EU Security rules at Airports'' (4th click). . 4 clicks to reach practical information can be tolerated only if there is high quality information in the end, otherwise it is too much. After that, prospect traveler can proceed further to ''Prohibited items'', ''Regulations for hand luggage for transfer passengers'' and ''Security charge''.

Content of information

''EU Security rules at Airports'' contains rules of packaging, information on LAGs and basic information on procedures. Minimum information is not enough, since it does not provide step-by-step recommendations what to do at airport security check. Besides that, waiting time in the queue before security check is not displayed and passenger rights are not mentioned. ''Prohibited items'' page displays a list of prohibited items, directly taken from attachment 4C of EC Regulation 185/2010. List is completed with a poster in Latvian and English illustrating regulation. ''Regulations for hand luggage for transfer passengers'' presents a poster, explaining carriage of LAGs, medicine and duty-free goods and includes a poster, completed in 3 languages Latvian, English and Russian.

Message presentation

Outlay of the text can be categorized as obsolete. Text itself is missing message hierarchy; chapters are not outlined, so passenger cannot really tell, what the topic of the text is. Passenger must clearly understand, what he is about to read on. That's what characterizes effective from ineffective information. Only visualizations are posters containing information with quite inadequate design. Main information about liquids and forbidden items are portrayed in total grey, so it looks really dull and does not engage reader into it at all.

Suggestions to increase information display effectiveness

Overall evaluation in terms of effective information placement is unsatisfactory. Such webpages might have been found 10 years ago, but nowadays they have become obsolete. To increase effectiveness of security information, information must reflect sequence of actions of travel preparation. To accomplish that, these steps have to be completed:

1st step – ''Prohibited items'' page must be placed before ''EU Security Rules at Airports'' and redesigned to make it more user-friendly. Currently it features direct quotation of European Commission regulation. Language of such document is strictly formal, with high rate of juristic terminology. Therefore, we can see that RIX made a mistake of wrong audience to communicate with. One possible solution might be to rebuild the poster, so he will represent

content of the law in the more effective format, using color coding and clear images. Another solution might be instead of current listing items one-by-one to provide guidelines how to determine, what is legal and what is not to be carried on board. In this case, text should be re-written containing highlighted topics, message hierarchy and images illustrating the text. These are text only related solution.

2nd step – ''EU Security Rules at Airports'' chapter features only written instructions of processes. Text is missing recommendations of security approach, such as 'Have your boarding pass ready for scanning', description of divest procedure is not fully described. Need to remove belts, watches, keys and metal containing possessions passenger carries on himself and/or in the pockets are not mentioned at all. Page as a whole is mix of overall and LAG's related goods carriage rules. There is no message hierarchy or separation of topics. For first-time traveler it might be hard to figure out the general message of the page.
Processes are best explained by visualizing them. Video must be created added presenting all steps and recommendations. It must contain voice at least in Latvian. Lack of subtitles might be partly compensated with currently existing text. In such case, page will contain not only a video, but also a text to explain it.

3rd step – ''Regulations for hand luggage for transfer passengers'' contains poster describing LAGs rules and a list of international airports considered as a third country. This webpage has almost no need to exist, since poster can be moved to ''EU Security rules at Airports'' page. List of third world airports can be relocated to the same destination as well.

4th step – To support basic security education of mainly first-time travelers and/or other groups of travelers, website must compile a list of Frequently Asked Questions (F.A.Q). Questions must relate to variety of security related questions. Answers must include 'Read More' option to main webpage of issue discussed. Questions must be culturally referred and reflect present issues of main RIX users audience groups.

5th step – Home page of the website, must contain current security queue waiting time.

6th step – To increase P2A communication might create a RIX mobile application, featuring necessary information regarding, way finding, flight information, aviation security rules and procedures and shopping.

If RIX decides to implement these steps to increase effectiveness of security information display, they will have modern website, with solid level of P2A communication. Completion of these steps will result in long-term advantages, such as greater operational efficiency and higher passenger experience.

6.3 Paris airports

Link to their homepage: http://www.aeroportsdeparis.fr/en/homepage

Accessibility of information

Aeroports de Paris is the managing body of all Paris airports. Designers created a highly modern and eye-catching interface. Because of the design features, initially website does not provide direct link to security information. Starting from luggage preparation, information can be found via path like this: Preparation – Your luggage – Golden rules. Therefore, 3 ‘’clicks’’ are used. After that visitor should follow links to 'Checked Baggages', then 'Cabin Baggages' and 'F.A.Q cabin baggages'. To access landside related security information, visitor must use 3 ‘’clicks’’: Preparation – Boarding Procedures – Security Control. 'Security Control' webpage refers only to actual security checkpoint procedures.

Content of information

'Golden rules' feature useful recommendations regarding preparation of the suitcases, importance of name/address signage, valuable goods carriage, warning not to accept other luggage from strangers, to pair medication with prescriptions and additional warning not to leave luggage unattended as they would become subject and would be destroyed. Text is highlighted with bullet points and completed with a YouTube video, which according to its title must visualize preparing passenger's luggage, but does not work. 'Checked luggage' contains the list of prohibited items in hold luggage (in form of PDF extract from Official Journal of European Union) and the list of airline weight limits, which cannot be accessed, since such webpage does not exist in the website directory. Both of these issues must be fixed, especially the video. It will help a lot to increase effectiveness. 'Cabin luggage' presents items forbidden in the cabin and regulations concerning the transport of liquids in the cabin, supported by another not functioning YouTube video. 'F.A.Q cabin baggage’s' answers questions for topics such as: LAG's, drugs and medical devices, power appliances in bulky or metal in airplane, equipment and X-ray and objects allowed in the cabin.

Message presentation

Security content is presented has a clear format and follows logical pattern of preparation for a flight. Text is written perfectly to outline milestones of rules and procedures. Besides that, there is an optional possibility to read full descriptions of regulations and complete lists of forbidden items. Airport approach to make full descriptions optional, instead of copying full text into webpage is really effective way to provide information, for those who are interested, without overloading reader with information. In support of the text, there is a video in

the bottom of the page. Unfortunately, only the most important video works, called "Getting through the security checkpoint smoothly and quickly".

Besides website, passengers are offered ‘’My Airport’’ mobile application. It is aimed towards traditional areas such as: way finding, shopping and flight information. What really makes this application to stand out in terms of passenger information, is the visual translator to translate signs from French and English into other languages. Possibilities to develop application further to fit security needs are presented in the next chapter

Suggestions to increase information display effectiveness

Aeroports de Paris has an overall high level of information presentation, yet few aspects must be improved.

First of all, there is a separation of two ‘’links’’ of one security ‘’chain’’, which are preparing the luggage and security procedures at the airport. Such separation of information might not be the most effective solution, because it disperses information to different areas. To increase information optimization, creation of such path might be a solution: Preparation – Preparing Your Luggage (including all subtopics) – Security procedures (including all subtopics).
Secondly, videos must be fixed in order to work. Only the most important video is working called "Getting through the security checkpoint smoothly and quickly". In overall, video is made well. It provides guidelines for divest of items, passage of WTMD scenarios and LAGs scan. Despite this, from the informational point of view, video contains two gaps. First disadvantage is missing sound and subtitles. They would seriously increase the perception of the video, by various kinds of learners. Another disadvantage of the video is lack of reminder about correct composure. Passengers must be reminded to collect and check their belongings after they come out of X-Ray scanner.
Third website related issue is not functioning airline weight limitation list. Website administrators must fix it as well, since it is one of the most important criteria in luggage preparation. Last but not least, current security queue waiting time status is missing.
If *Aeroports de Paris* decides to go further in terms of innovations, they should consider including basic security rules into mobile application. Screen size of the smartphones and tablets dictates information display features. Therefore, emphasis must be put on visualizations, such as images and videos.

6.4 Finnavia / Helsinki – Vantaa international airport

Link of the website: http://www.finavia.fi/en/helsinki-airport/

Accessibility to security information

Finnavia is a Finnish company who provides airport and navigation services to facilitate smooth traffic. It maintains and develops network of 24 airports and air navigation system. On 04.05.2015 security information on designated Helsinki – Vantaa International airport can be accessed using 2 ''clicks'' via path like this: '' I'm departing'' – ''Read packaging instructions'' or 'What to do in security control'. 2 ''clicks'' can be considered as effective access to important information.

Content of information

'Read packaging instructions' contains security control rules for cosmetics, foods and alcohol. Guidelines how determine what is considered liquid or not are provided. Exceptions, such as baby food, formula milk and medications with prescription are outlined. Handling of alcoholic beverages is explained. Instructions for scissors, knives, matches and cigarette lighters are presented, including 6 centimeter rule for sharp items. Besides that, recommendations regarding carriage of electronic equipment and batteries are given. Moreover, regional impact is taken into consideration, with fishing, camping, hunting and skiing equipment placement rules presented.

Tips for luggage preparation and packing, such as amount of bags, weight and additional fees are described, including items for impaired users.
Webpage 'What to do in security control' features written and visualized procedures for divesting and walking through metal detector with possible scenarios. Also, disposal of forbidden items by airport staff is explained. For those who seek for more knowledge about security checks, airport provides website of the Finnish Transport Safety Agency for more details.

Message presentation

Finnavia.fi has a high level of information presentation. Starting from the idea, information follows logical pattern of travel preparation. Website provides step-by-step instructions regarding security procedures. Text is written in the user-friendly manner. Main topics of text are highlighted, so reader can find easily what he is looking for. Besides text, video is provided for better perception of rules. It shows clearly, divest, WTMD and composure procedures. Again, what is missing (like in the Paris airports video), are sub-titles and voice support. It will increase effectiveness of the video by engaging audial learners and those, whose English proficiency skill are less than average.

But the most innovative feature, making Finnavia website the best in presenting aviation security rules is the tool, which allows the prospect passengers to check which items must be carried to the cargo hold and which can be taken on board as a hand baggage. It corresponds with an idea of Item Recognition Tool, but different approaches are used. Users of Finnavia tool have a list of suggested items "inside" the system, while Item Recognition Tool allows checking any item, by inserting information about it first.

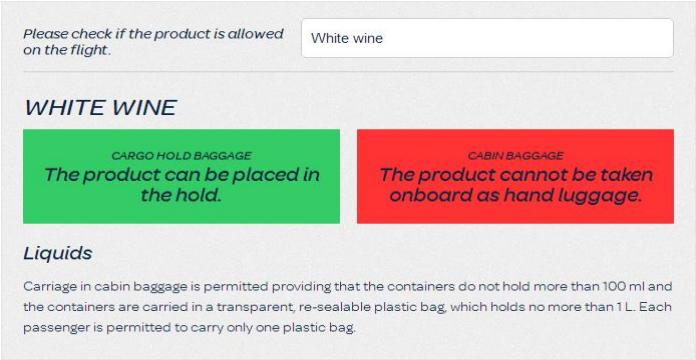

Figure 8 Finnavia's web tool to determine item legality for the cabin (https://www.finavia.fi/en/helsinki-airport/departing/. Accessed on 2015.09.21)

Suggestions to increase information display effectiveness

At the moment Finnavia possesses one of the most effective website in terms of travel preparation. In spite of all positive aspects, certain changes must be done and few ideas are left undeveloped. Video ‘’Airport Security Control’’ needs to have subtitles added and voice in Finnish and/or English reading them. Ideas left undeveloped are Frequently Asked Questions (F.A.Q) list and mobile application. F.A.Q really helps to sort out primitive issues of informational matter for passengers. Secondly, the mobile application is not highlighted at the website. It exists on iTunes and Google Play store, but it could be found only via website search. Search provides a variety of news regarding the application, but there are no links on the website to iTunes or Google Play for downloading application. At the moment, application seems not to have any security related content, so absence of it in terms of aviation security is not critical.

7 Vilnius International Airport ‘‘Security information for passengers’’ webpage concept

To inform prospect or current passengers of Vilnius International airport regarding security matters effectively, information should be concentrated at web location. Access to it would be gained via 1 or 2 clicks maximum. As recommended in chapter 4, information designed for passenger would resemble typical sequence of home and airport actions and be divided into

six chapters. Therefore, it would look like this: Main page – Luggage preparation – LAG transportation rules –Item Recognition Tool (advanced option) - General instructions for item carriage – Airport security procedures (I) – Airport security procedures (II) – F.A.Q.

7.1 Two tier development concept

Suggestions for development of a centralized airport security page could be divided into two tiers or levels – basic and advanced.

Tier 1 (basic upgrade) would include text only features, while Tier 2 (advanced upgrade) will include broader P2A interactivity.

Tier 1 (basic)	Tier 2 (advanced)
Instant visibility and one-click access	Live display of waiting time at security check
Luggage preparation tips and rules	Certain version of Item Recognition Tool
LAG carriage rules	'Listen to the page' feature
General instructions for item carriage (text + pictures)	
Presentation of airport security procedures (text + video)	
Airport security F.A.Q	

Figure 9 List of Tier 1 and Tier 2 webpage development features

7.2 Basic level webpage development - layout

Main page

Currently main page features no direct links towards airport security. Therefore, there are 2 suggested placements of direct links (no. 2 and no. 3), plus suggested immediate security check wait times display (no. 4). It would provide instant visibility and straight one-click access to security information (zoom in for detailed view).

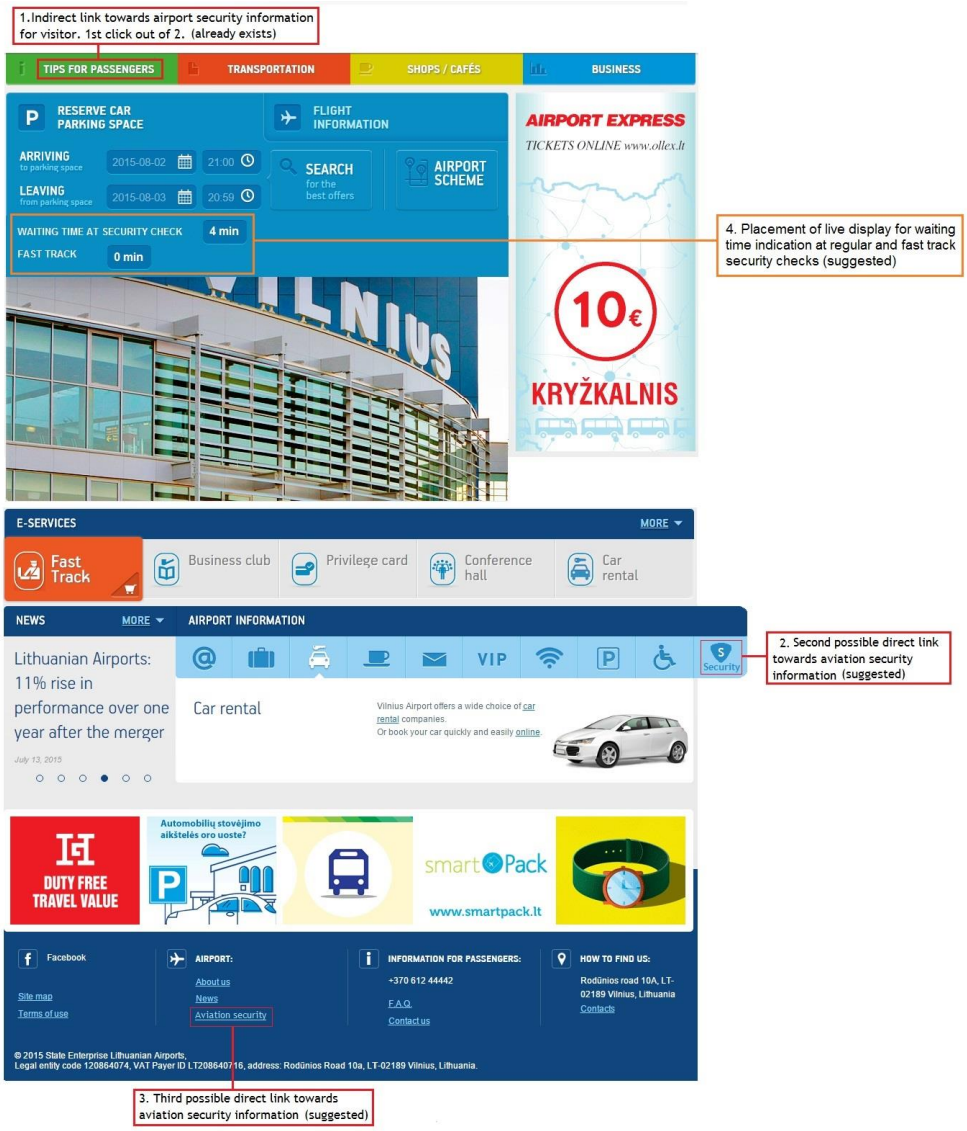

Figure 10 Prospect placement of links on the main page (Vilnius International Airport website, 2015)

Luggage preparation

As recommended in chapter 4, first page for passengers to start with would be ‘’Luggage preparation’’. Text starts with general rules for luggage preparation, then proceeds with weight and size limitations and ends with recommendations for parents travelling with children. To follow logical sequence, in the end of every chapter, link would be inserted leading to following chapter (zoom in for detailed view).

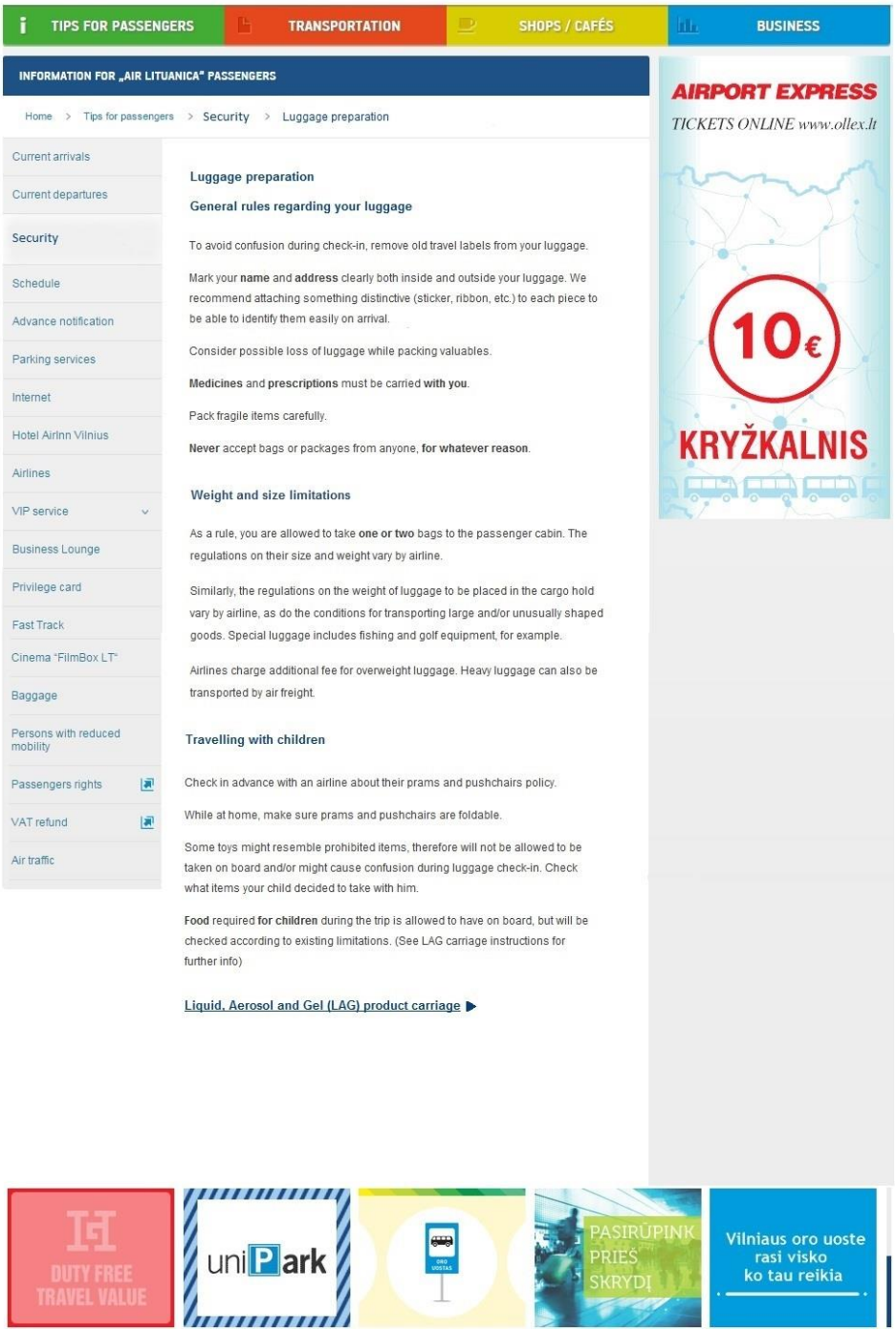

Figure 11 Luggage preparation page

(Vilnius International Airport website, 2015)

Liquid, Aerosol and Gel product carriage

One of the most important and complicated topics for passengers in terms of airport security is carriage of liquids. To engage with this issue airport webpage would feature detailed, yet easy to understand descriptions (zoom in for detailed view).

Figure 12 LAG carriage page
(Vilnius International Airport website, 2015)

General instructions for item carriage

Instructions for item carriage would feature visual representation completed with text and pictures. Pictures on the webpage would be the same as in the terminal making it easier for passenger to review previously obtained information.

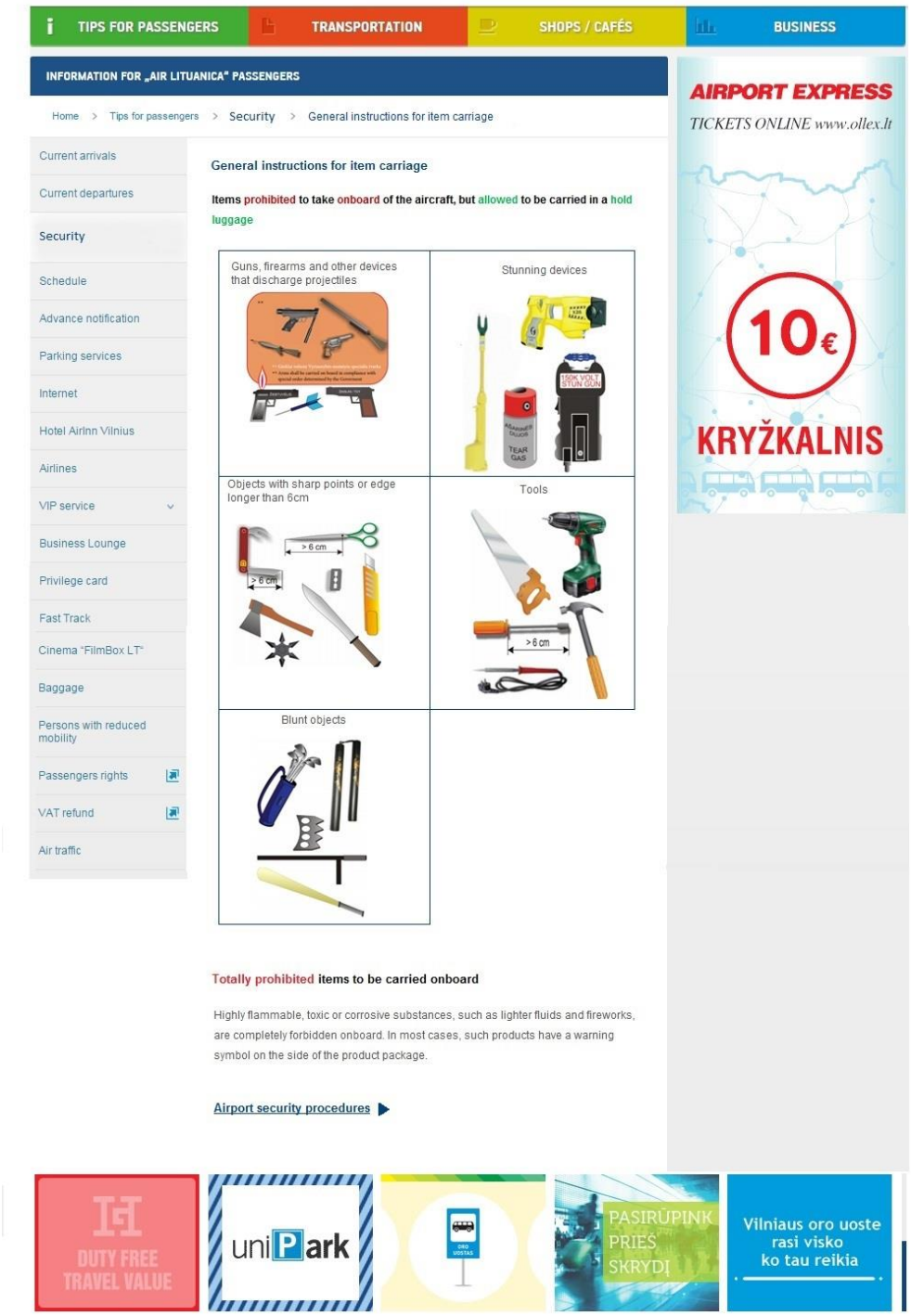

Figure 13 General item carriage insturctions page
(Vilnius International Airport website, 2015)

Airport security procedures (I)

Detailed description of airport security procedure aimed at passenger is vital in terms of passenger preparation for the trip and preserving smooth flow of airport operations. This page would divide security check procedure into 3 parts: divest, walking through metal detector and composure.

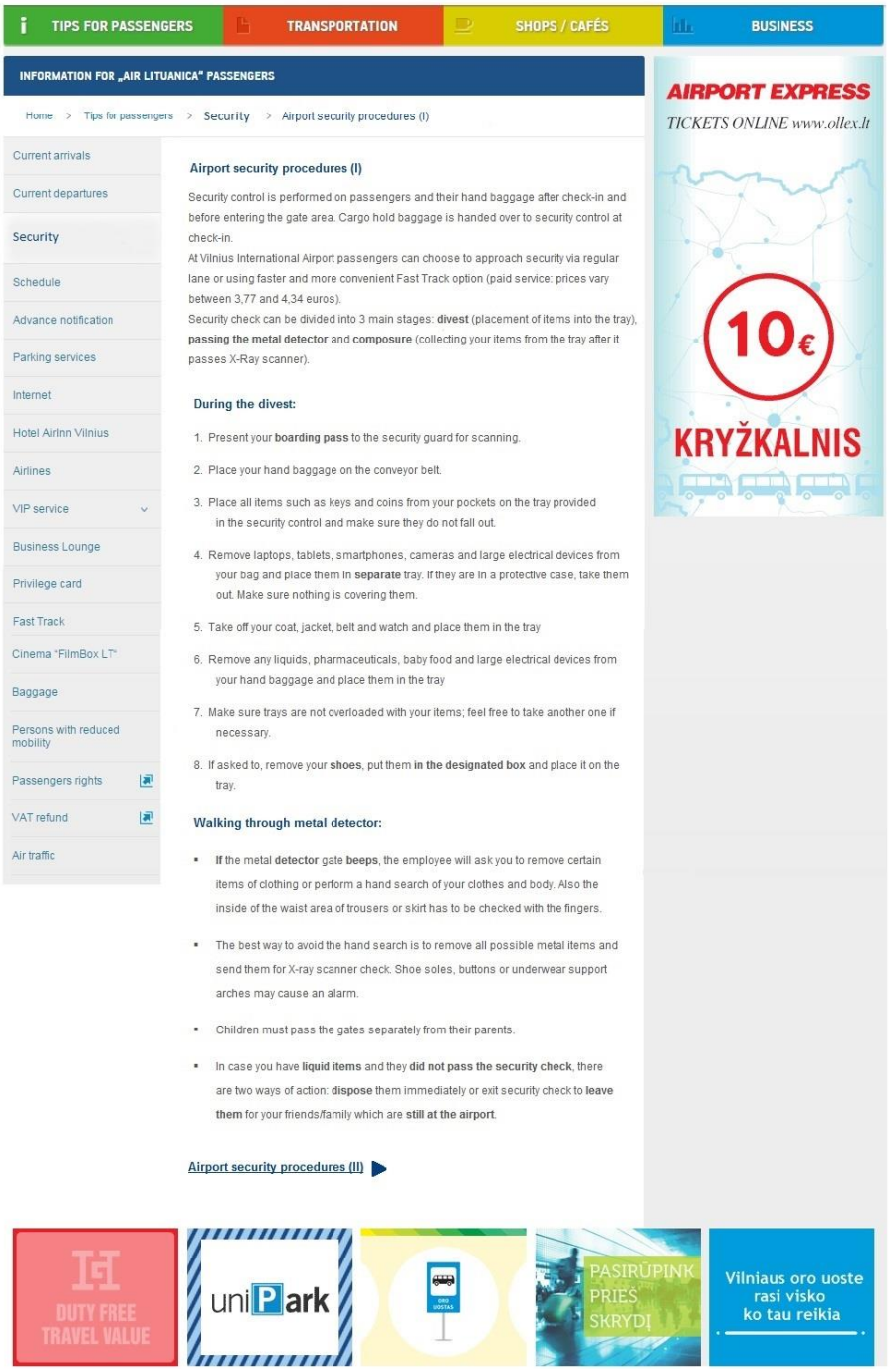

Figure 14 Airport security procedures (I)
(Vilnius International Airport website, 2015)

Airport security procedures (II)

Second page of airport security procedures would display remaining text and such vital feature as video. Currently Vilnius International airport possesses the video, featuring real security staff, which displays security check process. Uploading of such video to the website would engage much larger passenger audience than just actual terminal visitors.

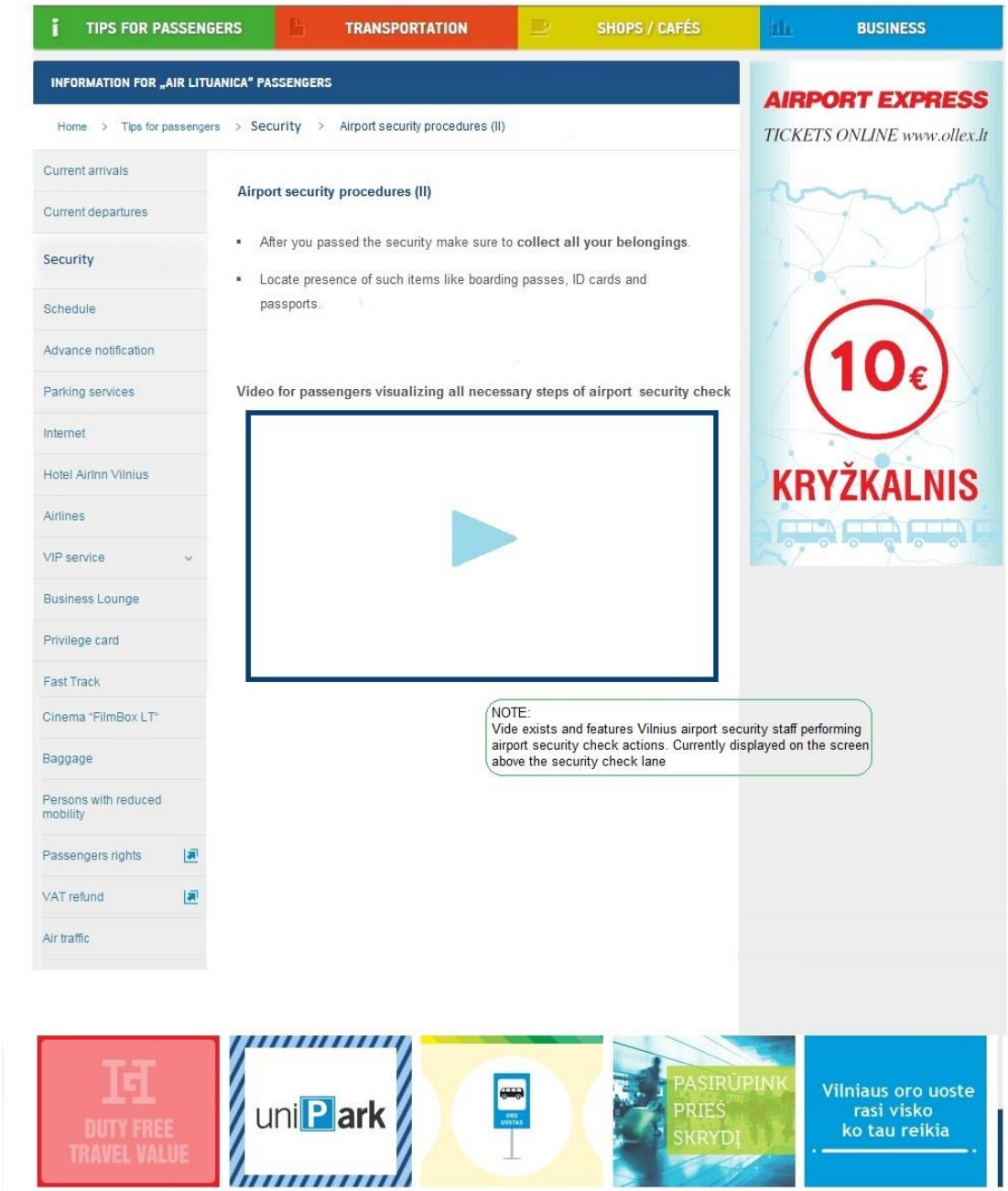

Figure 15 Airport security procedures (II)
(Vilnius International Airport website, 2015)

Frequently Asked Questions

Frequently asked questions would help passengers in dealing with different aspects of airport security. Questions listed here are chosen according to personal experience of airport security staff and cultural references of Lithuanian air travel.

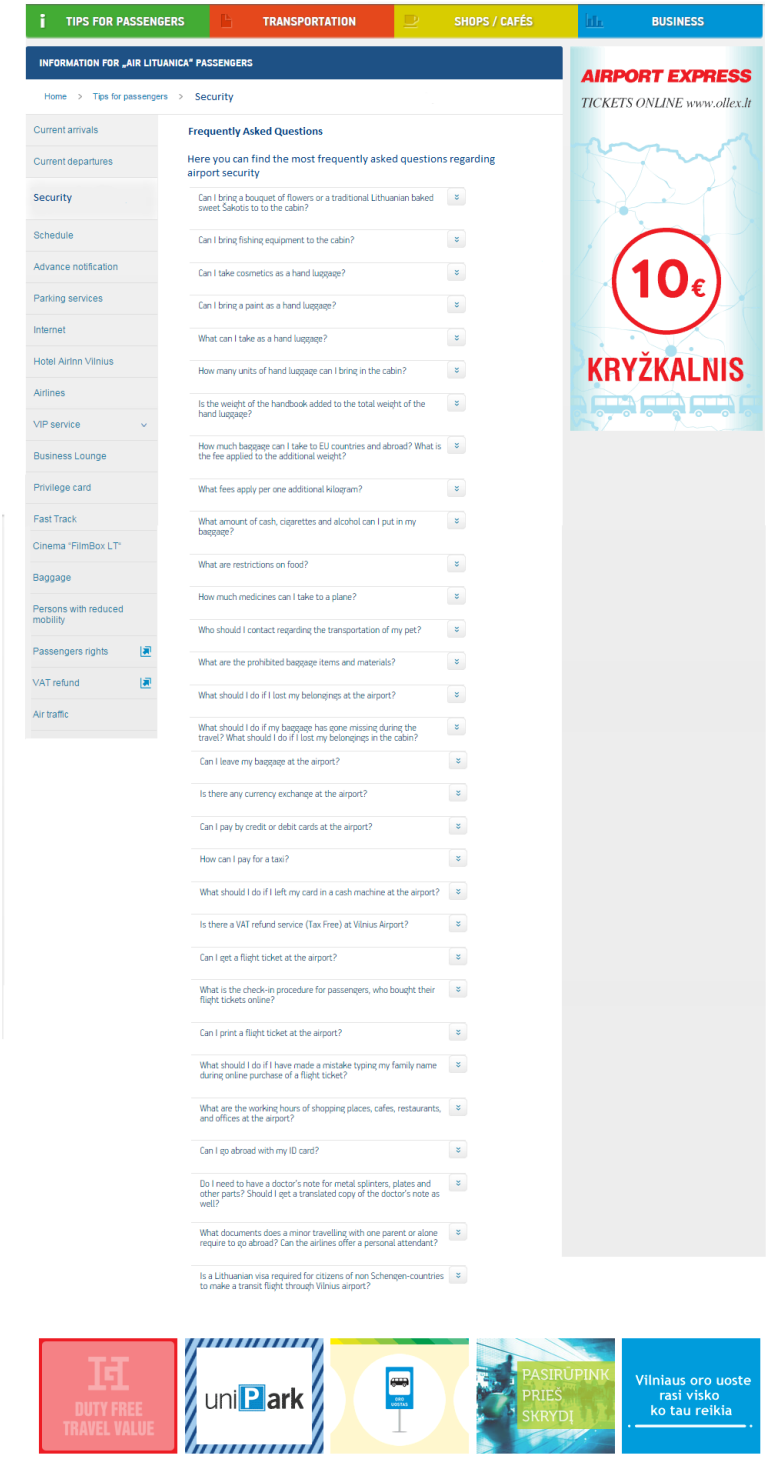

Figure 16 Airport security F.A.Q.
(Vilnius International Airport website, 2015)

7.3 Advanced level webpage development - layout

Live display of waiting time at security check

Live display of waiting time at security queue would require certain technological development of the airport site. Additional information for passengers would be featured on the top of the website including regular security check and Fast Track options. Contrast of a time, might have positive effect on Fast Track sales. Passengers realizing waiting time difference might opt for paid, yet faster and more convenient service.
It is up for the airport to decide what technology to use as a basis for waiting time notification system.

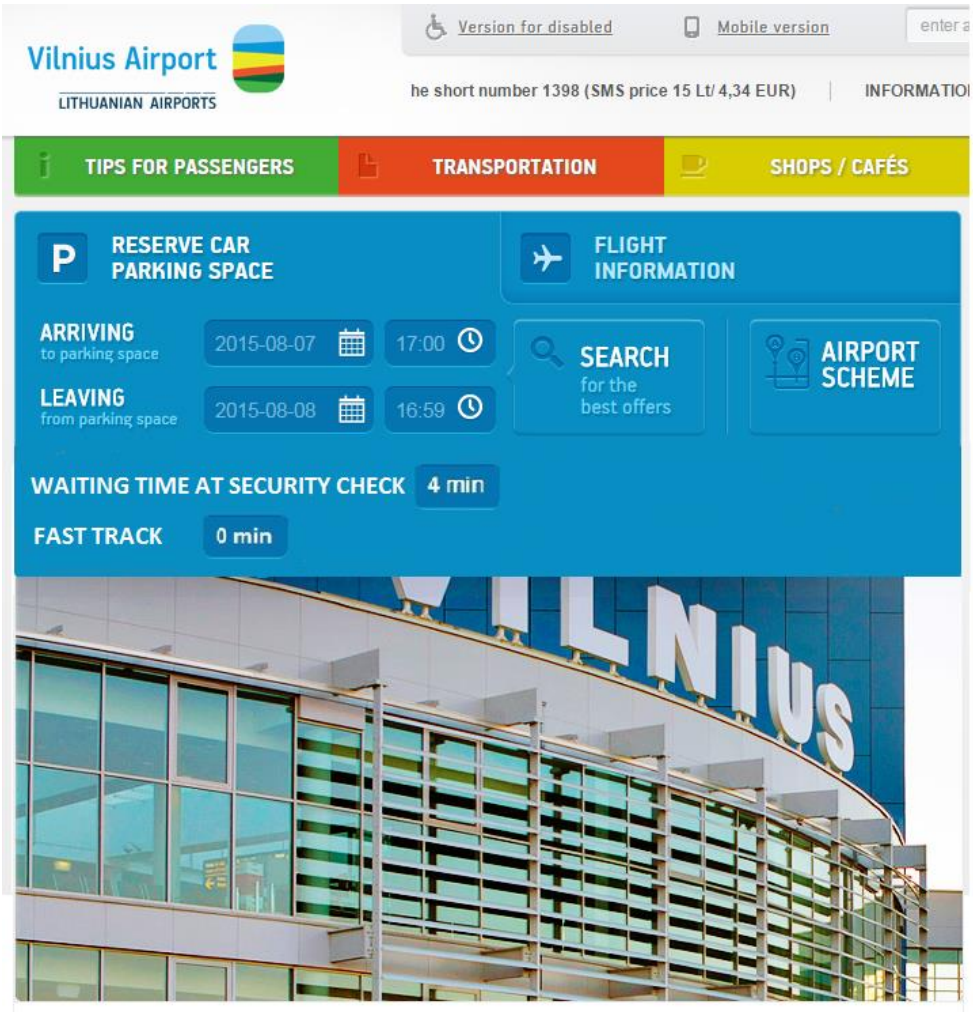

Figure 17 Live display of security check wait time (Vilnius Airport
(Vilnius International Airport website, 2015)

Item Recognition Tool

Option 1 - ”Finnavia type” of the tool

‘Finnavia type’ of the tool would be featured on the top of the LAG carriage page, above all the text and pictures explaining the carry, so passenger could just check item (if it’s in the database of the tool) instead of reading all the text.

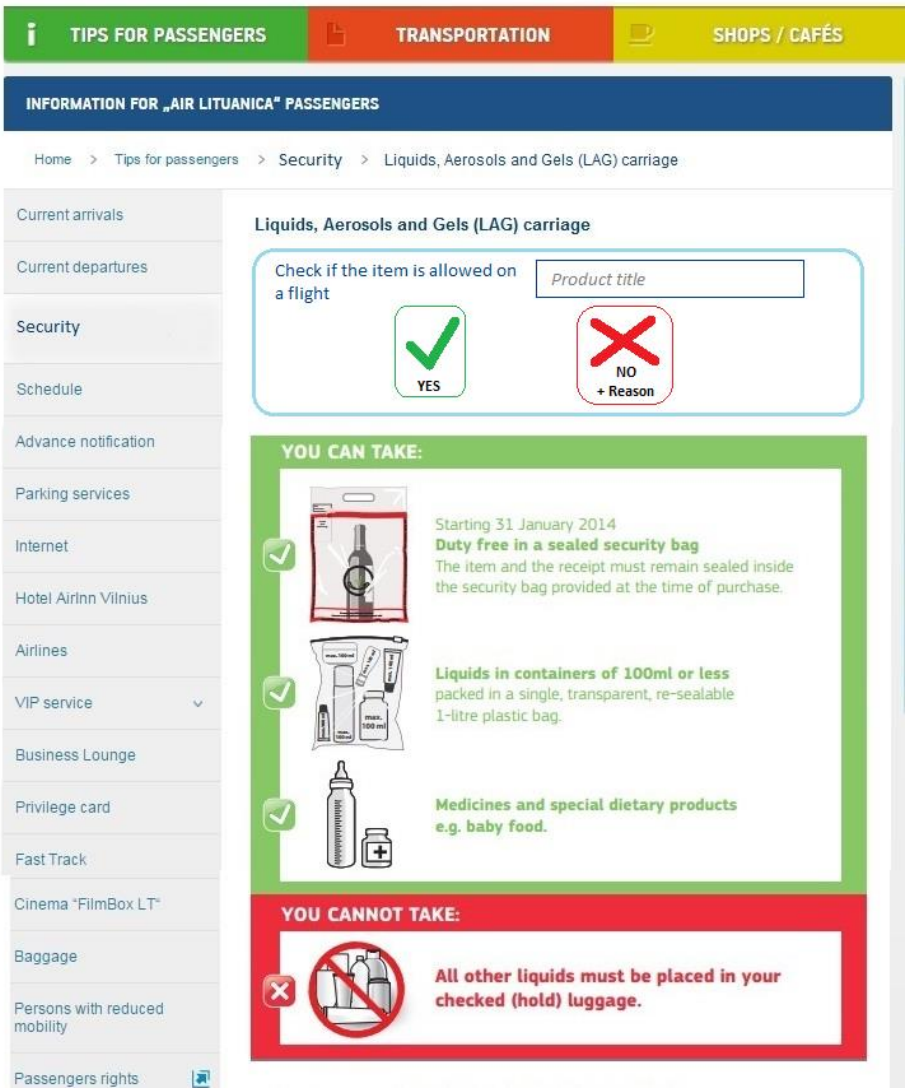

Figure 18 "Finnavia type" item recognition tool
(Vilnius International Airport website, 2015)

Option 2 - Item characteristics based tool

Tool based on item characteristics might be more complicated than 'list of items' based tool. Webpage visitor would be able to access tool after reading the text. Item recognition tool would be usually hidden and would roll out after clicking on its link. Certain manual or tips for users would be necessary to add, how to properly use the tool.

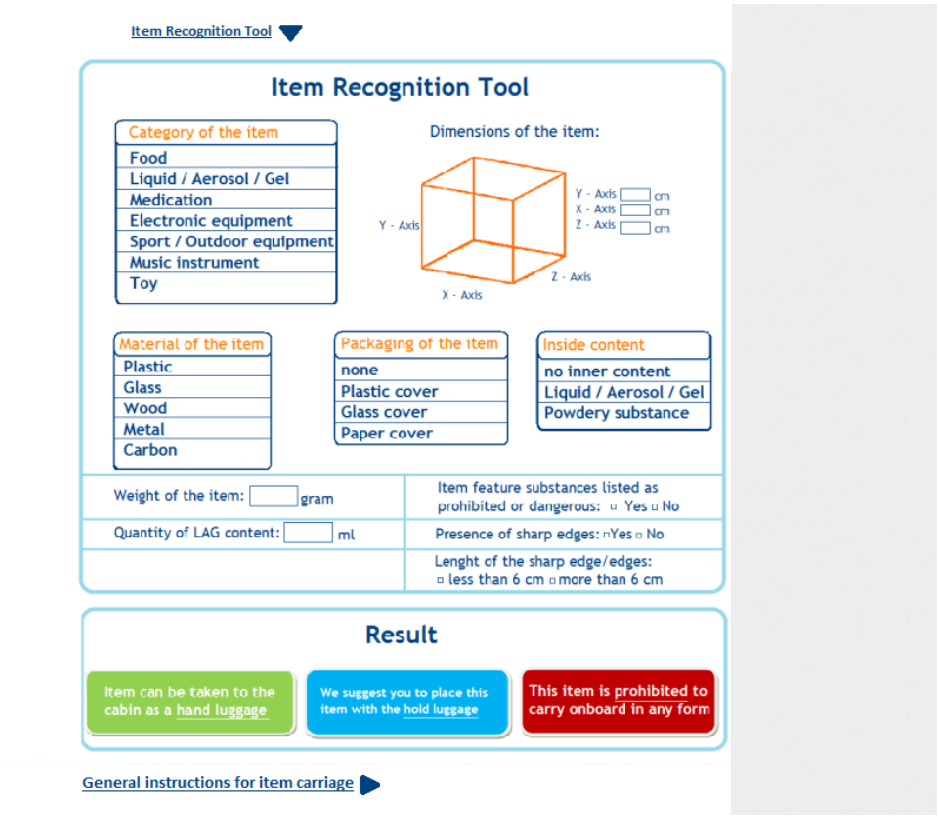

Figure 19 Item characterisitics based recognition tool
(Vilnius International Airport website, 2015)

'Listen to the page' feature

This feature can possibly be implemented to support the most important areas of information. In case of aviation security, audio version of every chapter would present main ideas what it contains. Audio would help auditory learners and hearing impaired users to perceive information.

Conclusion

Main advantage of providing effective information is **greater operational efficiency** of the airport, for travelers, security staff and airports. In case necessary information is placed too late, passenger misses all possible sources of information where he could be ‘’engaged’’ by it, stands in the queue, approaches the security checkpoint and only then realizes or is told about existing issues, whether its forbidden and/or dangerous goods, wrong amount of LAG product etc. If passenger has properly packed his belongings and knows divesting procedure, it substantially reduces queuing time at security checkpoint, which is one of the main ‘slow points’ of the airport. Besides that, wandering passengers are negatively affecting passenger flow, bumping into other travelers, taking their time to find out where to be headed, if information is inadequately shown. One of the main driving forces of the airport is gaining financial profits, so airport is interesting in transferring as much passengers as possible in a rapid manner to zones of income, such as sterile area with tax free shops and services, therefore increasing buying capability of passengers.
All these issues might be tackled if information is display effectively. Passengers will not feel lost at the premises. Well ‘educated’ passenger will know what to expect at the airport and be prepared for mandatory procedures. Airport and traveler can both benefit from effective information dissemination in terms of incident and travel disruption management.

Second positive aspect is **stress and anxiety reduction**. Passenger experience largely depends on the passenger's own feelings and mind-set during the trip. The main ’hotspots’ of stress during the air travel process starting from home and ending by leaving the airport are outlined in this table:

Increased stress points of air travel		
Preparatory phase	**Terminal airside**	**Leaving the airport**
Planning trip	Connections/wayfinding	Transportation
Booking tickets	Check-In	
Luggage packing	Security check point	
	Border Control	
	Luggage reclaim	

- can be positively influenced by electronic information tool

Figure 20 Increased stress points of air travel (ACI Europe, 2014)

In figure 20 most common stress points of travel are listed. Green color highlights areas, which are related to security and can be affected positively (stress level might be reduced).

If implemented online, proper pre-flight information would help directly to deal with anxiety related to luggage packing; check-in and security check process by providing the necessary knowledge and instructions. Having completed necessary steps suggested online, law abiding passengers not only will have proper luggage packing, but also a sense of confidence. First of all, stress reduction will help to fasten up necessary airport procedures and in overall contributing to the greater operational efficiency. Secondly, faster procedures will save time for passenger, and for the airport it will increase 'profit window' (period of time traveler is able to spend acquiring services and purchasing goods). Thirdly, confidence will empower traveler, allowing him to seek and explore more services, use other innovations provided by the airport.

If Vilnius International airport will decide to update their 'airport security for passengers' webpage, making it visible and accessible it can expect all above mentioned positive effects.

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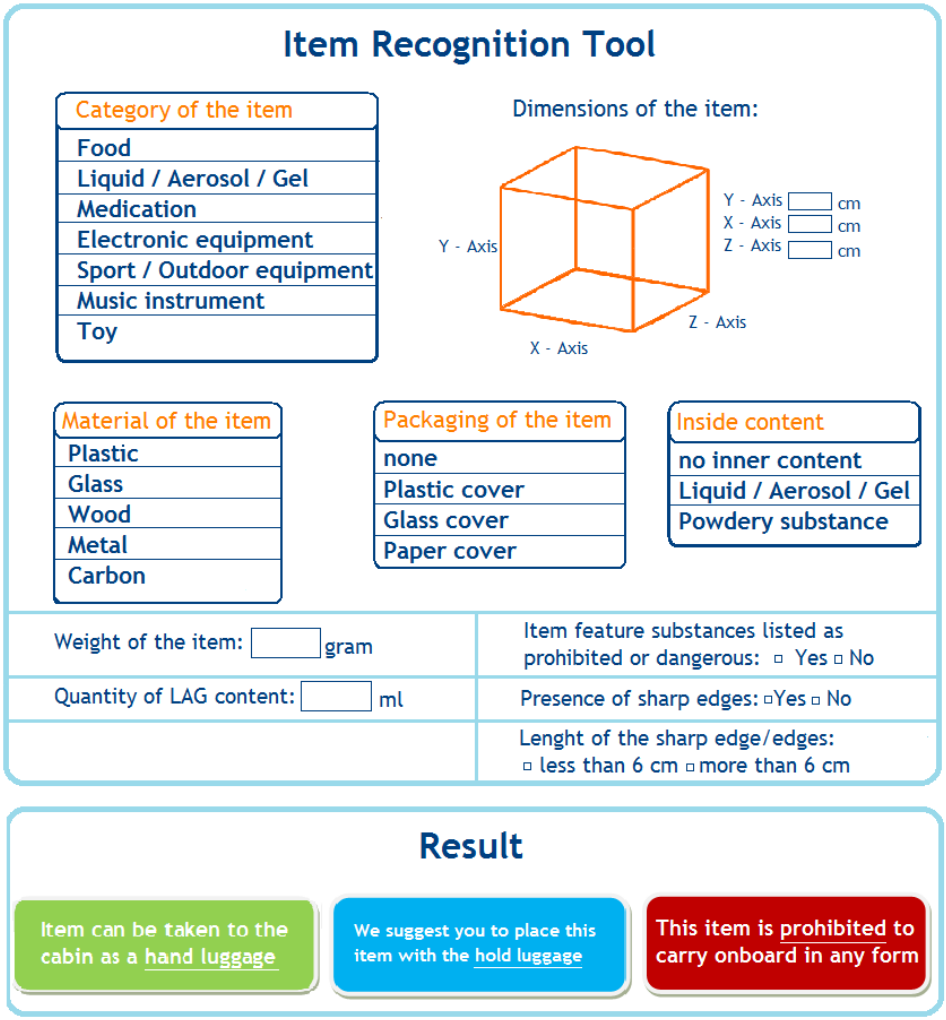
Figures

Appendixes

Appendix 1: Suggested user-interface features of the Item Recognition Tool



Here we can basic layout of the Tool. To determine items legality on-board user would mark suggested features of the item, such as category, material, possible packaging, and possible inside content. Then, he must provide data of the item, such as measurements, weight, and quantity of the LAG substance (if it's a LAG item). Important point is presence of sharp edges, therefore user must tell, does the item contains them. If item does contain sharp edges, holder must define length of the sharp edge. After data was filled in, Tool would present a result, which would include 1 solution out of 3 possible.

Solution 1: Item is allowed to carry into the cabin as a hand luggage.

Solution 2: Tool will suggest its user to place item in the registered hold luggage.

Solution 3: Item contains dangerous or prohibited feature, therefore is prohibited to be carried on board in any form.