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Modern ICT technologies – situation and trends

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Abstract

In the framework of the research work carried out in the Balkan region, the technological map of modern ICT application potentials of the regional wellbeing and wellness conceptions as well as that of the development opportunities by the support of ICT has been established. It covers all basic IT solutions that fundamentally identify all current directions of IT technology development and are the basis for the elaboration of touristic IT resolutions that are appropriate for meeting all the requirements of 21st century guests.

In the course of the technological map establishment, on the one hand, basic info-communicational technologies are included in the map that mainly identifies the IT development trends. Then an investigation has been implemented presenting the info-communicational status and trends of the project's target countries. Based on the experiences, a definite technological solution was made in the framework of the Touristic Program Navigator application that is also outlined as part of the article.

Keywords: *ICT, tourism, trend, cloud computing, e-business, business intelligence, Balkan*

Introduction

The Foundation for Information Society together with the Budapest Metropolitan University of Applied Sciences was awarded with a grant in a call for applications launched by the National Research, Development and Innovation Fund. The research project financed by the grant directs its attention to those values of the Balkans which could lay ground for the elaboration of tourism service concepts aimed at health preservation. The studied countries of the region were Albania, Bosnia Herzegovina, Bulgaria, Croatia, Greece, Macedonia, Montenegro, Slovenia, Turkey, Romania and Serbia, whereas the control countries were Austria, Hungary and Slovakia.

A research series engaging international experts lasting for more than two years has focused on two main areas: to gather cultural and natural treasures of the Balkans, and to elaborate marketable health tourism products grounded on them, and info-communication technology solutions. The project was aimed at the mapping of cultural and natural values appropriate to ground a Balkans wellbeing concept, and at conceiving products that could be offered for travellers seeking health restoration and preservation.

Hereinafter the results of the mapping of tourism IT trends and technologies relative to the Balkans can be found, which could ground the elaboration of ICT service profiles. In the course of the elaboration of the technological map

- those fundamental info-communication technology groups were appraised that exercise the strongest impact on the transformation of modern touristic services (electronic commerce, data analysis, big data, cloud based services, telework, etc.);
- a technology mix was mapped that – from the perspective of the criteria scheme of the 21st century – is absolutely indispensable for the state-of-the-art presentation of an attraction, a destination;
- in the frames of a questionnaire survey and a secondary research, outstanding IT trends were examined that are currently exercising the strongest influence on tourism, specifically in the project's focus area, i.e. in the Balkan countries;
- the IT development trends of the region were projected;
- finally, a model service was assembled that meets the above requirements and can in the future significantly boost the digital appearance of the region.

1 Distinguished IT trends that could be observed during the project period

1.1 Data analysis and big data

The „big data" phenomenon can be described as: appearance of large, quickly generating and multiplying set of data characterised by excessive variability and complexity, leaving insufficient time for processing. (Real time or near-real time processing is needed.)

A company with more than 1000 employees stores 235 terabyte data on the average. (BUGHIN et. al., 2011) For the sake of comparison, Google alone processes 24 peta bits of data each day. A large portion of the information generated and stored – according to IDC: more than 90% – is unstructured. (Forbes, 2013)

Analyses of unstructured big data are categorised as follows: data analysis, text analysis, web analysis, network analysis and mobile analysis. This sequence is also ranking by maturity.

Big data could be able to change competition through one of the following ways. Application of big data enables procedure reengineering on the one hand, and the modification of the corporate ecosystem and fostering innovation on the other hand. Big data can assist companies in collecting data in a manner that spans over the organisational units and involves partners as well as consumers and therefore attributably to the flexible infrastructure and appropriate scalability, companies would be able to keep pace with the demands. Experiments, algorithms and analyses could therefore be able to interpret the voluminous set of information so generated.

Of course, investments in IT necessary for the generation, storage and processing of data would not produce business results automatically. Research results prove that their utilisation is bound to certain conditions and a multi-year waiting period for positive consequences cannot be excluded.

However, an increasing number of companies seem to understand the most important factor: in order to keep in competition, to keep pace with the environment and the market, they need business analyses more spread and detailed than before, making use of all factors that may assist in achieving better position and bigger profit.

Data explosion, the phenomenon described above triggers vivid motions in business life: existing organisations try to adapt themselves, whilst many new business models and enterprises come to being, wherein solution suppliers, consultants, agencies can have outstanding significance.

Naturally, there are risks intrinsic in the area: data protection is a topic of contradictions, protection of personal data is obviously of extraordinary importance and meanwhile sharing them can be of interest for the individual as well as for the community to achieve an improved service standard. Collected and analysed data and the market benefit stemming therefrom could become a competitive advantage for the companies. Despite that, data monopoly is often in contradiction with the community's interest, since an alternative analysis of data collected by companies could make public services and other aspects of the communal life more efficient.

Intrinsic value of data may be attractive for criminals; a contingence can cause the biggest loss for companies through loss of data; therefore significant improvement is experienced in the area of data security.

BI projects carry all features and problems of all IT megaprojects; appropriately managing them is an extraordinarily important but not at all simply task.

Data explosion generates serious environmental effects and energy consumption, furthermore the management of electronic waste should be improved.

According to an IDC forecast, 10% annual increase of the BI market that by 2016 will amount to USD 50 billion would be attributed to dataset management. (Forbes, 2013)

Analysts of Forrester say that big data will leave data silos and penetrate into everyday corporate IT, and the CIO-s will be responsible for controlling this process. (Burt, 2012)

Spread of the self-serving business intelligence, utilisation of BI on all corporate levels, community data analysis in the decision making, scalability for overcoming all keep increasing datasets, spread of cloud based BI platforms used as services, furthermore the application of real time decision support in the analysis of social media are coming to the limelight.

Gartner and Forrester stated in unison that business analytics is on the way to cloud computing, although they both are sceptic as regards its velocity. This process is expected to be slower than forecasted, because at this point two large

paradigm shifts should be consented by customers, namely the introduction of cloud and analytics that are intrinsically critical areas. (PRENTICE et.al., 2013)

Under the pressure of market competitors, owners and regulatory authorities equally encourage the organisations to intensify the collection of accurate and detailed information, which at the same time increases the workload on the companies.

Users are in need of pieces of information that fit to their role played and position filled at their company. Manufacturers are therefore incited to develop various and more refined analytic applications.

Cost reduction could also be rationalised with the help of analytics, because instead of cutting back in general, only those areas should be reengineered that according to the analyses were critical.

According to market researchers, the importance of mobile devices will increase, by 2013 one third of the users accessed corporate data via such devices. This offers paramount advantage for those organisations that prefer mobile workforce or that employ staff or suppliers in telework, since mobile devices will always be at the hands of managers and members of the staff, which will assist in decision making. (ITBusiness 2013)

Their increasing popularity will make collaboration more important, this is why the spread of BI environments based on collaborative, communal network is an outstandingly important trend.

This segment of the Hungarian market, just like other segments, lags by a phase behind in comparison with the results achieved in America or Western-Europe, however, trends are similar; complex data analysis and big data technology gains increasing room also in Hungary.

Cloud computing within the area of BI solutions lags far behind the rest of the software areas (e.g. CRM). Perhaps the world of case analyses is the area where some breakthroughs could be seen, however, BaU (Business as Usual) information is expected from clouds only when the base data will be there, too. Meanwhile mobile BI is already attracting serious interest today.

All the above suggests that any large dataset in itself is valueless; more and more business models are based on the idea of exploiting the useful content therefrom: real facts related to individuals, communities, discretionally segmented groups of humans or products. A consequence of that obviously is that the world will need

increasing volume of workforce with competence in large dataset processing. Gartner concluded that this phenomenon might entail serious changes on the labour market, too. According to their estimations, by the end of 2015 4.4 million workplaces should be filled by experts experienced in big data analysis. (Gartner, 2013)

1.2 Electronic commerce

More than 1 billion buyers spent about USD 1.2 trillion in 2013 in the B2C (business-to-consumer) electronic commerce sector. 90.1% of commercial transactions were realised in three regions: North-America, Western Europe and Asia-Pacific. (eMarketer, 2013b)

Global electric sales continuously increased and according to a forecast there will be a two-digit global growth rate in this sector until 2017. According to the current trends, the main engines that drive this continuously high growth potential are the following:

- dynamic increase in the number of smartphone users,
- intensive growth of the electric commerce on the emerging markets,
- continuous innovations in payment and delivery methods,
- existing e-commerce companies enter new markets, and
- brands not yet available online are starting digitising.

The B2C e-business sector directly employs around 2 million persons in Europe, and this number is expected to continuously grow as the society is increasingly penetrated by internet.

At the beginning of 2013, in Europe there were 550 thousand websites engaged in e-commerce. The annual growth rate in this area is continuously around 15-20% and this trend is not expected to decline, attributably to the continuous and intense ascension of the southern and eastern European regions. (Ecommerce Europe, 2013)

In Hungary, the Hungarian online retail trade exceeded the expectations in 2013 and totalled HUF 217 billion, thereby increased its share within the entire retail turnover and now represents 3.1%. In addition, B2C trade on the online market places increased its turnover by HUF 10 billion. (KIS és PINTÉR, 2014)

In Hungary, HUF 7.5 billion was spent via mobile devices in 2012, this sum was HUF 14 billion in 2014 and the expected turnover by the end of 2015 could be 20

billion. This represents a growth rate of about 40% that is significant increase, the obviously low basis notwithstanding. (AMBRUSZTER, 2014)

In Hungary, it is expected that the number of online purchases and buyers will dynamically increase in the next years; the increase in the number of smartphone users and smartphone-based e-commerce transactions will be outstandingly intensive. Meanwhile the number of internet users will not increase extensively, therefore commerce should achieve the possibly largest penetration within the existing scope of users. In order that the e-commerce could improve qualitatively, two important things should and obviously will happen in the coming period: personal receipt of goods and cash payment would lose room for the benefit of e-commerce infrastructures.

1.3 E-commerce BI/BA

If the number of e-customers is large, e-commerce should pay outstanding attention to tailoring the content to the persons. This topic covers customer habits and the expedient presentation of the content. Tailoring to individuals might exercise significant impact on the website-loyalty as well as on the incomes of the e-commerce, since various individuals and various contents should be covered.

The importance of tailoring to individuals is supported by several researches: most of the companies agree that personalised online User Experience (UE) is a factor of critical importance from the aspect of the present and future corporate profitability.

However, for the time being perfect personalised service is just a dream; companies have just started up. Personalisation is included among the strategic objectives of increasing number of online traders but most of them got stuck at the introduction of initial solutions.

Research results suggest that 15% of the companies consented that appropriate ROI could be achieved as a result of their personalisation efforts, whilst 41% said that no financial results were experienced after the introduction of tailor-made services. (Econsultancy, 2013)

72% of the traders said that they understand the importance of personalisation but they do not really know how to start introducing and how to manage such project. (Econsultancy, 2013)

Most of the companies encounter technological barriers in the course of the introduction process. Companies explained that the two most important restricting factors that hinder the application and development of appropriate personalisation solutions are the following: IT processes are insufficient and the existing IT systems are unsuitable for the task. From the agency / consultant / technology supplier side, the same question should be answered as: lack of knowledge, or the inability of translating the business knowledge intrinsic in the data into real acts, corporate actions are the two most important restrictive factors.

If we have a look on the data sources used for analyses grounding personalisation, we may say that most firm work with profile data. The majority of the companies are already aware of the significance of the collection and analysis of historic customer information and its use in the interest of improving customer services.

An examination of the tailoring tactics suggests that product offering systems are used by the widest scope of organisations (42%), also, a relatively wide scope of organisations make use of the uniqueness appearing in the intra-site browsers as well as of the searches, and furthermore of the personalisation of the visual and textual content displayed for the user (40%-40%). (Monetate, 2014)

Despite its obvious advantages, more than 50% of the organisations do not use data from CRM, ERP systems of data warehouses (if any) for improving user experience. The main obstacle again is the handling of widely spread and various data sources, furthermore, the organisational units that are responsible for ensuring user experience have no idea in many cases about how to start the exploitation of the sea of data. (Econsultancy, 2013)

Another serious mistake or shortfall is that even the companies that are seriously engaged in the personalisation of the user experience, are for the time being focusing on the desktop and laptop based (big-screen) traditional IT environment.

Despite the fact that at the majority of the companies the personalised user experience was given high priority, in many cases, they miss the appropriate method either for creating the proper content or for testing the solutions applied.

Another distinguished group of the “big data” based e-commerce analyses is not directly connected to the analysis of customer habits but rather to proper pricing.

1.4 Mobile devices

Participation in the information society is not a discretionary option but rather an unavoidable condition. Its advantages could be enjoyed, if the services that are available for the people urge them to acquire knowledge necessary for the utilisation. Possession of such knowledge, digital literacy is a complex idea: it refers to knowledge translated into skills that enable the user to exploit the possibilities offered by the computer and the internet. The importance of e-public administration is gradually increasing; also, traditional learning increasingly relies on the use of internet.

In view of the fact that the operation of a society is based on the micro-decisions passed by its members, improved digital skills result in better decisions, more efficient timing, more rational performance, i.e. in positive economic effects. In business life, for instance, confidence is extremely important. A very important factor in the establishment of confidence is the method enabling physically segregated groups of the society to get acquainted with each other. The more digital skills one has, the more interrelationships with others can be established, and the better can others be understood. Understanding establishes confidence and confidence is the basis of successful business or economic life.

Acquisition of digital literacy entails the improvement not only of economic competitiveness but of the quality of life, too. It can with great confidence be said that 4.5% of the population of Hungary (450 thousand persons) is in the possession of this skill: they use computers not only for entertainment and keeping contact but also in the everyday work and/or for utilising electronic public administration services in a professional manner. Within this category this rate is significant: Hungary ranks 7th or 8th in an international comparison. According to the thumb rule the ideal rate is 6 to 8 percent. Several surveys say that the absence of digital literacy causes idle work time that causes loss of profit totalling hundred millions annually. (NMHH, 2014)

The real problem is the absence of the knowledge of skills necessary and indispensable for everyday life. In this respect the desirable result would be if – in harmony with the ideas of the ruling government – at least 1 to 1.5 million people would be proficient in digital literacy and able to pass their knowledge onto others.

There are two large fault lines in the area of digital literacy, which divide the Hungarian society into three parts. The main gap is between those who use devices and internet and those who don't; the other gap is deepening between

those who use internet in a manner that adds value and those who use it "unconsciously".

Almost two third of the population aged over 18 (63 percent) regularly uses internet. Almost all of the internet users (96 percent) uses internet at home and almost every fifth (18 percent) have access to internet at his/her workplace. Hardly 4 percent of the internet users use internet at places offering free access. In internet cafés, barely one fifth (1 percent) of the mobile internet users uses internet. 5 percent of the internet users uses internet whilst on journey.

Smartphones are continuously gaining more room within the toolbar of users. Within one year in Hungary, the camp of internet users grew by 2-2.5 million, which can unambiguously be attributed to the newly purchased smart devices sold with some subscription and broadband mobile internet connection. By way of using internet and therefore developing skills, the employees can more easily be engaged in the technology-intensive industries and work organisation processes. (Bellresearch, 2013)

Trends unambiguously suggest that all over the world – and therefore in Hungary, too – the society undergoes fundamental changes and internet usage as a specific activity is being replaced by continuous online presence. Employees are and will be present in the virtual space due to their smart and mobile devices. The companies therefore can rely on this phenomenon. A break in the trend line is not expected; although with the saturation of the market, the number of new devices sold might decrease, the demand for continuous online presence, accessibility and keeping contacts thereby generated will increase in the years to come.

Telework, as a specific phenomenon will become more and more usual. Although this could gain notable room in the developing countries, employers in Europe or in the USA state in unison that technological development laid ground for the remote employment of lots of people. Experience has proven that after the introduction of telework, there is no need to fear of significant drop in the performance neither on the white nor on the blue collar level, moreover the companies can save significant costs and in most cases the quality of work improves.

If workers can better organise the balance between work and private life, can get rid of travel stress and waste of time, they can in several cases be more productive in these frames than in the frames of traditional employment. Of course, not all of the jobs or the industries are suitable for this. Intellectual and

individualised jobs belong typically to this scope, and communication technologies are more and more apt to enable teamwork in this area.

New forms of employment must be accompanied by new work organisation principles, since by way of the automated demolition of large tasks into small details, enormous parallel capacities can be deployed without significant investments in the human resources infrastructure. This is the world of crowdsourcing that was also enabled by this technological development, some successful examples of which can be seen in Hungary, too.

Smartphones can be found in every third household; penetration of smart televisions and tablets is respectively 8% and 13%. (NMHH, 2014)

The population aged 15 and over uses internet in the majority on desktop computers. Other notable devices are laptop and Android smartphones that are used by respectively 18% and 4% of the population. Usage of other devices is negligible. (NMHH, 2013)

Within corporate and institutional environments the "smart" mobile devices that can permanently exchange data with public networks are becoming more and more popular. They can assist in simply solving lots of tasks, in designing an efficient work environment, meanwhile their appearance creates new challenges for IT security experts.

On the global level, more than 5 billion people have mobile phone out of more than 7 billion. Among mobile phone subscribers, 1.5 billion uses smartphone. Last year 1.63 billion new devices were sold worldwide, out of which 493 million were smartphones. Last year smart devices achieved a rate of 30% which should be compared to 11 percent in 2008. At the end of 2011, there were 2.1 million mobile internet subscribers on the Hungarian market, whilst in 2008 there were only about 500 thousand. (Ambruszter, 2014)

System administrators rely on the dynamic spread of tablets and smartphones in corporate environments, meanwhile 44% of the mobile devices lack any form of protection therefore they can be easy prey for virus infections, furthermore corporate data and information could be accessed through them.

More than three quarter (77%) of smartphones have access to e-mails and calendars, meanwhile 24% are able to access corporate documents. In addition, 9% of them enable users to access databases and 7% enable access to administrative systems. (IPSOS MORI, 2013)

56% of the companies allow their employees to integrate their devices into the corporate environment, thus they might access the network or their corporate e-mailbox via their own smartphone. (IPSOS, 2011)

A voluminous chapter of IT security is to handle the mass penetration of smart mobile devices (smartphone, tablet) into the corporate/institutional networks mostly without proper protocols and checks.

Until everybody worked on desktop computers, the possibility termed as "bring your own device" – BYOD – was meaningless, but mobility as well as computers with increased performance at affordable prices and chiefly smarttelephony generated changes in this area, too.

The clarification of the scope of data that could be downloaded to a device or the scope of corporate resources that could be accessed is of significance specifically in the case of mobile devices. The scope of sensible data should be specified as well as the method by which and the device wherefrom access is ensured (only within the company; from home via net permitted from public hotspot not permitted). Also, decision should be made about the procedure to be followed in the case of loss of data for instance when data is stolen or a device is lost. It is very important that every user should be aware of the measures to be taken (for instance filing immediate notice on the loss of the mobile phone).

If the employer is notified on the loss of a device, it should be able to take action. So-called mobile device management (mdm) software items and services that are available in ever increasing number serve for that purpose. They assist not only in centrally managing and checking devices but also in running important functions, such as remote data deletion even when the device is switched off.

The number of traditional threats menacing smartphones is continuously increasing. One of the sorts of the most important threats is malware. Within this area, too, the motivation behind most of the attacks is obtaining profit.

Malwares menace the user as well as the personal or corporate data stored on his/her device in several ways. It may happen that they subscribe on behalf of the user for premium services thereby debiting large amounts to the account of the innocent subscriber, or might send messages to mailing lists or steal data stored on the phone, furthermore they might take the control over the device, etc.

A direct consequence of their significant market penetration is that smartphones, specifically their most popular group running freely available Android operating system have become popular among the writers of malwares. (Kürt, 2012)

Tools necessary for mitigating risks are the following: high level use of inbuilt protection; conscious handling of downloads; verification of resources; application of anti-virus software for mobile devices; use of special software items for instance for storing password, mobile tracing (remote deletion following theft or loss); rational and purposeful participation in the social media; conscious management of geo-location data; safe usage of wireless connections; regular backups.

1.5 Cloud computing

No matter how positively IT experts or even business managers recognise the advantages granted by cloud computing, the biggest obstacles in the way of its introduction are safety concerns. Although all of the service providers emphasise that the data in their care are in total safety, none of the institutions are pleased to hand over their data that are confidential, mission-critical or simply (deemed to be) important, to an external service provider that would store them in a data centre at some unknown place under unknown circumstances.

1.5.1 Basic types of cloud based systems:

The following Classification is based on the framework of the Federal Risk and Authorization Management Program (FedRAMP) (NIST, 2010)

- **Private** cloud is cloud infrastructure operated solely for a single organisation, whether managed internally or by a third-party, and hosted either internally or externally.
- **Public** cloud infrastructure is available for the public or for a large industrial/sectoral group and its owner is the firm that provides this service.
- **Community** cloud infrastructure is ensured jointly by several organisations and it supports a community with common concerns (e.g. common mission, policy, security requirements, etc.). It could be managed internally or by a third-party, either hosted internally or externally. As regards its configuration, it can be a single private data centre or a network of (associated or community) data centres.
- **Hybrid** cloud infrastructure is a composition of two or more clouds (private, community or public) that remain distinct entities but are bound together by a standard or own technology that enables transfer of data among clouds (e.g. for load equalisation purposes).
  A possible design of hybrid clouds is when a private cloud is scaled into a public cloud. In view of the fact that hybrid clouds need the cooperation of

at least two clouds, it can be stated that hybrid clouds represent the second level in the cloud approach. In consideration of scope constraints, this present study does not go into more detail.

1.5.2 Service provision models

- **Cloud Software as a Service (SaaS):** this is a possibility for the customer to run the service provider's application in a cloud infrastructure. Applications could be accessible on various locations through thin client or interfaces, like the example of browser-based mail service. The customer does not manage or supervise the underlying cloud infrastructure that includes the network, the servers, operating systems, storages or the capacities of the applications. The customer controls only some restricted personalisation possibilities.
- **Cloud Platform as a Service (PaaS):** this is a possibility where applications developed by the customer or purchased from third parties could be installed by the customer in a cloud infrastructure whose programming language and development tools are supported by the service provider. The customer does not manage or supervise the underlying cloud infrastructure that includes the network, the servers, operating systems, storages but can supervise the application installed by itself and sometimes the configuration of the running environment.
- **Cloud Infrastructure as a Service (IaaS):** this is a possibility where all computing, storage and network capacities and all other resources are available for the customer, which enable the customer to install and run any software, including the operating systems, too. The customer does not manage or supervise the underlying cloud infrastructure but can supervise the operating systems, storages, applications installed and sometimes – to some extent – the network tools (such as firewalls).

1.5.3 Penetration

Increasing number of undertakings in both the state-owned and the private sector switch for cloud computing applications. Former intramural servers and data centres are replaced by outsourced large cloud providers and their giant data centres.

Reputation of the cloud technology continuously increases within the society, it is implemented in several industries although in various but increasing rates. Growth forecasts predict continuously very high rates (around 30%).

However, the publicly available data reflect just a part of the totality, i.e. this is too few to understand how many organisations and how many end users are dependent upon the services provided directly or indirectly by the cloud infrastructures. Cloud operators provide services to certain organisations that then serve some sort of solution to other organisations or even to millions of end users. Interrelationships between IT service providers at this degree of complexity prevents us in estimating the accurate number of users or organisations whose everyday operation, comfort and profit generating activity is dependent upon the activities of a large cloud operator.

Cloud service providers might offer services to each other, e.g. the applications of an SaaS provider can run on an infrastructure provided by an IaaS provider. In practice, it is impossible to estimate the number of customers that would be impacted by the breakdown of a cloud provider because in addition to the direct clientele, the indirect impact should also be investigated.

Data centres used for cloud service provision are huge. Sectors operating critical infrastructures accept the application of cloud infrastructures at an increasing rate.

In Hungary, 76% of the undertakings said that the application of information technology is of primary importance for achieving success – this is significantly higher than the European average i.e. 61%. The research revealed that some sort of cloud services is used by 53% of the small enterprises in Europe and by 66% in Hungary. (IPSOS MORI, 2013)

Half of the Hungarian SME-s have consented to the statement that cloud services will play increasingly significant role in the success of small enterprises – which is again higher than the European average that is only 42%. Meanwhile, out of the Hungarian firms that use some sort of cloud service, 63% agreed with the above statement and out of those that do not use any, only 22%. (IPSOS MORI, 2013)

Only a relatively small portion (23%) plans to regroup its information technology costs in favour of clouds. Two third (66%) of them deems that to be unlikely. The two comparable European data are 28% and 48% respectively. (IPSOS MORI, 2013)

From among the fears related to cloud-based services, the enterprises deemed the following to be significant: data safety (European average 62%, Hungarian data 56%), loss of data (61% vs. 59%), data protection concerns (58% vs. 55%),

meanwhile those who fear that cloud applications provide less functions than solutions installed on a computer represent a relatively smaller rate (42% vs. 37%). (IPSOS MORI, 2013)

Lessons learned from the data illustrating the market penetration of cloud services could be summarised in two points:

- Exploitation of cloud computing is increasing and in the near future the significant majority of organisations will utilise some sort of cloud-based service. This in itself makes the area of cloud services to be critical, simply because large masses of organisations and end users are already using clouds every day.
- Cloud computing has been accepted in critical sectors, such as finances, energy, transportation or governmental services.

2 The tourism industry in online environment

Within the tourism industry, the largest change was obviously caused by the penetration of the internet that brought significant and spectacular transformation in several dimensions on the supply as well as on the demand side of the tourism market. Recently launched online tourism services and the possibilities entailed by them, i.e. comfortable and quick collection of information, easy comparisons and transactions, greatly contributed to the development of new and personalised travelling habits. The traditional sales chain that existed on the supply side for decades, in consequence of the penetration of internet has been restructured by the turn of the millennia. First, the intermediaries were eliminated (des-intermediation) as the websites of the tourism service providers appeared and grounded the possibility for direct online sales. Des-intermediation was followed by re-intermediation (reappearance of intermediaries) when new intermediaries appeared on the tourism market: now we are speaking about the online presence of traditional travel agents on the one hand and about newly founded online travel offices that operate exclusively on the internet on the other hand. As a result of all the above, in the newly developed online tourism sales chain – in alteration of the traditional predecessor – dynamically permeable role-walls came to being, thus tourism services and programs could be displayed and sold by any of the market actors or even by the end users.

In summary: in parallel with the technological developments, the consumer's expectations increase – travellers wish to collect information quickly and easily via high quality services. In order that the actors on the tourism supply side could

be able to satisfy ever increasing expectations, the following five areas deserve our outstanding attention:

1. Social media: presence and utilisation
2. Publication of concise content
3. Appearance on smart devices
4. Checking of the sales channels
5. Redesign of the software items and applications currently in use in order that the customers could purchase more complex products.

3. Technological possibilities for the presentation of attractions and their utilisation

Any attraction may have an internet portal where the attraction is presented in images and all necessary information (opening hours, new and permanent exhibitions, guided tours, events, etc.) is communicated. A good site presents the local history, story of local persons, relevance to literature and art, the local infrastructure, ways of access, eating, shopping and accommodation possibilities. The next important information technology development could be the online purchase of admission tickets. Several foreign examples prove (for instance the Krakow Castle where several sections can be visited but each time only limited number of visitors are admitted) that the arrival to an attraction on schedule with pre-purchased ticket could greatly contribute to the organisation of a visit. Those who buy tickets in advance are aware where, what, when and for how long could something be visited, and they will not miss the program because the group is full, or will not have to wait for hours for being let in. At the same time, the system assists the site managers of a monument, a castle, a distinguished location in ensuring visits to the attraction in a civilised manner whilst the conditions of the location or the values therein are not endangered.

Despite or even attributably to changes in the photographic techniques, since photographs do not cost anything any more and the device is always at hand, this value preservation and documentation device becomes more and more popular. Of course, there is big difference between photos taken with a mobile phone and an artistic aerial photographic image but both have their reason for existence within modern culture. If someone would watch his/her environment attentively, what can be seen in what conditions, takes a photo and shares it with friends or

sends it to some editorial offices, he/she has done something in the interest of information flow. If a tourism destination wishes to call people's attention, a photo competition could be announced and the pictures received can be shared. The popularity of a location can be increased simply by ensuring possibility for sharing photos on its website.

Interestingly – and specifically in view of the above – nowadays when technical developments – for cost and accessibility reasons – push the centre of gravity towards electric publications, publishing of books do not decline, moreover, publishing houses multiply like mushrooms and an unimaginable quantity of books appear on the market.

Although it can be nice when one takes walks in a city with a paper map in his/her hand, and visits attractions marked in advance, as the world is proceeding today, tourists will be guided in foreign places by an electronic device in their pocket rather than by a book.

Applications written for smartphones could be appropriate alternatives of guidebooks. These applications contain the most important attractions, places worthwhile visiting, shops, restaurants and any other information on cities or regions can be uploaded.

Collections can be shown in various ways, since some of them are located in buildings that either were built as museums or have become a museum by a functional switch, or they can be in a castle or in a rural heritage building; furthermore exhibitions can be organised of local historical collections or show-workshops where old tools of certain professions are presented, or galleries or art collections and there are all variations of the above.

There is one thing that is of vital importance. Museums and exhibitions as well as their opening hours and ticket prices should be advertised everywhere in a settlement, region or city (traffic signs should be used!) – or they could be even offered in a package tour interconnected with other attractions with one ticket.

Nevertheless, one should be aware that attractions today could not be made up of just objects exhibited and small-letter ads about them glued on the walls. Exhibitions must be renewed. They should be made interactive through new techniques, new guiding systems and movable, music playing and operable accessories. The past, present or eventually the planned future should be presented by using projected moving images, 3D solutions, voice media or even odours to get close to reality.

Our heritage, specifically in this quickly developing world, is threatened by several hazards, environmental catastrophe, demolition, destruction. Preservation pays special attention to the given architectural heritage, the environing landscape, intellectual heritage, traditions, professions and the relevant relics. Institutions specialised in the protection, recording and preservation of the same or their managers or owners spend more and more money on value preservation, maintenance, research and renewal, at the same time they seek to cover the relevant costs with revenues stemming from tourism generated by increasing interest.

Architectural heritage and its environs or the relics collected could be preserved with the use of modern multimedia tools, always adapted to the professional aspects of tradition preservation. In this procedure, the owners or managers take videos on a castle, building, rural heritage building and their environment and take photos of the objects to be found inside, and thus take steps for their presentation on the web. The description of objects, relics included in the records could be obtained from local people familiar with the site and the customs, or from care takers or managers, or the assistance of a qualified monument protection expert or ethnographer could also be requested.

The first step is data collection, wherein data are screened, validated and handled in accordance with the rules of data control. Data security rules should be taken into consideration and access eligibilities should be determined. Data can be used for decision making, for the establishment of national and international integration between authorities, for the elaboration of a long-term tourism and service provision strategy, as well as for the compilation of various reports and for monitoring activities.

Data made available in the above way could be retrieved and presented as requested, and their proper presentation will be suitable for drawing visitors' attention to the local attractions, architecture, ethnographic traditions (music, dance, language, gastronomy, viticulture). Record management systems of this kind, populated with fresh information can easily be created in the areas of other tourist attractions i.e. in the area of wellness and health tourism thereby providing assistance in the wide-scope presentation of information on the internet.

4 Tourism ICT-trends in the Balkans

The primary aim of this research was the elaboration of an info-communication technology and tourism map of the countries in the Balkans. A distinguished task

was the examination of the possibility of elaborating an ICT system and/or an application for the countries of the Balkans, which could successfully utilised in the area of wellness-tourism – and to this end, as a part of the research project, a model had to be developed.

The main aim of the research and query conducted by INFOTA was the mapping of the maturity, the specific features and the current trend of tourism and ICT in the counties involved in the project. The results achieved by the research lay the ground for future (ICT) developments that could assist in the improvement of accessibility of the wellness and health tourism sector, furthermore the quality of products and services offered for foreign and domestic tourists.

The main conclusion that could be arrived at is that the maturity levels in the 11 countries are uneven, furthermore, no general valid concepts for the entire region could be found. In addition, a thorough scrutiny of the tourism actors of the Balkans reveals that ICT solutions and technologies applied are very much different from each other.

One of the most important statements concerning the maturity of ICT, that could be concluded from the questionnaire was that for tourists visiting the Balkans the most important role is played – in addition to mobile phone and mobile internet coverage – by wireless internet coverage (WIFI) extended to attractions, places of interest, restaurants and accommodation service providers. As regards the region in its entirety, it can be stated that 90% of the travel organisers, 85% of the private accommodations, 67% of the commercial accommodations, 67% of the restaurants/bars offer wireless internet access for visitors. Areas that could be developed are the cultural heritage sites, health care and wellness service providers and TDM organisations, where the WIFI coverage is under 50%, namely 36%, 40% and 44% respectively.

It is important to note that from the tourism aspect the wireless internet coverage plays a key role, since for the presentation of attractions on a modern – or I would say currently expectable – level, the utilisation of modern technologies such as mobile applications, mobile audio guide, QR-code and RFID is indispensable, and all these technologies need network access. The answers received reveal that the most dynamically developing segments of tourism are business (MICE) tourism, wellness and health tourism, bio- and eco-tourism, cultural tourism furthermore gastronomy and wine tourism. The main target is to improve the quality of services offered by the market actors, specialisation and diversification, as well as the establishment of closer cooperation and collaboration. It seems that in the area of health and wellness tourism the demand

increases (meanwhile the supply is enlarging), furthermore in the countries of the Balkan, the people's attention is more and more focused on the concepts of health consciousness and health preservation.

In summary, it can be stated that currently the role played by ICT solutions within tourism is not significant, therefore targeted and conscious development projects should be implemented in the future. We do believe that developments in the ICT support granted for the tourism sector would exercise positive impact on the industry's performance as well as on the wellbeing of the local inhabitants and the tourists opting for this destination – and would offer better user experiences.

In the interest of accurate results, first, we geographically delineated the examined areas of the Balkan region, afterwards elaborated a comprehensive picture reflecting the maturity, current situation and described the expected future trends of the ICT development level in the region.

4.1 Role played by ICT in travel decision making

The maturity level of ICT plays a significant role not only in the course of a journey but also in the travel decision making – let us think of the collection of preliminary information, of booking or even of online payment. In the case of the examined countries of the Balkan region, a thorough scrutiny of the shopping habits reveals that 70% of the people use online channels for collecting information. In addition, on the ground of the results received, it could also be said that in the Balkan region more than 60% of the hotel rooms and almost 40% of the package programs are booked online. In the case of both, the control group and the target countries, one can observe that the decisive portion of the inhabitants (> 50%) searches and buys goods either exclusively online or makes use equally of the online and offline possibilities. The proportion of those who seek and buy only offline or those who do not make any search prior to travelling is negligible. (Google, 2015)

As regards to the sorts of tools used in the course of travel decision making, it can be stated that in the case of both the control group and the countries of the Balkan region, the travel portals and websites and browser engines (Google, Yahoo) are the most popular. Whilst leaflets and catalogues are losing their popularity, (online) word of mouth plays an increasing role in travel decision making.

Within the Balkan region – apart from Turkey – the significance of the price-comparing websites (e.g. www.arukereso.hu) is low, therefore their impact on consumer decisions is also insignificant. The same applies to blogs, forums, the consumer generated content (CGM) and the social media. Of course, the extent of the usage of tools depends upon the actual phase of the travel decision making and upon the subject matter searched (destination, service provider, etc.). For instance, on the ground of the opinion of the interviewees, it can be stated that during the search phase preceding a travel, the chief role is played by travel portals and websites as well as browser engines; whilst in the phase of selecting a destination and a service provider the word of mouth and the online articles are the most popular tools.

Apparently, online presence is very important – and we are thinking of not only websites but of forums, blogs, online articles, social media and video portals. If a tourism destination is not present online, it can easily be predicted that the number of visitors will not show an ascending trend.

The hypothesis saying that Facebook is the most frequently used social media proved to be in total agreement with the facts. The results of the questionnaire survey do support this statement: the most important platform is Facebook that is followed by Twitter, and then comes Google+ and Instagram in a dead heat, and the less popular Pinterest, Foursquare and Blogoshpere rank last. In summary, it can be stated that in the case of both the Balkan region and the control countries, the Facebook penetration is the highest; the share of the rest of the social media is under 14%. The only exception is Turkey where in alteration of the average Facebook penetration measured within the industry (80-90%) a much lower rate, 65% can be seen. In Turkey – unlike the rest of the countries – Youtube (15%) and Twitter (12%) are more popular. Although there are smaller social media sites used only in a given country, in summary, it can be stated that in the countries of the Balkan region, Facebook is in monopoly position leaving sites such as Tumblr, Twitter, Pinterest and Youtube much behind. This statement is valid not only for the local inhabitants but also for the sets of foreign tourists. (RapidValueSolutions 2014)

4.2 Supply side

In addition to the customs of local inhabitants, domestic and foreign tourists, we should thoroughly scrutinise the actors on the tourism supply side, what they use the social media for. The results of the questionnaire survey suggest that currently the social media does not play an important role in the business conduct

of actors on the supply side of tourism – exceptions are travel organisers and travel offices, tourism destination management (TDM) organisations and the event organisers. The multitude of options offered by the social media is least used by health and wellness service providers, private accommodations, and cultural and natural heritage sites. As regards the functions utilised, it can be observed that the actors on the supply side of tourism use the social media platforms most frequently for posting texts, sharing photos and publishing advertisements. The significance of sweepstakes and promotions, customer service or customer relation management is low in the cases of all of these groups. This statement is supported by a topic investigated by some questions in the questionnaire which attempted to find out the devices via which the tourists access tourism service providers. According to the opinion of the interviewees, the most frequently used communication channel is e-mail, the next is the direct messaging possibility offered by a website, followed by telephone contact and personal visit, and then come social media and online messaging services.

As regards to the Balkan region, the results of the questionnaire survey suggest that for commercial as well as for private accommodation service providers the most frequently used platform is booking.com. It is worthwhile mentioning that as regards booking systems, the commercial accommodation service providers represent a much larger proportion than the private accommodation service providers. This is true for almost all booking systems used in the Balkan region and assessed by the questionnaire, except for hrs.com where the rate of the private accommodation service providers is higher by some percent.

Concerning (vertical) tourism portals, it can be stated that within the Balkan region the existence of thematic portals is not typical. General, local websites are much more popular mostly among event organisers, private accommodation service providers, TDM organisations and natural heritage sites. Whilst general and regional level vertical portals interact with event organisers and TDM organisations, the national level sites interact with commercial accommodation service providers, travel organisers and travel offices.

In summary it can be stated that the portals that currently exist do not utilise those technologies (see mobile application, QR-code, RFID) that could be expected by tourists in our days. Furthermore and in addition, the existence of interactive, online and downloadable content is not typical either.

From among the solutions used for presenting certain attractions – within the Balkan region in its entirety – GPS technology is the most popular tool, which is followed by QR code and finally by RFID. If we thoroughly scrutinise attraction

types, it can be properly observed that in indoor spaces primarily QR code and GPS is used, in outdoor sites and in the case of guided sightseeing, GPS ranks first and mobile applications rank second.

In summary, we can see that ICT solutions and technologies used by the market actors are various. The ICT tool that is most frequently applied by tourism actors in the Balkan region is the website that is followed by the presence in the social media. Bankcard payment ranks third and is followed by online customer service and online booking possibilities. It is important to note that websites optimised to mobile devices and online payment belong to the "elite", whereas responsive design, loyalty programs, CRM systems, utilisation of mobile payment or mobile applications cannot in the least be deemed popular. And as for the least utilised ICT solutions, we should list thematic and vertical portals, personalisation, recommendation systems, ATM-aided services, mobile smart devices and intelligent information terminals (kiosks).

4.3 Smart and social technologies in tourism

1/3 of the mobile-aided searches are of local interest; tourists want to find out what can be done within a radius of 5 to 50 km of their current position during the next some hour or some days. In view of the fact that the program is shaped continuously and flexibly, attractions, accommodations, tourism service providers should be present together with their localisation data on the internet, possibly in channels specialised in location-based searches and marketing, such as Foursquare, Google Maps, Bing Maps, etc. Even the Facebook's own search engine, the Graph Search needs accurate geographical data in order that its entire marketing potential could be exploited. (MARK, 2013)

One of the most important technological trends is mobility. Although the majority of users utilise desktop/laptop devices for preliminary data collection, elaboration of travel plans at home, preliminary booking of accommodation and services and/or online payment. On the spot obviously mobile devices will play the leading role. 39% of travellers travel with tablet and 90% of them have smartphones. In the event of elaborating short-term plans, making local searches, planning or reviewing the program for the next day, travellers use smart devices.

One fifth (20.52%) of the internet-aided turnover of the TDM organisations (information requests, planning, booking) is initiated from mobile devices. The increase rate is high, it was about 100% in 2014. (WWWmetrics, 2014)

The bulk of the mobile information turnover is made up of searches initiated from mobile devices, out of which 90% is managed on interfaces operated by Google. The second place of mobile turnover is awarded to direct data transfer to tourism service providers and the third most important segment is the follow-up of references. Mobile communication relative to the rest of tourism is based typically on advertisement campaigns and other unknown sources. (RapidValueSolutions 2014)

It can also be experienced that tablet users spend more time with the active utilisation of this device and view more sites within one session. The literature calls this the "sit back" effect, since the users take out this larger, typically two-hand manipulated device when they can sit back, i.e. not in the street when they walk but rather when they expect a longer and steady period, whether in the evening in the hotel room or in the course of a longer trip by public transportation.

However, the users of smartphones utilise this device more expediently, they spend less time with browsing and view less sites. Thus it can be stated that smartphone users consume "instant" content, whilst tablet users collect information. If we examine the interactional funnel of smartphones, we see that the visits initiated from smartphones are targeted on immediate subjects: e.g. events, restaurants or "what can one do at the given place?" type questions. Searches started from tablets cover a much wider spectrum. In many cases, the subject matter searched is the name of a city or a region, TDM-s or certain attractions.

The age or the freshness of the content is not so outstandingly important for the user than its relevance. Although the new content is, of course, important and regular updating is recommended, a mobile visitor – specifically if the visit is started from a smartphone – does not search for something new but would like rather to know what is happening now or will happen in the very near future.

A review of the statistics on the usage of websites discovers two outstanding entry points:

1. search for general events, programs: What can be done in a given time interval, on a given site?, or

2. search for specific events and programs.

If we examine the time when a search was made and compare it with the time horizon of the programs searched, we can say that the time span of plans that

travellers make with smartphone is 1.7 days on the average. Meanwhile the tablet users are much more open to general pieces of information, to "evergreen" contents. Such content is not bound to a given date; it is not time-sensitive. Tablet users who search and review program possibilities or events, make their plans for a much longer period, for 14.7 days on the average. (MARK, 2013)

The majority of the visitors use mobile sites linked to a given destination for targeted search for information. Content consumption has very specific targets: collection of information and getting answers. Although there are differences between the habits of tablet and telephone users, in the course of travelling, both groups search for targeted contents and experiences.

As it has already been mentioned, websites are widely used by tourism service providers. Meanwhile very few of them operate a homepage optimised for mobile devices and characterised by a responsive design – they represent significant groups only among the travel organisers and travel offices. Presence in the social media shows a much more evened distribution; low rate can only be seen among cultural and natural heritage sites and health care service providers.

Bankcard payment is utilised by a large proportion of travel organisers and travel offices, meanwhile this solution is very popular among wellness service providers and commercial accommodation facilities, too. Interestingly, the utilisation rate is lower than the average in the case of TDM organisations, health care service providers and private accommodation facilities.

Utilisation of online customer services can be observed mostly in the case of three groups, namely travel organisers and travel offices, commercial accommodation facilities and TDM organisations – the rest of the market actors either does not utilise this possibility or utilises just to a modest extent. And as regards to online booking: a negligible percent of the cultural and natural heritage sites, or health care service providers offer this possibility for their customers. Meanwhile, the rest of the market actors, such as commercial accommodation facilities, travel organisers and travel offices, event organisers and wellness service providers make use of the advantages offered by online booking.

If the frequency of the usage of ICT tools and technologies are thoroughly scrutinised, it can be stated that the rate of those who utilise the advantages offered by the currently available solutions is the highest in the group of travel organisers and travel offices, commercial accommodation facilities, TDM organisations, event organisers and finally wellness service providers.

5 Tourism ICT trends in the Balkan

In addition to its diversity in terms of physical geography and socio-geography, the ethnic, religious and cultural map of the Balkans is also versatile, the entire region is characterised by a "mosaic" pattern. A consequence of all the above is that tourism in the countries of the Balkan region shows an extremely diversified picture. The leading role of Turkey within the region cannot be questioned, at the same time Greece, Croatia and Bulgaria also belong to the elite, produce quite strong tourism performance that increases year by year. Albania has a magnificent tourism potential but its revenues from tourism have showed gradual decrease in the last years. Whereas Slovenia – despite the size of its territory and population – performs better year by year and achieves solid growth. This could not be said about Romania. Montenegro should be listed among the modestly performing countries of the region, and she is followed by the ex-Yugoslav states with underdeveloped tourism (Serbia, Bosnia-Herzegovina and Macedonia).

As regards to the general ICT situation in the Balkan region: internet penetration within the Balkan region examined in its entirety is under the average of Europe – or the control group – meanwhile the area produces sufficient results regarding broadband mobile internet coverage. 3G coverage lags just slightly behind the average of the control group, meanwhile the penetration of the 4G (LTE) technology has just started therefore it could be seen only in some countries. Currently, the ICT development level in the Balkans is similar to that seen in the United States at the beginning of the 2000's. Our analysis suggests that the Balkan region can close the gap in the areas of info-communication technology and online tourism, if it can produce an even growth rate for a period of 15 years. (eMarketer, 2012) As regards to a more thorough analysis of this topic: in case we would be in the possession of some accurate and tangible statistics on the countries of the region, we could easily apply the development model of the United States to the countries of the Balkan region.

If we presume that changes experienced in the United States in the last 15 years will happen on the Balkans now, then the development expected in the coming years-decades could be modelled based on estimations.

In due consideration of the necessary assumptions/corrections, by 2030, the internet penetration on the Balkans will achieve the rate experienced in the Unites States in 2014 (87%). (eMarketer, 2013a) By 2024 the rate of online bookings in the Balkans will achieve the level seen in the USA in 2012 (40%).

Technology-based solution possibilities

There are great changes in the tourism market which will exercise impact on the date, duration and destination of journeys, the means of transportation and last but not least on the ICT solutions applied in the industry. In the interest of being able to satisfy ever increasing and diversifying expectations emerging on the demand side, the supply side should develop new attitude and flexible adaption skills. Utilisation of new modern tools and technological developments is a necessary condition because no other instruments could enable tourism destinations to keep pace with the expectations of the demand side.

A solution for the problem outlined above can be a new development named the Tourism Program Navigation System that – through its complexity – can provide users with full scope of information. The system is able to provide integrated, continuous, updated information that could be tailored to the personal demands of visitors (can be personalised) with the help of a state-of-the-art computer-aided solution that can be utilised by people in any age group.

The novelty of the system developed by INFOTA is inherent in the novel data and information logistic approach applied by the server when it interacts with the sources, preparation, collection, processing and systematised compilation of information. The program enables recording and electronic displaying of fresh and systematised information. The necessary information is channelled to the system partly through automatic data collection and partly through the completion of a datasheet (which ensures uniformity). The scope of attractions included in the application is wide: architectural attractions, collections, events, natural values as well as active, leisure and cultural tourism spots are there. The programs included in the system can be searched by target groups.

Pieces of information received and uploaded are grouped according to various aspects and channelled to the end users who are assisted in navigation by detailed, searching and screening information. Users of the application can include spots, attractions and programs of interest in their own list or even can print out a personalised itinerary. Also, programs can be distinguished according to various weather patterns, hits can be systematised (according to names lists, time requirements or distances from places), whereas even list of “favourites” can be generated. Other advantages ensured for visitors are easy operability and navigation, user friendly and responsive design, possibility to use the program at home and to access printable contents. In addition to its base functions, the

system can be completed with a mobilephone-based audio-guide system and its activating QR codes can also be uploaded into the itinerary. (INFOTA, 2015)

Despite the fact that the system is very complex, it has several additional functions and there are some future, not yet exploited possibilities, such as identification with mobile code, connection with the social media (network), program level commenting, newsletter function, fully automated data collection, comment forum, spaces for promotion, advertisement and actions, additional languages and translation of existing contents.

Tools and programs of this character could help in the extension of the internet activities of the inhabitants of the Balkan region, who therefore will gradually improve the available set of tools, which grants significant potential for online tourism and therefore it is promising. All these can be boosted by the education of digital literacy together with the development of appropriate device friendly culture. The excess revenues that could be generated by tourism provide appropriate motivation for developments that – in the frames of cooperation between the countries (for instance through similar projects) – could in the future become more unified and better balanced.

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