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SAFETY ENGINEERING**

and



**UNIVERSITY OF ECONOMICS IN BRATISLAVA
FACULTY OF ECONOMIC INFORMATICS**

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and PhD. students or candidates**

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Held under patronage
of dean of Donát Bánki Faculty of Mechanical and Safety Engineering
prof. Dr. Zoltán Rajnai,
and of dean of Faculty of Economics Informatics
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FOREWORD

In front of you is the proceedings of the Sixth International Scientific Videoconference of Scientists and PhD. students or candidates entitled *Trends and Innovations in E-business, Education and Security*. The conference is organized by the Donát Bánki Faculty of Mechanical and Safety Engineering, Óbuda University, Budapest and the Faculty of Economic Informatics, University of Economics in Bratislava. This conference has become a relevant point for exchanging research results between scientists and PhD students. We started with two topics: e-business and education. Following the main trends we added topic Security. This conference hosted thirteen contributions, which touch the main fields from different perspectives.

Concerning recent development in the field of videoconferences, sixth conference in a line is a significant success. Budget costs are a usual sign in many research institutions. Hence, videoconference is an interesting option to participate at an international meeting with reduced costs, and especially for young researchers to improve their skills in presenting research papers in, for many of them, foreign language. The conference is over, but we have just started to think about the next one and how to improve recognised weaknesses and keep strengths for future participants.

Finally, we would like to thank participants for their interesting contributions and wish you pleasant reading. We hope that you will find inspiration for further research and participation in next videoconference.

On behalf of the scientific and organisation committees,

Zoltán Rajnai and Miroslav Hudec.

METHODS OF COMMUNICATION AND PECULIARITIES OF THE ORGANIZATION OF COMMUNICATION IN THE LEARNING DISTANCE LEARNING

Galyaev V.S., Gasanova Z.A.

Summary: The article examines the effectiveness of various methods of interaction (communication) of the teacher and the student in a distance learning, identified the main problems of communication in the framework of the educational process. Also in the paper gives some suggestions on the organization of the communication process in the implementation of distance learning

Keywords: communicative process, Information Technology, distance learning.

Introduction. There are many different definitions of "communication". Communication is defined as contact, process of information transfer, a communication facility of any objects. In our opinion the following definition is the most suitable for this concept.

Communication is a system in which the interaction, the process of interaction and modes of communication allowing you to create, send and receive a variety of information are carried out.

The communication method of participants of the educational process is an important factor. It determines the possible forms of communication, interaction between teacher and trainees. The effectiveness of the educational process greatly depends on the quality of communication. Communication in the educational process is the exchange of educational, professional, social and life experience, not only between teacher and trainees, but between trainees in the group, as well as between teachers.

The process for communication and dialogue are crucial for learning in distance learning, they define possible forms of interaction between the teacher and the trainees, as well as a set of used pedagogical methods and techniques. Today, vast sums of money are being made in the development of information tools that implement the various processes of communication. In fact, it is safe to say that 90% of new developments satisfy the communication needs of users in some way over the last 10 years of information technology development.

Organizing it is necessary to solve a number of technical problems associated with the implementation of different methods of communication of participants of the educational process, as well as pedagogical problems, including overcoming communication barriers. This paper is devoted to the effectiveness of different methods of communication of a teacher and a student in a distance education. We are going to denote the basic problems of communication in the educational process and possible ways to overcome them.

1. The effectiveness of different methods of communication of a teacher and a student in distance education.

The choice of the mode of communication in the implementation of distance learning significantly affects the learning opportunities, defines the requirements for trainees and the educational process.

It is possible to distinguish three types of distance learning depending on the mode of communication of teachers and trainees: self-education, individualized instruction and group teaching.

Self-education is a type of distance learning in which learning occurs through the interaction of the trainee with the educational resources (Fig. 1). The contact with other students is minimized. Any contact with the teacher is possible only after frontier or/and final control passing.

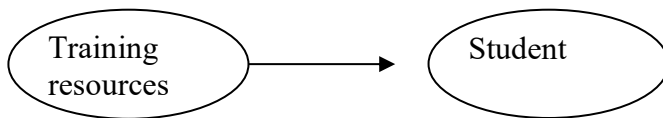


Fig.1 Self-education based on Distance learning Technology

The basis of the learning process is an independent individual cognitive activity, the main type of learning is self-control (frontier and / or final control may be the exceptions). Therefore, self-learning requires a high level of self-organization and a strong motivation from the student. Otherwise, students relax and his learning efficiency falls because of reduced inspection.

This type of learning requires a careful consideration of all training materials - theoretical material, practical and laboratory tasks, questions for self-control, etc. It is necessary to provide a student with detailed instructions and methodological guidelines for the independent exercise of the fundamental types of learning activities and self-control. Thus, implementing this type of education, the main tasks to be fulfilled are creating the necessary educational resources and organize their timely delivery to trainees. The disadvantage of self-education is the lack of contact with other participants, which limits all used learning technology and hampers effective development of student's communication skills.

Individualized instruction is characterized by learner interaction with educational resources and the teacher in individual mode (Fig. 2). In this case, the teacher acts as a consultant, tutor. The function of the teacher is to advise the student, to assist in the organization of independent work, to control and correct the educational activity of the student, if necessary.

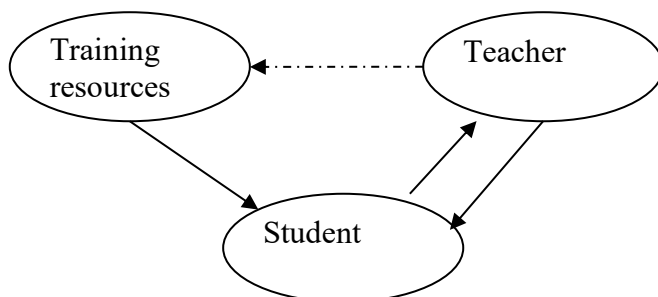


Fig.2. Individualized instruction.

Individualized instruction is effective only for achieving such results as the mastery of factual information, individual skills acquisition and technical skills mastery.

The main objectives for implementing this type of training are the development and operational delivery of necessary educational resources, preparation of special faculty advisors in order to create effective service of psycho-pedagogical support.

Group teaching is characterized by active interaction of all participants of educational process (Fig. 3). The teacher acts as a consultant, tutor, organizer of team-activities of students, monitors the academic activities of students. In addition, the teacher needs to maintain a favorable psychological climate in the group.

This type of study is of most interest, because even a small part of learning in group format, significantly increases the efficiency of distance education. Group teaching promotes active cognitive activity of students. Group teaching methods such as research, problem, project method, etc. are widely used in this type of distance education. They not only promote the development of independent thinking, but also the ability to perform different roles in collective action, development of communication skills. Communicating with each other students learn to express their thoughts clearly, to write correctly. In addition, group teaching can reduce the isolation of learners, peculiar to distance education, and increase the possibilities of assistance to the trainees in their daily instruction and assignments.

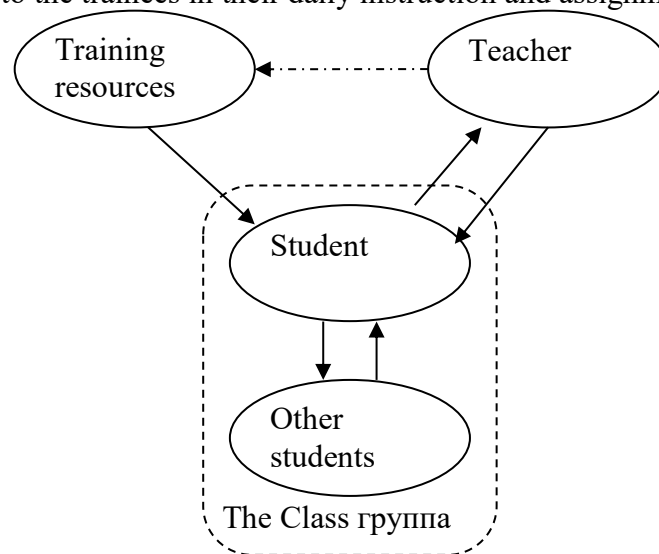


Fig. 3. Group teaching based on Distance learning Technology

This type of training organization makes high demands on teachers, used information and communication tools.

2. Features of teachers' communication

A distinctive feature of pedagogical interaction is more competent written and oral speech, less littered with slang or short-lived linguistic features (the so-called phraseological memes). In other words, teachers characterized by "academic" communication: specific vocabulary, the construction of speech patterns, the general style of communication. In many organizations and companies it is possible to address to each other using slang words and obscenities while working and solving internal team questions. But teachers couldn't make such a frivolity because of the publicity of their profession. In the educational field the colleagues and the trainees retain a certain distance, which is expressed in the reference by name and patronymic name, the use of specific terms of business communication.

On the other hand, the continuous use of the same techniques in communication leads to the emergence of habits and patterns. Teachers with great experience, even being out of the educational environment, continue to use the same methods of communication, trying to play the role of leader, organizer of the communication process, use formal language and try to maintain a certain psychological distance with the other participants of the communication process. The pattern "head – group of subordinates", which is used by many teachers during the lessons, is transferred to the interpersonal communication between their colleagues or between subordinates and governing bodies. Moreover, the use of this pattern is not always

justified by the structure of communication, the topic and other aspects that brings a certain dissonance between the verbal and non-verbal communication techniques. This communication pattern is less effective in distance education, where there are a large number of tools and techniques to create free communication, creativity and intragroup interaction.

3. The features of communication at distance education

There is a very brief list of technologies and their potential impact on the field of communication (without considering the emergence of a global network as a separate technology – it serves only as a medium for the implementation of other technologies):

- the emergence of smart phones, which expanded the range of communication opportunities - not only speaking on the air, but sending text messages, video calls, exchange of any multimedia content;
- the emergence of messengers firstly on personal computers (e.g., ICQ), and then on smartphones (Viber, Telegram, WhatsApp, etc.) has created a special culture of communication - the exchange of short text messages, with its brand-specific vocabulary and techniques. One such technique is the use of a text code word emotion - the so-called emoticons.
- the development of VoIP technology - video calls - helped to enrich the distance communication using non-verbal methods.
- active development of distance educational technologies has allowed to implement distance learning with the use of "webinars" technology - workshops in the global network. Due to this technology it is possible to send the teacher's voice, his appearance and gestures, the multimedia component of the report in the form of presentations, as well as the use of written communication in a chat format.

Thus, the development of information technologies allowed combining virtually all the techniques and methods of communication within the same communication process. On one hand it gives a positive effect – the impact on the learner through several channels of impact: visual, auditory, – leads to higher levels of perception of the received information, the memorization and mastering.

On the other hand, the constant pressure of large information content can lead to the adverse effect. Sociological studies show that the negative trends were brought out in mind of school children and students over the last 10-year intensive development of information technologies: they become narrow-minded, their vocabulary and indicators of information memorizing become worse. This is called the phenomenon of Google (after of the most common search system such as Google) – a young man is easier to find information in the global network than to try to memorize it.

The development of a specific network interaction is another aspect. It is very difficult to assess its manifestation. It includes network-specific global slang. The same words and expressions are translated or transliterated and used worldwide regardless of generic language of interlocutor.

Speaking of business communication, the penetration of information technologies also has its own specifics. Simplification of contact, maintaining contact in "sleep" mode and an escape from the formal rules of communication blurs the lines of business communication with the use of modern means of communication. For example, you may not greet each other if you continue your chat the next day. However, it is compulsory for a personal meeting. A transition to less formal communication is observed more often: the rejection of polite speech and polite address to a person and so on. The names of the users in the network, the so-called "logins", and accompanying image, the so-called "avatars" contribute to this fact.

Various information technologies for communication of participants of educational process have their own characteristics and opportunities. Communication is often implemented in the form of forums and chats during the distance education. The verbal communication between participants, which is typical for traditional forms of education, was substituted for the epistolary (written) communication. In this case, participants cannot use such means of communication as gestures, facial expressions, intonation, and the training seems to be emotionally poor for students. However, asynchronous communication in the forums gives us the opportunity to interact with the participants in the learning process, even if they are unable to communicate due to any reasons, for example residing in different time zones. A communication through audio and video connection is more emotional. In this case, the participants can hear and see each other during the communication. Eye contact and a voice approximate the distance communication to face to face communication as much as possible. It can help to mitigate students' feelings of isolation and loneliness. Such communication involves the simultaneous connection of all participants in the educational process.

4. Recommendations on the choice of methods of communication and possible ways of overcoming communication barriers in distance education

The main tasks in distance learning are the choice of the method of communication and implementation of the correct format of communication. The choice of the method of communication is the solution which defines further organization of the learning process and affects its efficiency. Taking this decision it is necessary to consider factors such as technical capability of the institution, the level of training of pedagogical staff and the quality of teaching materials.

Choosing the communication format you need to combine a formal style of communication of teachers with the habits of free communication of some students. In particular, creating a distance educational system you can offer a number of relatively easily implemented measures allowing you to make the overall style of communication:

- in the case of using forums and chats you need to use graphic symbols to convey emotion and mood "emoticons", punctuation, accentuation with capital letters, symbols, for example, :-)), etc.

- observance of the norms of netiquette. It greatly affects the creation of an environment of psychological comfort. All participants in the process of distance learning must remember the netiquette not to offend the interlocutor accidentally.

- it is necessary to keep track of the questions and always answer them without delay when you use the forums for consultation, because the long wait of the answer may have a negative impact on the motivation of some students and reduce their interest. In the case of educational forums this problem can be solved by the forum moderation, the introduction of a specific regulation.

- to allow regulation of correct logins use, coinciding with the real (surnames) with names of participants of educational process;

- to monitor the quality of multimedia materials, to prevent the destructive factors of the communication process.

Conclusion.

Active development of information technologies and methods of using them in the educational process pose a difficult problem for the teachers: how to organize effective learning process and communication within distance education. Various methods of communication and technologies have different capabilities and pedagogical potential. Thus it is necessary to consider the following factors when making a decision about distance education:

- the purpose and requirements of the learning outcome;

- technical base of educational institutions;
- the level of pedagogical staff training, mastery of modern communication technologies;
- levels of motivation and mastery of communication technologies by students;
- the possibility of compiling and quality of the educational materials.

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PROBLEMS AND PROSPECTS OF TRAINING IT-PROFESSIONALS

Galyaev V.S., Gasanova Z.A.

Summary: This article focuses on the issue of training specialists in the field of information technology. It analyzes the most sought-after IT-professionals, studies the modern programming trends as well as some issues in teaching programmers.

Keywords: IT-professionals, programming, teaching methods, algorithmic thinking, programming techniques.

Introduction. Today information technology specialists are very popular in the labor market, both in Russia and abroad. Leading Russian recruiting companies and agencies such

as HeadHunter, SuperJob and others said about steadily high demand for IT-professionals all over Russia. According to experts IT-industry is an area where wages permanently grow even in crisis. Today there are about 22.5 thousand programmers' vacancies in Russia (Fig. 1).

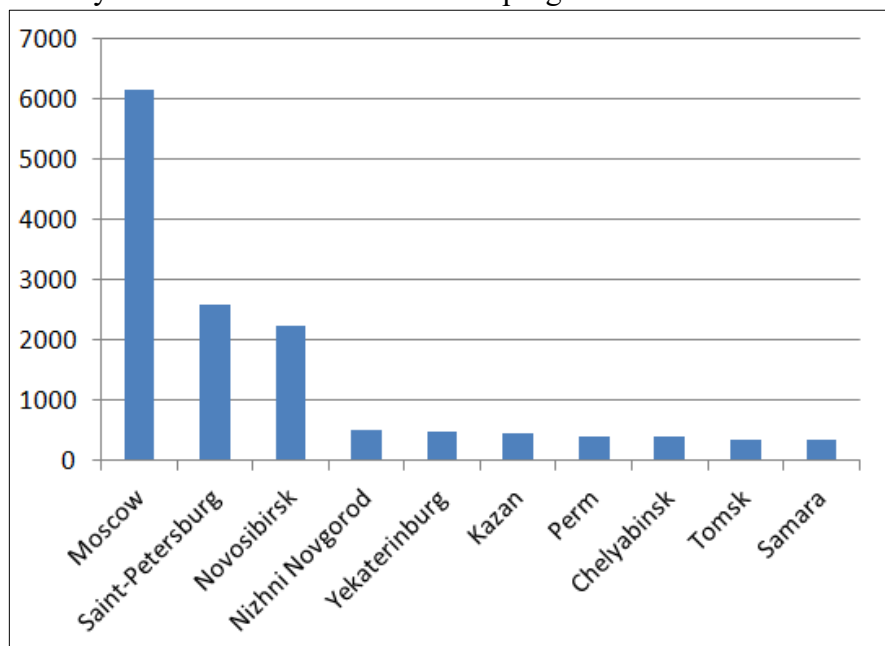


Fig.1. The amount of vacancies for programmers

The analysis of companies' requirements in certain programmers allowed to rank the most popular programming languages in the employers' requests (Table 1) [2, 3].

Table 1. The ranking of popular programming languages in employers' search queries

Programming language	Number of search queries	%
SQL	5524	18,77%
Javascript	5028	17,08%
PHP	4860	16,51%
Java	3567	12,12%
C#	2264	7,69%
.net	2205	7,49%
C++	1382	4,70%
Android	1372	4,66%
Python	1233	4,19%
iOS	1157	3,93%
Ruby	490	1,66%
Delphi	353	1,20%

1. The overview of modern programming languages

Let's consider the purposes and possibilities of the most popular current programming languages.

SQL is a powerful tool used for creating, modifying and managing data in relational databases. This language is independent from specific DBMS, as it is supported by all common DBMSs. Database technologies such as MySQL, PostgreSQL and Microsoft SQL are used in large and small enterprises, SQLite is used to access the databases of mobile applications.

Javascript is a scenario programming language. It is embedded on default in all major web browsers including Internet Explorer, FireFox and Safari. Almost every site contains some elements of JavaScript, thus increasing the demand for JavaScript-developers. Recently JavaScript is also used as a basis for Node.js, server technology, which allows you to communicate on line. Javascript supports object-oriented, imperative and declarative programming styles (for example, functional programming).

PHP is a scripting general-purpose language which is actively used for web application development along with databases. Today, the majority of sites and web applications are written in PHP.

Java is an object-oriented programming language. It allows you to build scalable web applications and you can use Java on any devices: PCs, smart phones and even TVs with Smart TV technology.

C# is a programming language that combines object-oriented and context-oriented concepts. C# focuses on developing software for NET platform and is suitable for rapid prototyping applications and developing large-scale ones.

C++ is a powerful programming language allowing you to create effective almost multipurpose programs from low-level utilities and drivers to complex software systems. C++ supports a variety of programming styles and techniques, including traditional directive programming, OOP, generic programming, meta-programming (templates, macros). An important advantage of C++ is the possibility of cross-platform programming. But this language has a high entry threshold.

Python is a general-purpose programming language. The main distinctive feature of this language is its simplicity and readability. It is a great language both for beginners and experienced professionals, enabling to implement web-development, 3D rendering and scientific computing.

Today mobile users (smart phones, tablets) are much more than PC ones. Therefore, one of the most promising programming trends is the development of mobile applications. Users want and shall have an access to essential services on computers and mobile devices both at work and at home. It is a constantly growing trend, so developers of mobile applications will always be in demand in the market. Therefore such programming areas as mobile platforms for Android, IOS, and programming languages Objective-C and Swift are gaining popularity.

2. Some issues in teaching IT-specialists

Many universities prepare IT-professionals today, but the number of qualified programmers is less than desired. Unfortunately graduates often do not meet the employers' requirements. Being well prepared on theory and syntax of programming languages they can't always cope with the required task because of the misunderstanding of the program structure and its basic ideas.

Having analyzed the experience of programming training at schools and on undergraduate courses in universities, we can conclude that the reason of this problem lies in the teaching approach of programming subjects.

The purpose of programming teaching especially for freshmen is to develop algorithmic thinking of a student. Then it is necessary to complicate gradually the solvable

tasks in conjunction with increased ability of applying tools. Students should be learned to design problem solving, to predict the decision results, to analyze and to find out rational ways, etc.

Algorithmic thinking is a cognitive process, characterized by clear, appropriate sequence of committed thought processes inherent detailing and optimization of consolidated blocks and conscious fixing process of obtaining the final result which is presented in a formalized form of the executive language with adopted semantic and syntactic rules [1].

Today the algorithmic programming languages are not used in practice for solving serious tasks. As a result the study of this approach to programming is not always paid sufficient attention. Moreover, programming training is often limited to the study of the syntax, particular programming language structures and the implementation of some tasks on these structures. Therefore students gain only theoretical knowledge and can solve typical tasks. So they can't cope with non-standard ones, as it requires the development of a new action algorithm. Furthermore, according to this approach students acquire only one specific programming language and the self-learning of new languages are difficult for them.

Therefore it is important to pay sufficient attention to the development of students' algorithmic thinking. For achieving this goal it will be useful to study working and management principles of algorithmic machines, for example Post and Turing. They are abstract computing devices unused in practice but serving as a good tool for learning such concepts as algorithm and algorithm performer.

The following actions also promote the development of algorithmic thinking:

- The creation of a new algorithm and its recording, then verification and execution by a student or a selected contractor.
- The acquisition of basic algorithms for solving typical tasks.
- The search and correction of syntactic and semantic errors in the algorithm.
- The optimization of finished algorithm.

The second issue in teaching IT-professionals is the lack of skill in teamwork. Today a professional should possess not only theoretical knowledge and practical skills, but also he should work in a team and sometimes manage it. Future IT-specialist will be involved in various projects, so he must be sociable for participating in teamwork and solving required task within the general team's goal.

One of the efficient ways of the organization of educational activity is the implementation of group projects. Taking part in these projects students learn to divide their task into subtasks, to allocate functions within the project team, to perform their duties in the group and to coordinate their activities with the other participants. In addition, such collective work in real-life environment prepares students psychologically for their future careers.

3. Some issues of teaching students to new technologies of software development

The field of software development technology and the organization of this process is also an important issue in training IT-professionals.

The software development technology is a way of an organizing the process of program making, a set of techniques and methods for performing certain activities.

The effectiveness of the development organization process influences on the success of the IT project as a whole. In training IT-professionals at colleges a special emphasis is laid on the study of certain software development models such as cascade, spiral models and Case-technologies. However, in practice it is widely used relatively new approaches to programming, more effective in modern conditions. It is so-called agile methodology (Agile).

General characteristic of Agile methodology is an iterative development, emphasis on interaction and communication, as well as full or partial refusal of expensive interim project tools. As part of Agile the development is divided into a series of short cycles (iterations). Each iteration takes from a week to a month and is built as a full project in a nutshell: from design to testing. After finishing each iteration the development team and the customer (product owner) overestimate development priorities. Therefore, the concept of Agile assumes that the final product meets all requirements of the customer. The most common methods of Agile are scrum and kanban. Therefore, in training IT-specialists it is necessary to focus on these software development technologies.

Conclusion

The article describes and analyzes the requirements of Russian labor market in IT-specialists. It also shows some issues in the personnel training for information technology sector. The main challenges for educational institutions that train IT-professionals are:

- The changing approaches to teaching programming subjects, for example laying stress on solving tasks by programming tools rather than learning specific theory.
- The usage of design methodology in studying software development programs that gives students practical skills in a real project with its own budget, timing and amount of work.
- The constant updating of the educational program in accordance with market needs and modern trends.

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USING NEXT GENERATION SOFTWARE FOR ANALYSIS OF FATAL FIRE-FIGHTER ACCIDENT

Peter Jackovics

ABSTRACT

The investigation of accidents occurring during high- or low-angle rope rescue, due to peculiarities and specific circumstances provides us with extraordinary lessons learnt, so that we can disregard the template-like content of minutes taken on work accidents, and used up-to-date analysis methods avoiding subjectivity, like next generation Visual Risk Assessment software and tool, the Bowtie Method (BowTieXP).

The goal of this study is, by elaborating a fatal fire fighting accident, to investigate and analyze the risks of accidents occurring during special rescue operations and to share the lessons learnt with professional fire-fighters in order to avoid similar incidents. The analysis of different risks was performed using up-to date accident investigation methods in order to fully analyze the cause and effect circumstances from all sides.

It can be seen after the analysis of the case that human role is fundamental in the occurrence of the accident, since, substantially; a human error caused the accident. The Human Error of the commander and the fire-fighters strengthened the causes of the occurrence of the accident, which was strengthened by environmental, procedural, training and technical factors.

Keywords:

BowTieXP Software, Fatal Accident, BowTie Method, Visual Risk Assessment, Safety Management System.

INTRODUCTION

The cause and effect investigation of severe injuries during high- and low-angle rope rescue can be regarded as peculiar from many aspects, since due to extreme circumstances and uniqueness, the reasons of these accidents is quite difficult scrutinize posterior, and it is also difficult analyze and evaluate their effects. In Hungary, the accidents within the disaster management system are primarily investigated within a legal framework and are processed based on accidents protocols prescribed thereby. The strict administration liability does not allow the full elaboration, analysis and evaluation of the cause and effect circumstances of accidents and to collect the lessons learnt.

The investigation of accidents occurring during high- or low-angle rope rescue, due to peculiarities and specific circumstances provides us with extraordinary lessons learnt, so that we can disregard the template-like content of minutes taken on work accidents, and used up-to-date analysis methods avoiding subjectivity, like the Bowtie Method [1][2].

DESCRIPTION OF THE SEVERE WORK ACCIDENT

On 1 November, at 17:03 hours, the operations control of the Hungarian disaster management received a notification that a person fell into a ravine outside the administrative

area of an inhabited place and was injured. On the day of the alert, there was no rainfall, it was dark. In addition to the floodlights, there was no other lighting.

During the reconnaissance, starting from the direction of Pilismarót, on a road accessible by a four-wheel-drive vehicle, but not by a fire engine, it took 700 meters to turn up at the incident site. During the reconnaissance, no one was found there, only a soft shouting was heard from the forest. Then, the rescuers went in the direction of this voice. To approach the source of the voice, they had to descend on a slope of 35-40 degrees, covered with leaves and trees, approx. 50 meters to the place of the slip. Rope securing in this place, due to the vicinity and the accessibility of the landmarks (trees, bushes) was not justifiable. The terrain conditions hampered the possibility of skidding. During the reconnaissance, headlights and torches were used.

General description of the incident site: open view on the top of the cliff ledge, climbing 15-20 meters on a slope, relatively steep (approx. 60-70 degrees slope angle), covered with dry leaves and loose soil, opposite of the supposed place of the fall or skidding.

One of the fire-fighters of the rescue team was looking for an anchor point, when he slipped at the place indicated above; first, he skidded approx. 4 meters slowly, then rapidly on an 8-meter-long slope of approx. 60 degrees; and in the following, he fell vertically approx. 20 meters. According to the primary investigation, he died immediately.

WHAT HAPPENED? WHY DID IT HAPPEN?

At the occurrence of an accident, we always investigate the causes: a fire-fighter fell into a ravine. Why did the accident occur? What happened during the accident? – we can ask the questions. We may start the investigation by asking the five why-questions, at the end of which we can find the cause(s) triggering the accident. The fire-fighter, due to the bad visibility and the extreme terrain as aggregate causes of environmental effects did not perceive that he had stepped on to a steep and sloping area, from where he can longer return, there, without rope securing, he would surely fall into the ravine.

Cause	A fire-fighter fell into a ravine.
Why? 1.	He skidded down a steep slope.
Why? 2.	He did not use a securing rope.
Why 3.	He was in a dense woodland with slopes.
Why? 4.	He did not perceive the danger.
Why? 5.	There were limited visibility circumstances.
Consequence	He entered a danger zone.

Table 1: The “5 Why?” questions about the causes of the fatal accident

The area from where it is no longer possible to climb back because it is steep and slippery is called a danger zone by experts involved in cave search and rescue, cliff climbing or mountaineering rescue. The individual sections of the terrain and caves have their danger zones, whose locations and sizes are different, so they are difficult to define, usually they are empirically determined and identified. In the indicated area with ravines, this danger zone was not marked or outlined; such dangers of the area were not known to the rescue unit, and there

is another significant fact that, due the limited visibility circumstances as well, they did not perceive the risks of the mountainous and forested environment.

ANALYSIS OF THE SEQUENCE OF EVENTS – WHO DID WHAT?

During the chronological analysis of the sequence of events, the critical mistakes are unambiguously visible that may have caused the accident. The more different methods we use to analyze the given accident, the more recurring causes we may see, which, individually or collectively, may have resulted in the occurrence of the severe accident. Let us examine the incident with different methods, but first, let us take a look at the circumstances, the sequence of events how the accident may have occurred.

The sequence of events can be reconstructed retrospectively from the minutes of the accident, which clearly shows that the events can be divided into 13 key steps. From the minutes, based on the factual findings of the investigation, critical points can be assigned to the given steps. Collecting the critical points is not yet the analysis of the incident; it is a kind of a sketch of facts. To analyze the information collected from the sketch of facts and the documentation several years and fire fighting and rescue, command and control knowledge and experience are required [3].

Based on the knowledge of the critical points, we can see that the cause of the occurrence of the accident is expected to be complex. Beyond individual responsibility, the correctness of and the lessons learnt from the organization, the commander and the methods and procedure must be analyzed. We should examine how the environment and the level of training, the use or not use of individual protection equipment and other tools and instruments have aggravated the accident, that is how they have increased the occurrence of the accident resulting from skidding, [4].

During the analysis, we always investigate:

- Why did it occur? What would have happened if...?
- Why did a fire-fighter colleague of ours die?
- How can we prevent the occurrence of similar incidents in the future?
- What are the lessons learnt for us?

These questions are not simple because the causes of the given accident are also complex. Each and every critical point involved a risk of certain gravity:

- a long walk to the incident site, which could cause fatigue,
- incorrect information regarding the location and the position of the injured,
- dense woodland with limited visibility,
- steep hillside,
- night darkness,
- presumably lighting devices with poor illumination capabilities,
- difficult terrain, heavy protective clothing,
- slippery terrain, thick litter layer of dead leaves,
- locating the missing person by his voice,
- steep hillside,
- Circumstances of anchoring the securing rope.

RISK ASSESSMENT OF THE FATAL INJURY WITH THE BOWTIE-XP SOFTWARE

The Bowtie representation of evaluating of the causes and consequences of the accident causing a fatal injury is a good method, where the results of the fault tree method and the herringbone technique can be depicted in an aggregate way. The risk analysis of the fatal accident of a fire-fighter and its evaluation and representation using the Bowtie method is shown in Figures 1-3. The left hand side of the bowtie analyzes the causes of the occurrence of the accident; its right hand side analyzes the consequences, effects and aftermaths of the accident. In the centre, we can see the result of the accident as an event and main danger [5].

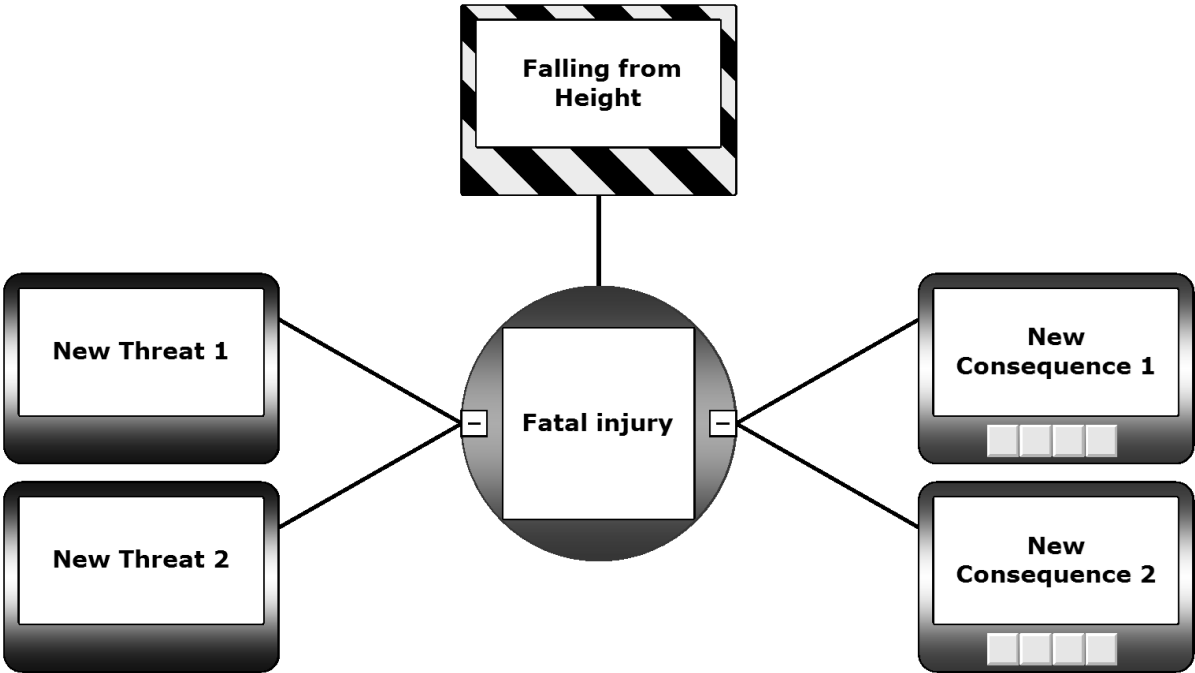


Figure 1, First step: Hazard and Top Event in BowTieXP with Major Accident Hazard

Both sides of the bowtie figure contain the limits that may hinder or mitigate the occurrence of the event, respectively, its effects. So, on one side, data clarification, communication, coordination by the duty office, and on the other side, decisive instruction by the commander, a tactical decision and the training of subordinate commanders [6]. The detailed analyses are depicted by the figures of the fishbone (Ishikawa methodology) diagram and the fault tree method (Event Tree Analysis, ETA).

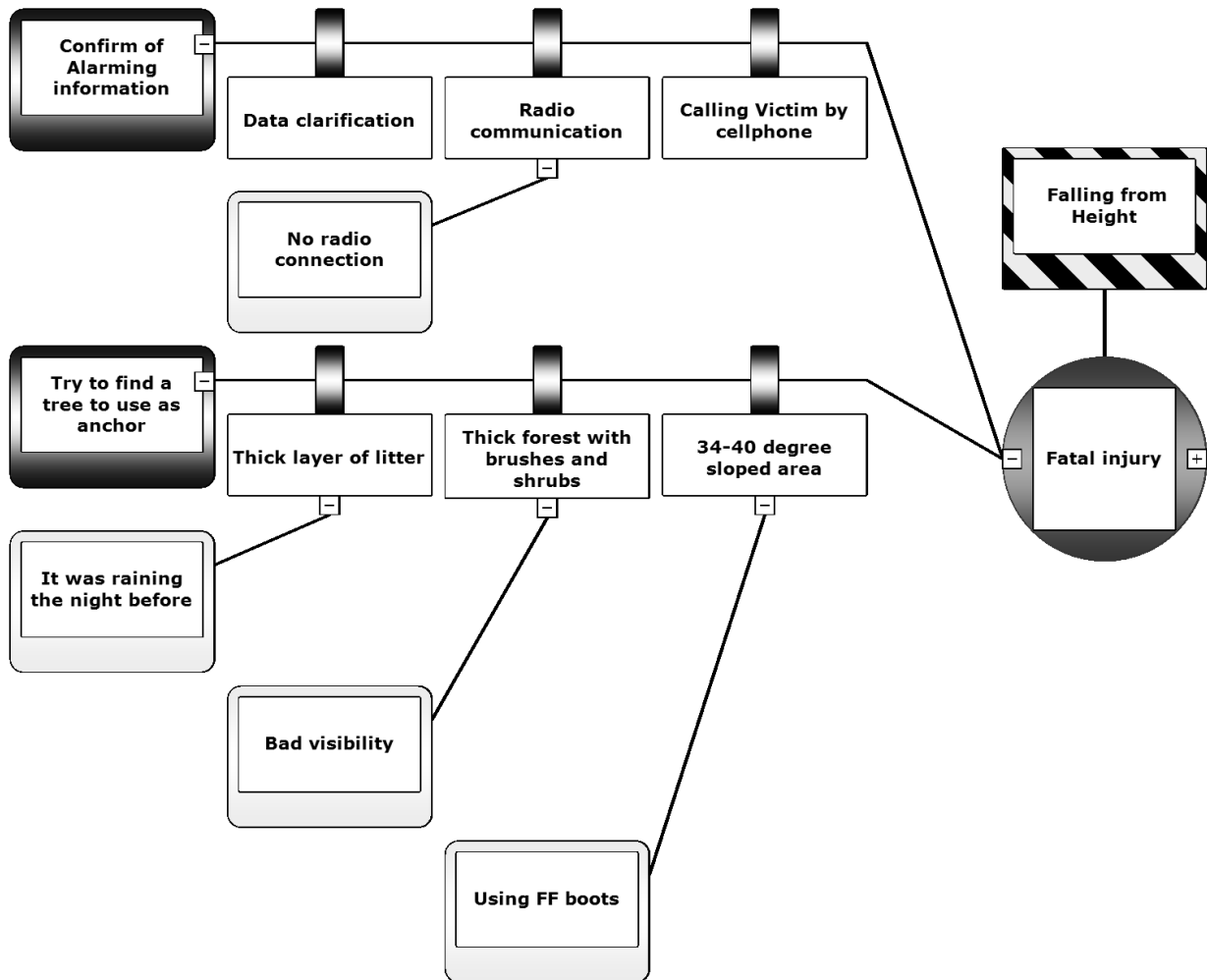


Figure 2, Examples of Hazard, Top Event, Threats, Outcome and Barriers on left side of BowTie diagram with selected Threats

It can be seen, the combined effects of how many circumstances should be considered at the occurrence of an accident [7]. The causes must be analyzed in a complex way, because certain factors strengthen each other, in other words, it was not just a wrong decision by the commander that led to the unfortunate accident. Such joint or aggregate causes were:

1. Walking 700 meters uphill with equipment could have caused the fatigue of the fire-fighter, so he had no chance to hold on to something, having the equipment and the lighting device in his hands.
2. They trusted the GPS coordinates and the information from a layperson, important information on the position of the injured person was not available, which collectively influenced the commander's decisions and the tactics of search.
3. They had limited personnel and assets, since the central duty office had not acted prudently in collecting the information: darkness, inaccessibility by regular vehicles, the injured person was not questioned attentively, no forester with site awareness was called to incident site, no off-road vehicle and supplementary rescue forces were sent to the site [8]. No request was made by the commander of the unit to do so.
4. The commander did not take into account the importance of safety when rescuing with a small number of personnel on a difficult terrain: a firm commander's

instruction on anchoring and the request for additional forces were lacking. There was a fundamental mistake not to approach the victim on the tourist route from the bottom.

5. The team did not have an action plan, as it seemed to be a simple removal of an injured person. They were prepared for a normal terrain based on erroneous information; they had an erroneous rescue tactical plan.

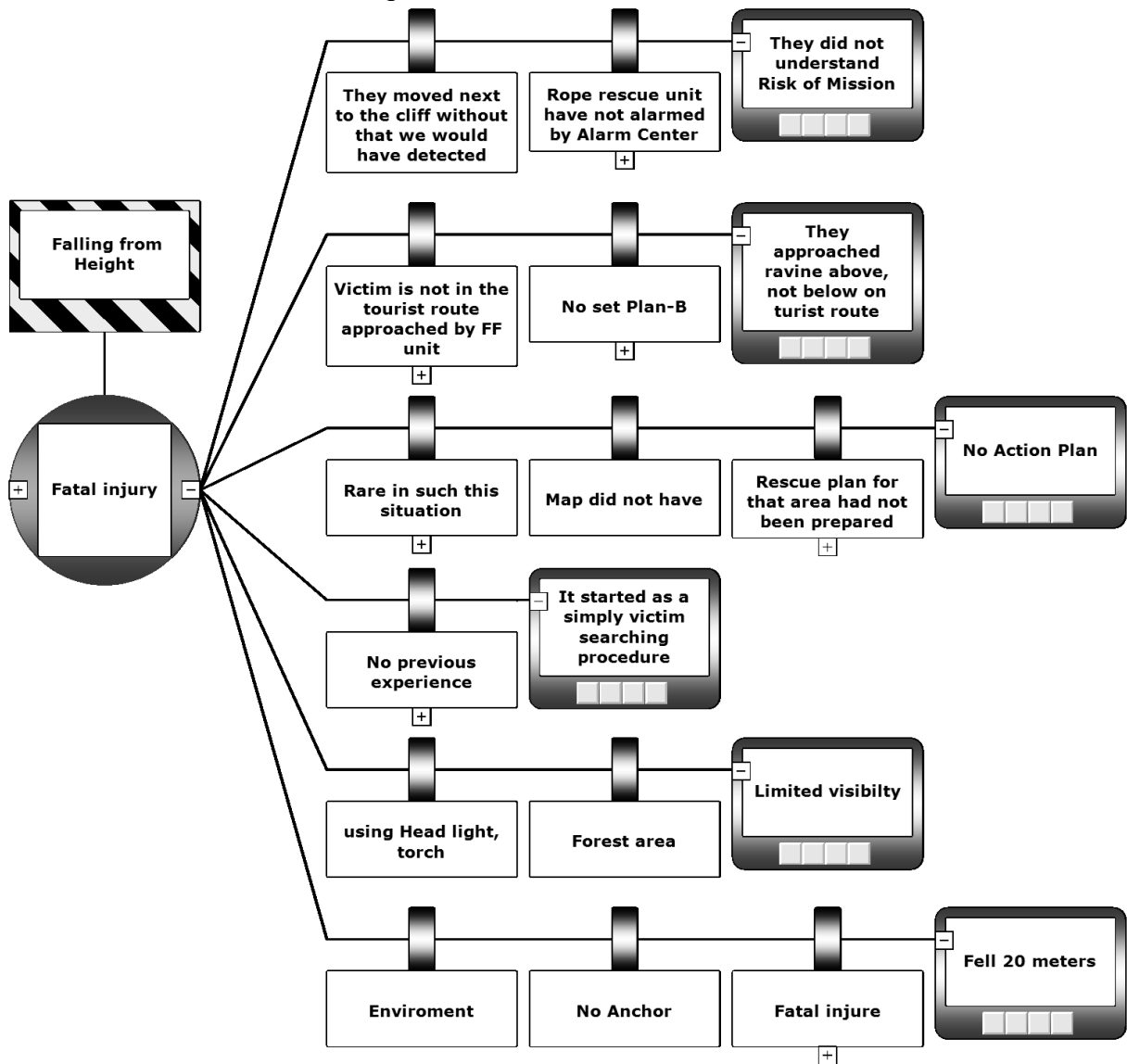


Figure 3, Examples of few Outcome and consequences at left side of BowTie diagram, without barriers

CONCLUSIONS

It can be seen after the analysis of the case that human role is fundamental in the occurrence of the accident, since, substantially; a human error caused the accident. The Human Error of the commander and the fire-fighters strengthened the causes of the occurrence of the accident, which was strengthened by environmental, procedural, training and technical factors [9].

In order to reduce the occurrence of accidents it is important to prepare a person mentally and professionally to keep the safety regulations. The training of subordinate commanders must be emphasized in particular, focused on extreme situations and special rescue.

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BENEFITS AND DRAWBACKS OF VIRTUAL CURRENCY BITCOIN

Pavol Jurík

Introduction

According to Šlosár, Šlosárová and Majtán [1] the term currency in general is a comprehensive term referring to a set of money circulation elements regulated by law in a country. Virtual currencies were defined in 2014 by the European Banking Authority as "a digital representative of a value that is not emitted by the central bank or another public authority and it has not a direct relation to a real currency, but is used by individuals and legal entities as a mean of exchange and it can be sent, stored and exchanged in an electronical way." [2] According to [3] "a virtual currency is a digital currency (also called cryptocurrency) or electronic money that do not physically exist as coins or banknotes. People use virtual currencies to purchase goods and services online without expending high transaction fees and charges. The most attractive part of virtual currencies is that they allow their users to remain anonymous." Among many virtual currencies (for example Bitcoin, Ripple, Ethereum, litecoin, Dogecoin, Dash, Peercoin, Stellar and others) the most important and most used currency is Bitcoin. It is also the very first virtual currency, which was created in the year 2009. The issue of virtual currencies is therefore a relatively new area and for many people it is still unknown. This article focuses on the virtual currency Bitcoin. Its aim is to create a complete list of basic advantages and disadvantages of Bitcoin with detailed descriptions of each. In literature these advantages and disadvantages are described only

briefly, so this article should fill the gap and inconsistency in literature. It can be also useful as a support material for the decision-making process in terms of the use of Bitcoin for the realization of business transactions.

1. Virtual currency Bitcoin and basic characteristics of its use

Founder of Bitcoin, acting under the pseudonym Satoshi Nakamoto, defines it as "an electronic payment system based on cryptographic procedure allowing the mutual connection of any two parties who are willing to trade directly with each other without the need for a trusted third party". [4] Bitcoin is a fully decentralized P2P currency (Peer to peer - a computer network, where the nodes are mutually equal, so there is a central control node missing) that is independent of any authority with regard to the technical operations, currency emission and controllership over transactions. Virtual currency Bitcoin can be useful for making payments between the users through the Internet, while transactions in this currency are irreversible and, once accepted by the Bitcoin network it is not possible to cancel the transaction in any way.

Anyone who is interested in making payments via the virtual currency Bitcoin has to install a so called digital wallet on his computer (or his mobile phone) at first. It is a free open-source software, whose task is to generate the first Bitcoin address and also subsequent addresses for every user.

This software wallet can occur in three forms:

- *computer wallet* - installed on a personal computer or a laptop,
- *mobile wallet* - installed on a mobile phone,
- *web wallet* - accessible through a website of the Bitcoin services provider. In this case there is no installation required on a client device - just a Web browser is needed.

After generating a Bitcoin address it is needed to get some Bitcoins, which will be available through the digital wallet after their assignment to this address. Bitcoins can be obtained in several ways, for example they can be bought through Bitcoin currency exchange offices (Mt. Gox or Bitstamp) or through services like BitInstant. This service allows you to transfer funds between money changers and it supports different payment mechanisms. All transactions are carried out through the Bitcoin network, where they are stored publicly and permanently. All transactions and the Bitcoin balance on a specific Bitcoin address are therefore visible to all other members of the Bitcoin network. For this reason, experts often recommend the payers using Bitcoin to create a totally new Bitcoin address for every single transaction in order to ensure privacy and increase of security. It is possible to pay via Bitcoins only in companies that support this type of payment. It works so that such a company sends its Bitcoin address to a given payer who has to transfer the required amount of Bitcoins from his digital wallet. All transactions made with Bitcoins are stored in a publicly available statement, referred to as "a block chain". The block chain is useful to verify whether the payer actually has the required amount of Bitcoins available and it was not a trick. This also has to prevent the multiple use of the same amount of Bitcoins for different transactions. [8]

Virtual currency Bitcoin has a deflationary nature, which means that the total amount of Bitcoins is known in advance and final and this ensures that no one can create more money and devalue the currency as it happens when more money is emitted by a central bank. The final amount of Bitcoins that can be emitted to the market is determined to 21 million BTC (Bitcoins). [6] On February 6th, 2016 there were 15 176 825 BTC in circulation. In addition to that approximately 3600 new BTC are being harvested every day. Every four years, the number of new Bitcoins emitted (i.e. harvested) daily will be reduced in half. In the near future, this will happen in 2017. The whole system of Bitcoins emission is designed in such a way that by the year 2040, the whole and final number of 21 million BTC will be emitted.

Bitcoin is an open source electronic payment mechanism that is available to the general public without restrictions. This system is designed in such a way that there is no single owner or controller of the mechanism and that anyone can become a user (i.e. a member of the Bitcoin network), if he is interested in doing so. Its open source nature is very closely linked to the decentralization of the system. Bitcoin emission and putting them into circulation is decentralized. Bitcoin therefore operates with the absence of a single management authority, institution or intermediary. All transactions take place only between the sender and the receiver. Users communicate with each other in the peer-to-peer manner, without the existence of a central control. [5]

The first Bitcoin has been put into circulation in the year 2009. The volume of this mean of payment in circulation is increased automatically by generating new Bitcoins in the number of 25 pieces in each approximately 10 minutes. This process is called Bitcoin mining. However, for mining the Bitcoins there have to be some miners, i.e. people who are willing to mine these Bitcoins and to store them in their digital wallet as a reward for their effort. It can be implemented by anyone who downloads and runs a program suitable for obtaining Bitcoins (for example GUMiner, which runs on Windows operating systems). The user of the Bitcoin network who strives for Bitcoin mining is called Miner. [7] The principle of mining works through the use of high-performance computing hardware, which is able to solve very complex mathematical equations that are linked to the process of Bitcoin transaction validation. Every time when these equations or mathematical problems are solved, the miner who is responsible for their solving is allowed to put a reward on his own account in the form of a certain number of Bitcoins. The original amount of remuneration for the miner was 50BTC, however, today it is only 25 BTC. Every four years, the reward will be halved until the market gets filled up, i.e. the maximum possible amount of 21 million Bitcoins will be in circulation. The complexity of the mathematical equations is rising and therefore greater processing power is needed. [5] At first, only a personal computer processor (CPU) was needed as a computational platform for solving the equations. After that, when the complexity of these problems began to rise, high performance graphic cards were used. Today, mining of Bitcoins is possible only using a specialized equipment with a high computing power, known as an ASIC. It is a single-purpose chip that is focused exclusively on solving mathematical problems related to the obtaining of Bitcoins. Even with such a device, however, it may take years for one miner to be successful and therefore the miners are creating groups consisting of people with the same objective – to mine the Bitcoins. These people join their forces and if they are successful, they divide their reward according to the amount of each member's contribution to the success.

2. The advantages of using Bitcoins

In this chapter we will gradually introduce the main benefits that are associated with the use of the virtual currency Bitcoin. These benefits were identified based on an extensive analysis of a wide variety of aspects related to this currency and subsequent synthesis of learned knowledge. The basic advantages of using Bitcoin are:

a. It is a fully decentralized and deflationary currency – virtual currency Bitcoin is fully decentralized, i.e. there is no central authority, respectively no central bank with the privilege to control the process. The whole Bitcoin system is managed only by the regulations that were created by the author of Bitcoin, who is known under the pseudonym Satoshi Nakamoto. The Bitcoin network is consisting only from its regular members and there is no central node responsible for the control of the entire process. This currency can thus function without interference from a managing authority, an institution or an intermediary. The network is fully distributed among network users. The payments within this network are carried out with no cost or with only a little cost. It is designed in such a way that no one - author, individuals or governments could have any influence on the circulation of money.

They can also not cause an inflation. Bitcoin is a deflationary currency, because the total amount of money is finite and known in advance (21,000,000 BTC), which means that after the fulfillment of this limit no one will be able to mine or emit any more bitcoins.

b. (Pseudo) anonymity of Bitcoin - Bitcoin is often referred to as an anonymous currency, because payments via it take place on a separate network consisting of Bitcoin customers. All transactions are recorded and published using the so-called “block chain”, but the exact identity of the participants of these transactions is kept in secret. Their identity is hidden behind a unique Bitcoin address. Every participant of the Bitcoin network may create any number of these addresses and they are not connected to his name, IP address or other identifier, unlike payments via bank transfer or PayPal payments. In reality Bitcoin is only a pseudo anonymous currency because it is possible to analyze the flows of Bitcoin transactions and in most cases also to track their routes so that in the end it is possible to identify the participants with a high degree of certainty despite the fact that their identity was not directly published. Thus, the whole world (or at least people who are able to do such an analysis) can see, from which Bitcoin address the Bitcoins were sent and who is the recipient. Information about individual transactions can be detected with the help of websites that are designed to map the flows of Bitcoins. An example of such a website is Bitcoin Block Explorer, which is an open source web-based tool that allows its user to view information about the blocks, addresses and transactions connected to the Bitcoin block chain. After entering an identifier – a Bitcoin address or a unique ID - a complete account history is displayed. There can be seen some information about the incoming or dispatched Bitcoin transactions and even the current Bitcoin address balance. Each transaction has a unique ID. It is a hash that is assigned to each transaction. This hash hides other interesting details such as the exact time when the transaction took place, transaction charges and more in it.

c. Secure transaction mechanism - cryptography is used to ensure the safety of the peer-to-peer Bitcoin network and for each user it enables to use only the money that he owns and by doing this it prevents the re-use of money that were once spent. Thus, unlike conventional money Bitcoins can not be falsified. Bitcoins are something like an "internet cash". Whereas, during the payment it is not necessary to reveal the identity of the participants – there is no need to enter any personal data, such as the name, card number or any other sensitive data and in this sense it offers a similar security than cash. We also don't have to reveal our name while buying food or clothes in a supermarket so in this sense this can be essentially compared to a cash flow. Thus, there is no bank, card company or merchant who would store the information about our shopping. For this reason, potential attackers do not have a database full of personal data, which they could use for their purposes. The transaction may be carried out only by the owner, respectively the sender of the payment and no one else can download anything from his account, as it happens while using credit cards or bank accounts. The money belongs only to its owner and no one can take it away. That's why the Bitcoin security is very high and there are virtually no effective means to challenge the transaction security mechanism. Although in theory it is technically possible, but in reality any manipulation would be quickly detected. Thus, security of transactions and ownership in the Bitcoin network is very high and transactions via this virtual currency can be regarded as highly secure.

d. Freedom and almost instant transfers worldwide - individual properties of Bitcoin are interrelated and derive one from the other. With the property of decentralization of this currency another feature and advantage is linked and that is freedom of paying. Since Bitcoin is not a subject to any regulation by any governing body, the exchange takes place directly between two parties and therefore no one can be prohibited from accepting or sending Bitcoins. Because of that payments can be cheaper and quicker. Bitcoins move from one account to another quickly and they are not burdened with charges typical for payments using

standard currencies. Moreover, payments are accepted immediately without annoying confirmations, restrictions or bureaucracy. Thus, Bitcoin is a technology that allows quick transfers of considerable amounts of money worldwide. Since this currency is fully digital, it is easy to carry it across the borders and it is resistant to state control. If no failure occurs, it is possible to send and receive any amount of money mainly instantly, almost any time and anywhere in the world (however, a reliable Internet connection is necessary). For banking transactions routing abroad it often happens that the payment “travels” to its destination for a few days. Payments using Bitcoin are usually transferred in a few minutes.

e. No or minimal transaction charges – at present time, Bitcoin payments are processed either free of charge or at minimal charges. These charges are, however, negligible in comparison with the fees for transactions using standard currencies. The question is when and why to pay it. Situations may arise in which a large number of transactions accumulates at the same time. In this case the transactions that are free of charge are of lower priority and they are processed after transactions with higher priorities so there can be some delays and no one can guarantee when these transaction will be processed. Then assigning Bitcoins to a specific Bitcoin address (i.e. Bitcoin account) can take all day. Thus, users have the option to pay a small transaction fee in order to get it processed as quickly as possible. In this case transactions with higher priority are confirmed faster by the Bitcoin network. All payment transactions are processed by miners. The mathematical equations that have we mentioned earlier are linked with the processes of Bitcoin transactions processing and validating. Because of this, transaction fees will get directly to the miners as a part of their reward for their mining activities. Transactions that contain a fee have a different size from fee free transactions and thus the miner knows whether it is a transaction with or without a fee. In the future, these fees are supposed to fully replace the rewards for mining. Because of this, the miners will be still motivated to mine for Bitcoins and to confirm transactions of other members of the Bitcoin network. Recommended charge for smaller payments (up to 1 BTC) is set to 0.0001 BTC (representing approximately € 0.037). For larger transactions, it is better to pay a higher fee so the recommendation is set to 0.005 BTC (the equivalent of approximately € 0.187) in order to be sure that the transaction is processed as soon as possible. However, for the vast majority of transactions the sufficient charge is of 0.0001 BTC only.

f. Investment opportunity - "Foreign exchanges, stock exchanges and payment gateways, as well as the production of hardware and software for mining are gaining the attention of investors, who see a unique opportunity in the development of these kinds of projects. While the investments of venture capital in projects related to cryptocurrency in the year 2012 were in millions of dollars only, in 2013 these investments rised up to 93 million dollars and in 2014 it was almost 400 million dollars. In the first two quarters of the year 2015 the same amount of capital was invested as in the entire year 2014." [13]. According to [10] the average profitability of Bitcoins for the years 2010-2014 was 244.64% and the riskiness of the investment for the same years was 120.6%. This underlines the fact that Bitcoin is more suitable for investors with a positive attitude to risk who could earn a considerable amount of money, but at the same time they were undergoing a huge risk. For comparison, the average profitability of gold in the years 2010-2014 was only 3.11% and the risk level was 17.5%. According to these values, gold is more suitable for conservative investors.

3. The disadvantages of using Bitcoins

In the previous chapter we have focused on core advantages, respectively benefits of using the virtual currency Bitcoin payment system. As each coin has two sides, Bitcoin is also not quite perfect, and there are some downsides of its use. In this chapter we will present the main disadvantages, respectively risks of Bitcoin using:

a. Exchange rate volatility and instability of the payment system in time - a considerable disadvantage of Bitcoin is a strong fluctuation of its market price. Since its value is given only by the development of the market situation, it can fluctuate freely. Therefore, if multiple users wish to exchange Bitcoins simultaneously, the price climbs up automatically. The question whether this currency can be a stable store of value is one of the most debated issues of Bitcoin. The stability of the payment system is influenced by the volatility. Volatility represents the instability, respectively variability of asset prices in financial markets. Price development of Bitcoin throughout its lifetime since its inception in January 2009 until June 2016 indicate that Bitcoin is a currency with high volatility. The price of the Bitcoin from January 2009 to April 2011 was just above zero. In April 14th, 2011 the Bitcoin value reached \$ 1. A sharp increase of price occurred in the first decade of the June, when the Bitcoin price jumped to \$ 29.60. Till the end of June, however, the price fell to \$ 16. Till the end of the year 2011 the price decreased gradually and on December 31th it reached the value of only \$ 5.53. During the next one year, the exchange rate was relatively stable. In January 2012, the Bitcoin price was around \$ 4-6, in summer it rised up to a level of \$ 13.50 and then it fell sharply and by the end of the year and stabilized at a value from \$ 10 to 14. In January 2013 the exchange rate began to climb up sharply, till it reached its peak of \$ 230 then. This increase was due to market expansion because the awareness of Bitcoin among people was bigger. This level, however, had a short duration only and in the same month the price sharply fell to \$ 68. Thereafter, up to October 2013 it ranged from \$ 66 to 150. Since October 2013, when the price was around \$ 100, it began to climb up again and in December 2013 it reached its maximum value of \$ 1147. In the same month, however, the price decreased sharply and it reached a level of \$ 520. In early January 2014 it climbed up to \$ 950 and up to September 2014 it ranged from \$ 400 to 900. From October 2014 to the end of 2015 the Bitcoin price fluctuated between \$ 210 and 460 with a one-time drop to a level below \$ 200 reached in January 2015. At present, the value of Bitcoin is relatively stable and since the beginning of 2016 it ranges from \$ 358 to 458. In these days the evolution of the Bitcoin price is not so turbulent as it was before, which was until now the most criticized property of Bitcoin. In order to identify the volatility of the Bitcoin price we analyzed data available at Coindesk.com [11]

b. Relative anonymity of Bitcoin accounts and their illegal use – the anonymity of Bitcoin transactions appears to be one of the benefits of using Bitcoin, but this may not always be the case. There are suspicions that the relative anonymity of Bitcoin accounts and anonymity of the entire transactions encourage an illegal use and assist in an illegal criminal activity. Because of its properties Bitcoin may be potentially attractive to finance illegal activities, such as drug trading, weapons trading, support of terrorism, etc. This is often an argument for a negative attitude towards Bitcoin on the part of governments and banks. From the nature of Bitcoin transactions benefited also an online market for illegal goods called Silk Road, which is not functioning any more. It was a huge black market, where it was possible to find drugs, guns, to order contracts for killing, to hire hackers, etc. For the purchase of these goods and services virtual currency Bitcoin was used because it enabled the buyers and sellers to remain anonymous. "Silk Road is a part of the deep web (it is also called "the dark net") – a part of the Internet, which is unreachable using usual Internet technologies. The deep web is in fact separated from the so-called "web surface" and common web browsers are unable to make them available. To enter this side of the web special software is needed as Tor (The Onion Router). It is a system designed for anonymous web browsing. Therefore, it was very complicated to trace its users. It was not possible to obtain their IP addresses and to locate their computers based on their MAC addresses. Annual turnover of Silk Road was approximately 9.5 million Bitcoins and there were just over one million registered users. Every day, there took place over a thousand different transactions with an average purchasing

value of \$ 976. "[12] Silk Road is already broken, but there are other versions of it on the deep web.

c. Distrust in the Bitcoin financial system and its non-acceptance – the acceptance of Bitcoin as a means of payment and the confidence of people in it belong without a doubt to the biggest disadvantages of its use. Without the acceptance of Bitcoin as an official and legal means of payment at the side of individual governments or states it is not possible to expect that its acceptance at the side of companies will rise. "The current lack of confidence in the new virtual currency also stems from the unclear objectives of its creation. Many authors consider the use of an electronic payment system as a deliberate means to damage the traditional way of money emission by central banks or other financial institutions. Bitcoin is also perceived as an attempt to destroy the state's ability to gather taxes and as a mean to monitor the financial transactions of citizens. "[5] One of the biggest opponents of the Bitcoin platform are banks. It is quite understandable, since the more accepted Bitcoin is, the more the conventional payment systems are jeopardized. Many central banks already published their official statements on the use of Bitcoin as a currency. Within these statements they noted that the investments in Bitcoin are risky and they do not underlie to the regulation and supervision of some central authority. Because of this, there is no protection of the Bitcoin owners against a theft, stock market crash, and so on. The number of traders accepting Bitcoin gradually grows and it grows also the number of transactions that are made through the Bitcoin network. The acceptance of Bitcoin at the side of large companies (for example EBay, PayPal, Amazon) will probably have a great impact on the speed and way in which Bitcoin will be able to append conventional payment methods.

d. Security and protection against theft and improper transfers - safety is one of the properties of Bitcoin, which is seen as an advantage as well as a disadvantage. On the one hand the security of the transaction mechanism itself is high, but on the other hand the problem lies in lack of knowledge about the principles of data security of the end users (i.e. the members of the Bitcoin network). People do not have the proper safety habits while using their computer, and therefore using Bitcoins is a big security risk. Because of this it is very important to follow certain precautions. The private key that belongs to a specific Bitcoin address, with which a certain user can manipulate with his Bitcoins, must be kept secret. It is also necessary to choose a password to the digital wallet that is strong enough. Exceedingly, the loss the password or the entire digital wallet purse is a very high risk. The password should include a combination of uppercase and lowercase letters, numbers and other characters (such as: ., !, ., ,, ?, ", /, etc.) and it should have a sufficient length. The proper password length is usually considered to be between 8 and 15 characters. The more complex the password is, the more difficult for hackers it is to detect it. Under no circumstances should the password contain whole words, because such passwords tend to be most easily detected. To lose Bitcoins is also possible through realizing an improper transfer operation, when the user sends his Bitcoins to a wrong recipient. If a user sends his Bitcoins to a recipient, then at the time when the transaction has been submitted and confirmed by the network, the entire amount of Bitcoins is gone and it is not possible to cancel the transaction. The sender is no longer an owner of these Bitcoins and their ownership is transferred to the recipient. As mentioned earlier, there is no institution to protect the Bitcoin users against any loss of Bitcoins.

Conclusion

The execution of business transactions using virtual currencies is a relatively new option and many people do not realize the benefits and the risks that are associated with such payments. Therefore, the purpose of this article was to identify and characterize all benefits

and drawbacks of using virtual currency Bitcoin in detail, which is among all virtual currencies the oldest, best known and most widely used. Based on thorough analysis, synthesis and classification of the existing evidence, we have created a detailed list of benefits and risks, which can serve as an initial material for making decisions about the use of this currency to undertake genuine financial transactions.

Abstract

Virtual currencies have existed only since 2009, when the first virtual currency Bitcoin was created. Therefore, many people are not familiar with advantages and disadvantages of its use. Also in literature these advantages and disadvantages are described only briefly. The aim of this article is to create a complete list of the benefits and drawbacks of Bitcoin with detailed descriptions. This list should fill the gap and inconsistency in literature and it should also represent a valuable support material for the decision-making about the suitability of Bitcoin use for business purposes.

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CLLOUD COMPUTING – MEANING AND TRENDS

Alžbeta Kanaliková

Summary

Cloud computing technology has already passed its beginning stages, many industries have already realized the benefits it provides, and have already started adopting and integrating the technology to their businesses.

The article dedicated to the field of cloud computing cloud computing, his meaning for the industry, the economy and companies. The first part of the article describes the general types of cloud computing, models, architectures, features and applications and security of cloud computing. The second part of the article deals with trends in cloud computing, describes of the prediction and the developments in security cloud computing.

Keywords:

Cloud computing, computing technology, open learning, meaning of cloud computing, security of cloud computing, feature and trends cloud computing.

Introduction – trends of technologies nowadays

Nowadays technologies focus on network connection and services of network. Services of internet network are big increase, creating a platform for the interconnection electronic devices, artificially intelligence is used. Society Gartner divides the new technologies into 3 groups: [1]:

1. Digital Mesh:

- The device mesh - brings together traditional desktop-centered computing, mobile computing, the IoT and cloud computing.
- Ambient user experience - people have access to their own personal cloud of services dynamically provided through intelligent-agent-based interfaces.
- 3D-printing materials - advances in 3D-printing materials are creating opportunities for 3D-printed items.

2. Smart Machines:

- Information of everything - big amount of data from systems, IoT and cloud create an overload. This situation must be addressed with analytical methods which are integrated into applications and business processes.
- Advanced machine learning - machine learning enables computers to act without being explicitly programmed.
- Autonomous agents and things - autonomous and semiautonomous agents and things, including robots, autonomous vehicles, smart vision systems, virtual customer assistants, smart agents and natural-language processing, this is opportunity integrate these technologies in various business and manufacturing processes.

3. New IT reality:

- Adaptive security architecture - security must start with application design, contextual analysis and machine-learning algorithms will deliver real-time monitoring and active protection for internal systems.
- Advanced system architecture - advanced system architecture which to support parallel processing — will help ignite the growth of smart machines.
- Mesh app and service architecture - cloud computing principles and adaptive, layered applications provide the foundation for the digital mesh. Software-defined approaches, the creation of microservices with rich, layered APIs and delivery of services using OS containers provide greater deployment flexibility to support the dynamic nature of the digital mesh.
- IoT architecture and platforms - IoT platform enables enterprises to monitor and control IoT endpoints and build applications to meet digital business requirements.

Cloud computing is an important service in the new trends technology. Cloud computing is used in combination with other technology services, for example IoT platform.

1. Cloud computing

According to NIST [2] cloud computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services).

Cloud computing is a distributed computing format for its resources to a wide range of users to scale, virtualization hardware and / or software infrastructure over the Internet. Cloud consists of a set of technologies that are offered in the form of customer service. For example, storage, processing power using a hardware / software distributed virtualized network.

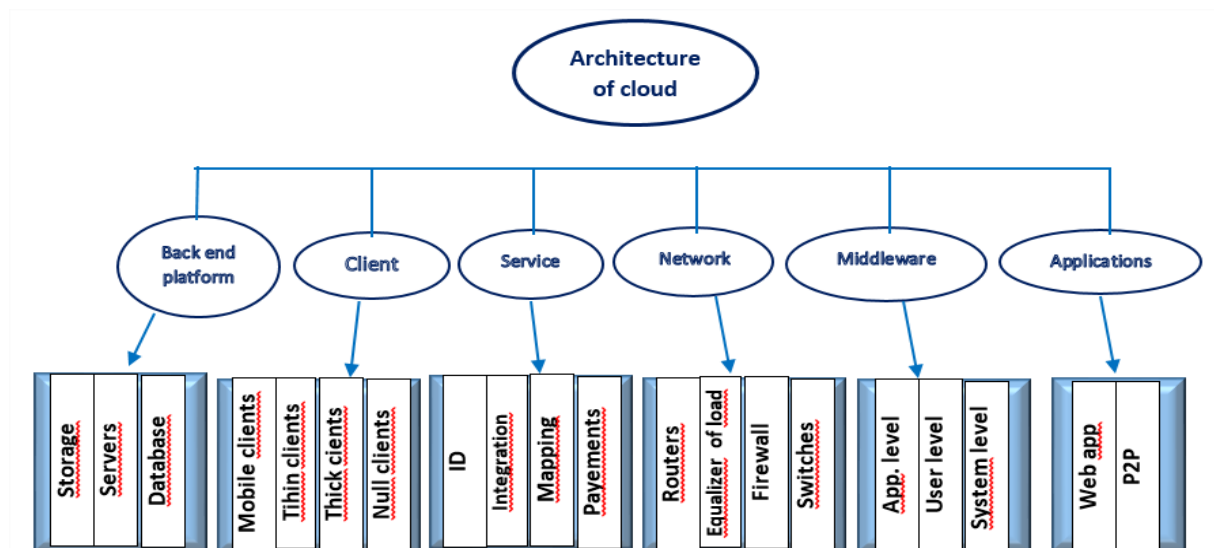
The main advantages of cloud computing are self-service on request, ubiquitous network access, resource pooling regardless of location and the transfer of risk. Cloud has low operating costs, simple management, service quality, reliability, no major investments in infrastructure, better adaptation and better scalability and management (congestion management demand).

According to the NIST cloud model is composed of five essential characteristics:

- **Self-service on-demand service** - Self-service means that customers can execute all necessary steps to execute the required services.
- **Broad network access** - access to technology is enabled over the network using various client platforms (laptops, work station, mobile, thin client, etc.).
- **Division resources** - resources provider of cloud services are divided between some users. This concept is a fundamental prerequisite scalability in the cloud.
- **Flexibility** - This is a property through which changes scalability - add or remove capacity, processing power and memory.
- **Services measurement** - indicates that the resources used are monitored, controlled and reported to the user.

1.1 Architecture of cloud computing

Architecture of cloud computing solutions is the structure of the system, which typically includes resources Cloud (back-end platform, server, storage), services, network, middleware and software components, the visible features on the outside and relationships between them. [3]



Picture 1 Components of architecture cloud computing

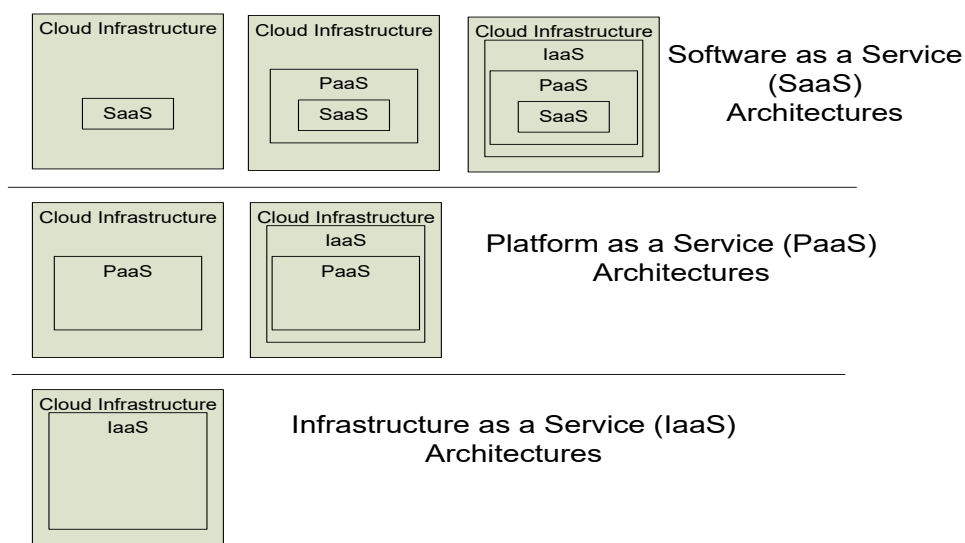
- **Back end platform** - They are large servers that can maintain great amounts of data and can be located anywhere in the world.
- **Cloud users** - cloud users can access by clients to cloud resources, including thick client, thin clients, zero clients, tablets, mobile devices. These client platforms cooperate with the cloud data storage via the application (middleware) through a Web browser or virtual connection.
- **Network** – use of cloud computing services with firms it means that the server and server management tasks exchanged for networks and network management. Therefore many of requirements are for the network.
- **Middleware** - middleware is software that creates a connection between any two clients. Cloud middleware provides users several functionalities that help them in the development of business applications.

- **Services** -cloud services are services that support solutions based on the cloud such as identity management, integration of service-service mapping, billing / payments search etc.
- **Cloud applications** - cloud applications (Cloud App) is an application program that runs in the cloud, with some characteristics of desktop applications and web application features.

1.2 Model services and model deployment

Model services:

The models are available cloud services to clients. In accordance with the NIST, there are three service models: SaaS (Software as a Service), PaaS (Platform as a Service) and IaaS (Infrastructure as a Service), in picture 2.



Picture 2 Services architecture of cloud computing [4]

SaaS (Software as a Service) - it is a software distribution model in which applications are hosted by the actual vendor or service provider. They are available to customers over a network, typically via the Internet. The advantages of SaaS are: cost savings, flexibility, stability, instant deployment, availability, new updates.

PaaS (Platform as a Service) - provides a platform and environment to allow developers to create applications and services through Internet. PaaS services are hosted in the cloud and accessible via a web browser. Customers can rent virtualized servers and related services for the use of custom applications. Examples of resources contained in PaaS: operating system, scripting environment for servers, system for database management, server software, support, data repository, network access, tools for design and development etc.

IaaS (Infrastructure as a Service) – it is the delivery model in which the leased resources constitute operating systems, security, networking, storage and servers for the development of applications, services and the deployment of development tools, databases, etc. The service provider's have equipment and is responsible for the hosting, operation and management. The client pays based on usage. The advantages of IaaS are: quick and easy access to business solutions, scalability, simplicity, no investment in hardware, independence on the location, the physical security of the data center location etc.

Model deployment:

They usually use four cloud deployment models: private, public, hybrid and community cloud.

Private cloud - is created and managed within a single organization. Organizations use software that enables cloud functionality, for example, VMware.

Public cloud - consists of computing resources which provider provides. The most popular public clouds include Amazon Web Services, Google AppEngine and Microsoft Azure.

Hybrid cloud - is a combination of computing resources provided with private and public clouds.

Community cloud - resources shared across multiple organizations but also from other providers.

2 Meaning of cloud computing

Cloud computing can support any application. However, some tasks are better suited for deployment in the cloud of organizational or technical view. For example:

Managing Big Data - cloud computing is perfect for processing of big data analytics, as the elastic computing capacity and provide performance on demand makes analysis available for multiple teams within the organization.

Tasks, where is required amount of calculations - cloud computing allows you to carry out calculations more efficiently by centralizing data storage.

Development and testing in the cloud - development teams will use the flexibility of the creation of virtual machines in minutes. Cloud computing does not require organization to open new development environment. In addition, an organization can get applications to the production environment quickly and configure them as needed.

Other relevant possibilities use of the cloud: file storage and sharing, backup and recovery after accidents, CRM system, ERP system, hosting websites etc. Cloud computing is and will be a great use, especially for business applications in management.

Cloud solution haves for business management the following advantages [5]:

- **Low overhead** - upgrades, maintenance and system administration take place in the cloud and are managed by the vendor.
- **Ease of access at anytime, and from anywhere**
- **High availability** - cloud software architectures are designed from the ground up for maximum network performance.
- **Security** - security a cloud-based solution is often higher than the customer company without cloud solutions.
- **Fast deployment** -for example, the deployment and implementation of ERP, CRM and e-commerce system is much faster than in the company.
- **Optimized performance** - cloud adjusts performance needs, dynamically assigning server cycles.
- **Subscription-based pricing** - subscription option for cloud services.
- **Energy savings** - cloud computing reduces electric consumption, for example for servers etc.
- **Scalability** - users have access to large amount of resources that scale to their needs.
- **The current software** - cloud provider is able to update the software at maintaining feedback on previous versions of the software.
- **Reducing the risk** - organizations can use iCloud to test ideas and new concepts before they would have invested heavily in technology.

The market in cloud computing are three major providers *Google, Microsoft and AWS (Amazon web services)*. [6]

According to the model of cloud computing can list examples of the following providers:

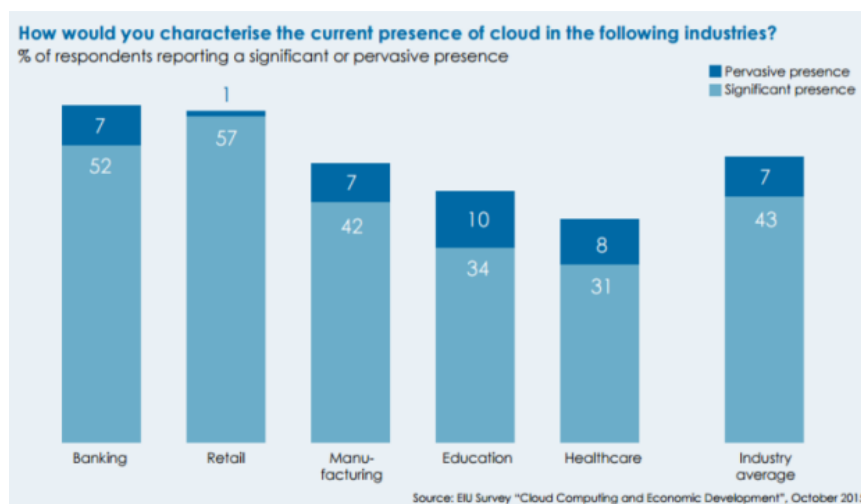
- **SaaS (Software and service)** - *Google Apps* provides web office tools like e-mail, calendar and documents, *Salesforce.com* provides full CRM (Customer Relationship Management) applications, *Zoho.com* provides a large set of web-based applications, mostly for company purposes.
- **PaaS (Platform as a service)** - *Google App Engine* provides users with a complete developer stack and allows them to make their applications run on Google infrastructure, *Akamai EdgePlatform* provides a large distributed computing platform for deploying their own web applications. They orientation on analysis and monitoring, *Microsoft Azure* provides the computing power and data storage services, *Yahoo! Open Strategy (Y! OS)* provides users with the means to develop Web applications based on existing Yahoo!
- **IaaS (infrastructure as a service)** - *Amazon Elastic Compute Cloud (EC2)* provides users with special virtual machine (AMI), which can be deployed and running on EC2 infrastructure, *Amazon Simple Storage Solution (S3)* provides users with access to dynamically scalable storage, *Microsoft Live Mesh* gives users access to the distributed file system focused on individual use, *IBM Computing on Demand (CoD)* provides access to configurable server and as an added service data storage.

The cloud offers more ways for digital marketers and potential customers to interact.

Cloud computing is still a fairly new concept, so marketers are advised to learn as much as possible about it to stay ahead of the competition. Companies can make the most of the cloud by using it to fill gaps in the organization and to provide a more personalized, robust customer experience.

2. Trends of cloud computing

Today, cloud computing is changing the entire IT world because they are created large data centers and develops software for the cloud. Tens of thousands of companies of all sizes in a broad range of industries are utilizing cloud-based software, platforms, and even infrastructure to streamline processes, lower IT complexity, gain better visibility, and reduce costs. [7]



Picture 3 Industry and growth of cloud computing [8]

The Economist Intelligence Unit, sponsored by VMware, asked a panel of 360 senior executives and thought leaders their views on the future of cloud computing. These

respondents were equally representative of five key industries—financial services, retailing, healthcare, education and manufacturing—that are being impacted by cloud. [8]. Cloud computing and its services are also growing in each of industries mentioned, in the picture 3.

Trends in the adoption of cloud computing in the abovementioned areas of the economy, according to experts, as follows:

In banking - In banking is two trends adoption cloud computing: back office and selected customer operations by traditional banking institutions and second trend is trend of bank to be successful on market through services of banking implemented in the cloud.

In Retail – Experts predict, that cloud computing grow five-fold in retail. Cloud computing technology used to increase access, lower prices and reducing costs for the customer.

In Education – Education have somewhat slower adoption cloud computing. Expert predicts over 3-5 years increase the use of cloud computing.

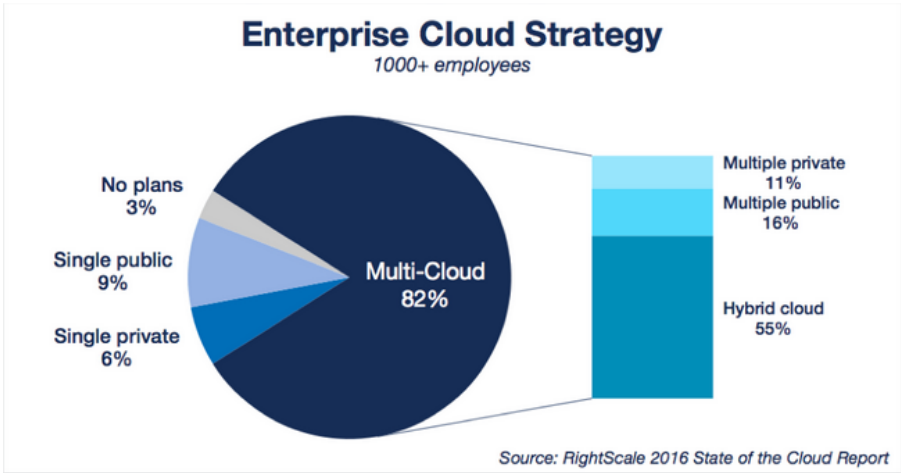
In healthcare – In healthcare specifically, cloud is geared to support remote diagnostics and treatment. Cloud computing in healthcare supports storage of extensive data, medical records and information of preventive care.

In manufacturing - The use of cloud computing technologies into production is more demanding than in banking or retail. In manufacture, embedding cloud into a factory requires the design of new sensors, ensuring common standards across machines, communications protocols and a host of other “cyber-physical” challenges to be met. Experts expect the cloud penetration to manufacturing within three years also despite the higher complexity.

Another survey in the cloud computing trend **realized by RightScale** (Company *RightScale* is a SaaS-based cloud computing management solution for managing cloud infrastructure across multiple IaaS providers.). The survey involved by technical personnel managers and experts representing various companies across various industries. These professionals have in their companies experience with cloud solution. Their answers provide a comprehensive perspective on the state of the cloud today. [9]

The results are as follows:

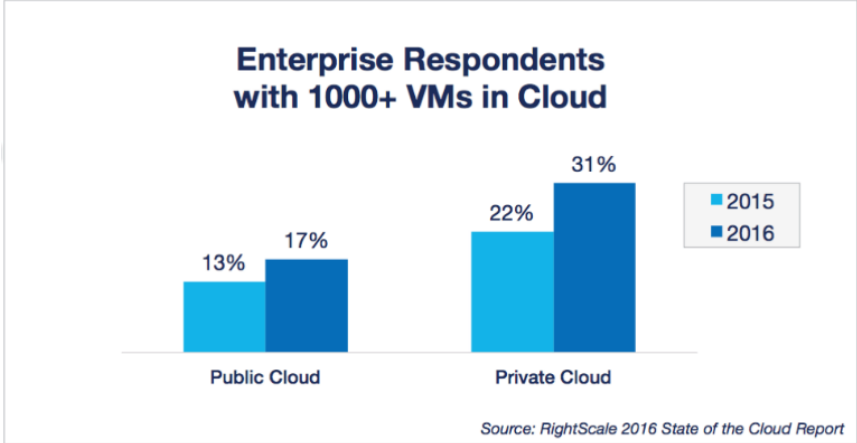
- Enterprises want a multi-cloud strategy (picture 4)



Picture 4 Enterprise cloud Strategy [9]

Enterprises have a hybrid cloud strategy, 82% of respondents. Private cloud adoption increased from 63 percent to 77 percent, 95 percent of organizations surveyed are now running applications or experimenting with infrastructure-as-a-service.

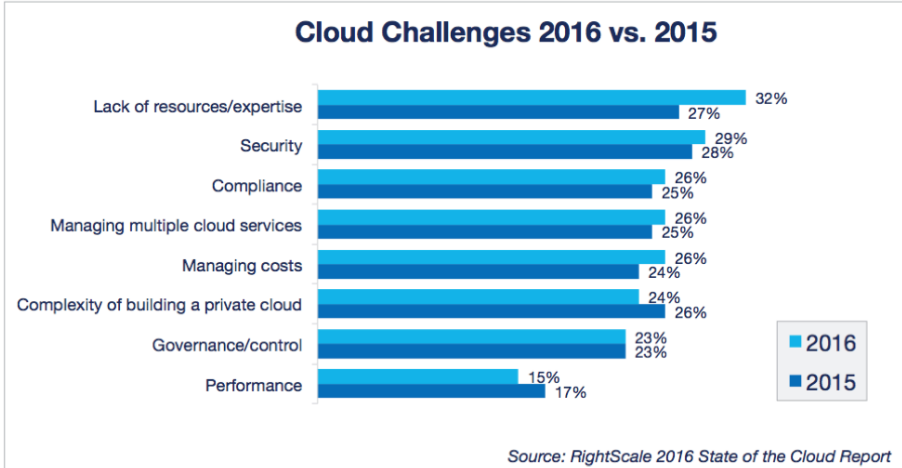
- More Enterprise Workloads Shift to Cloud, Especially Private Cloud



Picture 5 Enterprise cloud shift to cloud [9]

Private cloud showed even stronger growth with 31 percent of enterprises running more than 1,000 VMs, up from 22 percent in 2014 and 17 percent of enterprises now have more than 1,000 VMs in public cloud.

- Security is no longer the top cloud challenge
 Picture 6 are displayed changes in priorities properties of cloud in implemented cloud computing in enterprise. Lack of resources/expertise is now the #1 cloud challenge and security is no longer the top change.



Picture 6 Cloud challenges [9]

3. Security of cloud computing

Cloud computing presents several risks associated with data protection of customers and providers. In some cases for customer may be is difficult to effectively control the way in

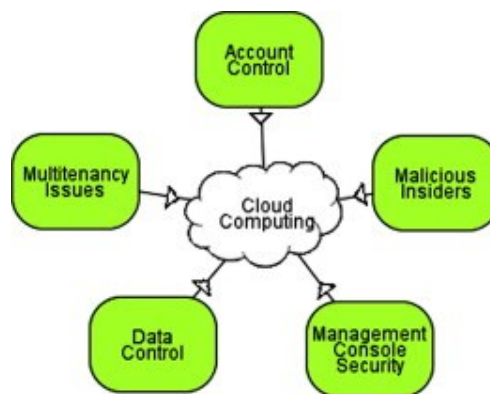
which the provider of cloud (as a data manager) handles the data and to be sure that the data is handled legally.

Customers when considering a move to cloud computing must have a clear understanding of potential security benefits and risks associated with cloud computing, and set realistic expectations with their cloud provider. The customer and provider of cloud computing conclude agreement which has appropriate provisions about security and security of privacy. The agreement must help maintain legal protections for the privacy of data stored and processed on the provider's systems.

There are a number of security risks associated with cloud computing that must be adequately addressed: [10] loss of governance, responsibility ambiguity - responsibility over aspects of security may be split between the provider and the customer, authentication and authorization, isolation failure, compliance and legal risks – for example compliance with industry standards or regulatory requirements, the customer must check that the cloud provider has appropriate certifications in place, handling of security incidents, management interface vulnerability –interfaces to manage public cloud resources (such as self-provisioning), application protection, data protection, malicious behavior of insiders - damage caused by the malicious actions of people working within an organization, service unavailability - this could be caused by hardware, software or communication network failures, etc.

On the other side cloud computing does not only create new security risks: also provides opportunities to provision improved security services that are better than in many organizations. Cloud computing should ensure through its technology following threats: [11]

- Account control
- Multi-tenancy issues
- Data control
- Malicious insiders
- Management console security



Picture 7 Cloud security threats [11]

Security in the cloud depends on the cloud service model. Each cloud service model comprises its own inherent security flaws; however, they also share some challenges that affect all of them. Regardless of services and deployment model are three major mechanisms which are essential: network, data and application security. [12]

Network security and major cloud network security mechanism:

- network access controls,
- perimeters firewall controls,
- access control lists,
- content inspection and control,
- DDOS protection/migration - the distributed denial of service attack.

Data security:

- avoid storing sensitive information in the cloud,
- review the contract agreement,
- use strong passwords,
- use encrypted cloud services.

Application security - developing applications for cloud environment is different than the traditional hosting environments in the following areas:

- Control over physical security is substantially reduced in public cloud scenarios,
- Potential incompatibility applications between providers when services are migrated from one provider to another,
- Protection of data through the lifecycle must be considered. This includes transit processing and storage,
- the combinations of web services in the cloud environment can potentially cause security vulnerabilities to be present,
- Fail - over for data and data security in the cloud has to be more detailed and layered than traditional environments,
- Assuring compliance with relevant industry and government regulations is typically more difficult within a cloud environment.

Conclusion

Cloud computing is the emerging and rapidly evolving model which regularly creates new possibilities and uses. Cloud computing affects the deployment and use of technology, is changing way in which many organizations manage their information technology.

For companies and enterprises of different industrial sectors cloud computing brings new opportunity and advantages that a company or enterprise alone can't provide. One of the main concerns are security and privacy. These concerns are dependent on the type of companies. For large companies with considerable resources that can reserved for sophisticated information security program must be overcome many challenges in security, privacy and cooperation. For small and medium-sized enterprises (SME - SMB - MSP), the security of cloud computing look attractive compared with the resources that companies can in today time afford to spend on information security.

Resource

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USE OF IT FOR ADAPTING MIGRANTS

Kultan J., Kuprina, T.V.

Abstract

The article is devoted to actual problems of educational migration flows both in real and virtual environments. The article discusses the positive and negative experience with virtual platforms. Particular attention is paid to cultural and cognitive characteristics of the students belonging to the Generation Z, which requires the creation of entirely different instruments for implementing the educational process. The authors propose the method of creation, management and evaluation of feedback in the process of virtual educational migration using the latest IT- technologies that are used to create ultra-fast feedback and allow bringing new technologies into the learning process.

These results confirm the possibility of the new method of providing feedback, allowing to improve the training quality of students, who are members of the educational migration flows. However, the use of IT- technologies is not a sufficient factor in improving

the quality of education and the level of progress achieved by the trainees, but it can be a good helper in the course of examination, automation of selected methods of control, more individualized approach to learning.

Key words:

education, educational migration, modeling, virtual technologies, feedback, economic feasibility, incentive effect, Generation Z, cultural and cognitive characteristics, highly skilled migration

Introduction

In today's globalized world international migration flows are becoming increasingly important being a complex and multidimensional phenomenon. They have many characteristics and different directions, one of which is educational migration related to the internationalization of education and the demand for highly qualified personnel. In fact, educational migration is a global intellectual capital both for a distinct society and countries' associations as a whole.

Such interest and competition among the developed countries are due to shortages of highly skilled labor resources. According to experts, at the beginning of the XXI century the lack of specialists in such fields, as IT-technologies, was as follows: in the United States - 850 thousand people, in Europe - 2 million people. The high demand persists in such industries as aerospace, aviation technology, health, education. It is noted that the problem can not be solved only through the expansion of domestic resources implementing new educational trends and retraining. Thus, due to the expansion of educational migration flows one can get a number of benefits from the dissemination of knowledge and satisfaction the demand for highly qualified specialists in the most advanced and fastest growing sectors of the economy.

Effective educational migration can be one of the mechanisms to solve existing problems, as its economic, political and social benefits are quite obvious. As a result, exports of education allows a country:

- sell educational services on the international market;
- cut costs on primary and secondary education of future foreign entrants;
- use financial investments of foreign students for the learning process in the interests of local businesses, services and local budgets;
- improve the gender and age structure of the population by attracting young people of reproductive age;
- obtain new citizens, entering the Russian society by the most profitable way – through the educational system, taking into account that in the course of their studies, they are integrated into the receiving society [1].

In general, educational migrants are a quite promising object for research. They have a high communicative resource and are more attractive to the host community than other migrants because they can have a positive impact on the development of the region or country. Consequently, the economic, social and political benefits of educational migration can and should be the basis for making the development of educational migration an important part of migration policy [3].

Success in the field of educational migration depends on concerted decisions and actions not only at the level of university management, but also at the level of regional and federal immigration policy. As a result, in the current socio-demographic situation,

international education migration can be regarded as a significant resource of required highly skilled migration in general. At the same time, it should take into account the peculiarities of today's younger generation, which is significantly different from previous generations. They are often called Generation Z (Digital Native) who was born between the early 1990s and the middle 2000s. The common features of Generation Z is the fact that they are "connected" to each other due to such things as the Internet, YouTube, mobile phones, SMS, MP3- players, handheld devices such as PSP.

Researches have shown that the training pays off precisely when using the most suitable for a person ways of presentation. So, D. Kolb concluded that people often study by using one of the following learning methods: 1. Specific practice: real experience enables a person to understand and feel what he/she has to do. 2. Reflection: involves the analysis of their own and others' experiences. 3. Designing a model: the creation of a theory that gives meaning to the observed phenomena. 4. Method of trials and errors: people tend to try different options, actively experimenting with new approaches [4].

In fact, taking into account the specificity of the cultural-cognitive profile of students and, as a consequence, the nature of their educational activity will meet the expectations of students and make the learning process more effective. [5]

Thus, firstly, educational migration is a source of highly skilled labor forces and improving the quality of human capital. Secondly, there is a need of changing the approaches to teaching, as traditional "passive" approaches, based solely on memorizing and reproducing the material under study, can no longer fully meet the psychological type of students. In life of Generation Z there are many virtual gaming moments. Consequently, it is more and more necessary to introduce interactive technologies into the teaching process.

I. Educational migration: real vs. virtual

At present, the competition of countries - exporters of education is entering a new round, there are new players and in the coming decade it is quite likely an educational division of the world. By 2025, the total number of students in the world will increase from 97 to 260 million people. According to the forecast of UNESCO, at that time there will be 5-7 million foreign students. Two-thirds of them will come from Asia. India and China will be leaders in the supply of students; therefore, the fight will precisely unfold for these regions [6].

UNESCO defines the category of foreign students (education migrants) as the persons admitted to undergo a specific program of study at institutions of higher education in the country where they do not have citizenship. This migration is classified as temporary, limited by the time required to pass the course. These migrants usually receive special student (not immigrant) visas, which often provide the right of entry with the accompanying family members, and limited employment opportunities [6].

In training of their citizens abroad there are interested both donors and host countries, which often assume part organizing training costs. On a personal level, in getting education abroad are greatly interested students and graduate students, as evidenced by the increase in their numbers, even when training at their own expense.

Experts predict that competition for international students as the most desirable category of migration will escalate. Overall, the world market of educational services is estimated at 50-60 billion dollars. Particularly active in attracting students are economically developed countries (United Kingdom, Germany, USA, France, Switzerland, and others.). In particular, the US State Department over the years has allocated substantial funds for the implementation of programs on development of student exchanges and attraction of foreign students and lecturers for study and internships in the United States.

Moreover, small countries without diversifying education systems often have a higher mobility of students and graduate students who after graduation plan to stay and work in leading foreign research centers.

In order to attract foreign specialists, the return incentive and motivation going abroad compatriots, countries use a variety of complex measures [6]:

1. Implementation of special programs to encourage the inflow of certain professionals categories.
2. Simplification of the procedure and conditions of employment for highly qualified specialists.
3. Provision of international students with the opportunity to work on their territory during the training and continue working afterwards.
4. Creation of a special infrastructure. Taking into account the wide spread of English, foreign language countries provide courses in English. Considerable resources are invested in social and living conditions – the libraries, equipment campuses, transportation infrastructure.
5. Conclusion of agreements between countries and universities, the establishment of foreign branches contributes to the export of educational services. For example, American universities are opening their branches in Europe and Asia, which thus gain access to the American education in their own countries. In turn, American universities are expanding the number of students of whom they will be able to select the best candidates for further training and even work in the United States. Russian higher schools also have such experiences (branches of Moscow State University, Peoples' Friendship University, et al. in the CIS countries).
6. Stimulation of the training and subsequent return to the homeland is done in order to protect the interests of donor countries. For example, China conduct a support of training abroad, encourage return, freedom of entry and exit, which corresponds to the policy of openness and international cooperation of China with other countries in the field of education.
7. Implementation of policies to facilitate the return of highly skilled migrants and the interest of foreign specialists to continue working abroad. For example, there is a developing infrastructure for the innovative business sector of research and development activities, provided financial support.

In general, at the moment, despite the tightening of the rules of entry and stay on the territory of foreign states, migration policy in many countries are increasingly focused on attracting highly skilled professionals, graduate students, providing them with a number of privileges and preferences.

Absolutely new direction of training and attracting foreign specialists and students are massive open online courses (MOOC). In this regard, one can speak of a so-called virtual educational migration. Education not only changes the distribution channel, but also the high-quality format by digital channels of learning, such as gamification, simulators, virtual reality 3D. Virtual education is also considered as one of the variants of the selection of talented students for future job offers [19].

Virtual technologies allow creating flexible individual training scenarios tailored to the rate of assimilation of each student. Moreover, with the help of web cameras one can monitor non-verbal communication, and using smart phone or "smart" watch - even a change in the physical state of a student. It allows keeping a track of the time losing focus, adapting and optimizing the flow of information [7].

At the same time, experts have warned of a possible change of control over education to several leading universities, mainly Anglo-Saxon, which are able to select the best specialists around the world. MOOC is electronic learning courses, including video lectures with subtitles, presentations, infographics, textual lecture notes, homework, virtual labs, tests and final examinations. Unlike traditional lectures video materials are presented in 5-10

minutes fragments (corresponding to clip material perception by new generation). While training there are actively used forums for communication between students and lecturers. MOOCs are created by most of the leading universities in the world.

Thus, the world's leading universities aggressively use new technologies to increase their share of the education market. Any universities could include in their programs courses of the best lecturers in the world. In addition, the development of methods for analyzing large data turns MOOC into a unique research platform. However, there are several problems with the use of MOOC platforms. For example, it is impossible to teach virtually all specialties (e.g., the field of medicine). Due to the lack of real communication there is a loss of socialization in training. "Although perhaps for the generation of gadgets online communication skills and training will be an important part of the socialization at the growing popularity of virtual communication and remote work" [8].

Another problem is a small percentage of students who receive certificates. "For many students MOOC is not a tool for vocational education but the kind of intellectual entertainment for the expanding horizons" [8].

Besides offered educational courses for MOOC platforms, there are problems of expanding of the geographical influence and language localization. For example, Coursera has launched a project for translating their courses into other languages. Its Russian partner has become the company ABBYY Language Services, to provide a platform for the translation.

At the same time MOOC platforms are tools for cultural influence. Thus, two-thirds of Coursera students are foreigners, including Russians, who actively explore the language, culture and values of other countries and peoples.

"The theme of the struggle for cultural influence is particularly relevant for Russia, since the liberalization of education with its transition to the online sharply complicates the transition of traditional values. Moreover, MOOC fight not only for the souls and values, but also brains. It is an effective tool for the "drain" of the most successful students into the world's leading universities "[8].

Open education gives students the chance to choose individual learning paths. In addition, the platform there are used modern technologies to develop the necessary professional competences in the form of simulators, games and the like, which are more understandable and familiar to today's younger generation. There may be a blended learning (both virtual and real). ... In the future, the platform will receive additional directory of online projects for team working from the representatives of business, there will be developed mobile applications, improved teaching methods, the ability to study master degree [9].

Consequently, it is possible to determine the advantages and some problems (in the particular context they may transfer into advantages) of online learning. They include: free subject choice and schedule of their study, interactive teaching methods, adequate to cognitive abilities of today's students, the lower cost of educational services vs. lack of the personal contact with the lecturer (but it may be considered as a new kind of socialization in a virtual environment), quality equipment and Internet connection. Thus, in the modern education system there are clearly visible new trends that require new approaches and methods to preserve the competitiveness of both universities and teaching staff.

Therefore, one can speak about a cross-border higher education and internationalization of universities, i.e. education received when lecturers, students, programs, universities cross national borders. Universities are integrated, i.e. developing dynamically in order to adapt to a rapidly and continuously changing environment [10].

In addition, universities need to take into account the cultural characteristics of foreign students, whose number according to experts tends to increase.

Besides, there is a possible entry of foreign providers of education services to local markets. As for the real learning environment, Russia's approach to the commitments on

modes of supply of educational services in many ways similar to the approach taken in the United States and the European Union. On the one hand, it is characterized by removing restrictions on market access for cross-border supply and consumption abroad. On the other hand, it includes restrictions on the conditions for foreign suppliers of these services. Such an approach will neutralize concerns about the full opening of the educational sector to foreign investors.

Thus, the preventive measure is the introduction of control over the provision of educational services by foreign partners. However, for example, in connection with the opening of a branch of the University of California in Yerevan (Armenia), a large outflow of students from national universities is not observed.

On the other hand, cross-border education is often in a virtual (remote) format, which cannot influence on the content and quality of getting knowledge. Foreign lecturers are generally quite independent in carrying out the methods and content of ongoing training. Accordingly, there must be a high level of qualification requirements for foreign lecturers.

Thus, in the existing context one can talk about an innovative information and learning environment (ILE) as a system-organized set of information, technical, educational software, inextricably linked with an individual as the subject of the educational process. ILE accumulates all national cultures and on the whole it can be seen as macro environment, and in a particular way – as an immediate social environment, i.e. the microenvironment [5].

Therefore, expanding educational migration, both real and virtual, and also cognitive features of Generation Z, preferring the virtual and creative forms of work, requires designing of new educational trajectories. Particularly noteworthy are such learning technologies, in which students take an active part in the proposed activities.

II. Computer simulation of educational migration cases

One of the main components of the active adaptation model of educational migration is the formation of the educational system and its forms and, in particular, forms of post-graduate education (life-long learning). An important role in this model plays the feedback in the education process and its assessment. It is important not only from the educational point of view of the final result, but also in relation to the correction of the educational content and forms. One can assume that educational migrants have originally owned the basic skills to work with information and communication means, in particular, the modern technology of mobile telephony [12]. Therefore, it is natural and appropriate in the process of transmitting information and knowledge to use e-support and e-learning, which has a number of advantages [13]:

- relatively easy way to obtain training materials;
- flexibility in curriculum development, quick and easy update of educational training courses;
- effectiveness of communication between lecturers and students;
- geographically unlimited training, individual approach and progress in students training;
- electronic register of actions and measures in the assessment of students' knowledge;
- remote access to the lecturer;
- long-term reduction in direct and indirect costs for the organization and management of education;
- implementation of training in concrete and specific conditions in production and non-production companies.

The main disadvantages in this process are:

- labor-intensive processes of training courses preparation;
- limited practical skills;
- limited direct interaction between lecturers and students;
- access to computers connected to the Internet with the necessary data rates.

Additional features typically include:

- Self-study, in which one can use multimedia programs with educational topics stored on CD-ROM or DVD-ROM. The method base is students' exposing of the specific training schedule, and an agreed plan of studies, because training is carried out without the contact with the lecturer. The biggest advantage of this method is its flexibility. The disadvantage is the risk of non-transparency in the form of educational materials processing by students.

- Online courses via the Internet and Intranet also have a form of self-study by the university and other educational portals with a minimum requirement for the registration of the user. There can be used the methods of direct access with direct attachment of an educational portal on the Internet. One can work by the off-line method, in which students download materials from the educational website and save it in their computer. However, this kind of training need students' high motivation and strong will.

- Training with the lecturer-leader is carried out on-line, synchronously and in real time. The most suitable form is the use of videoconferencing systems, a modern information tool, that is used for video and audio connection for two or more participants, allowing to share data presented [14].

Thus, on-line education has certain advantages, but the main problem is the establishment of feedback and assessment activities on the basis of IT-technologies.

The learning process (Fig.1), objectives and ways to achieve them can be compared with certain simplifications of a technical control system. One of the main tasks of management processes is to create a proper feedback which can not only maintain the controlled system in the sustainable state but also to achieve the desired result. In the technical sphere there are developed different approaches to creating effective feedback for linear and nonlinear systems.

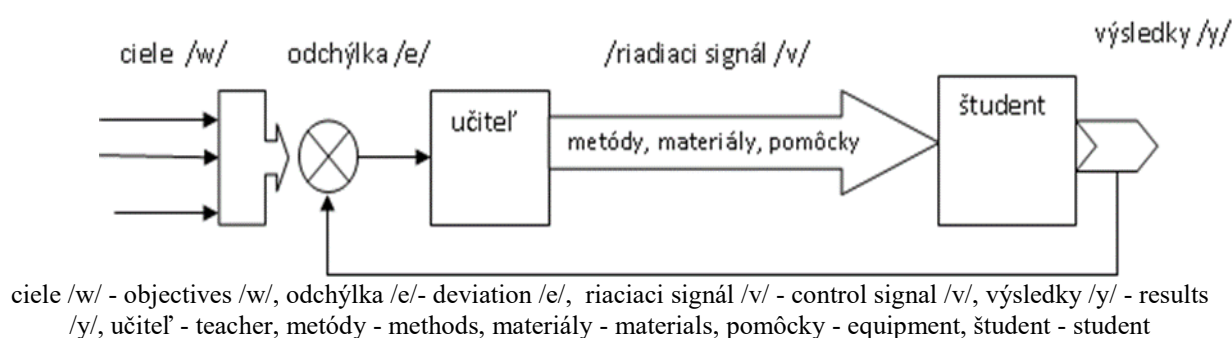


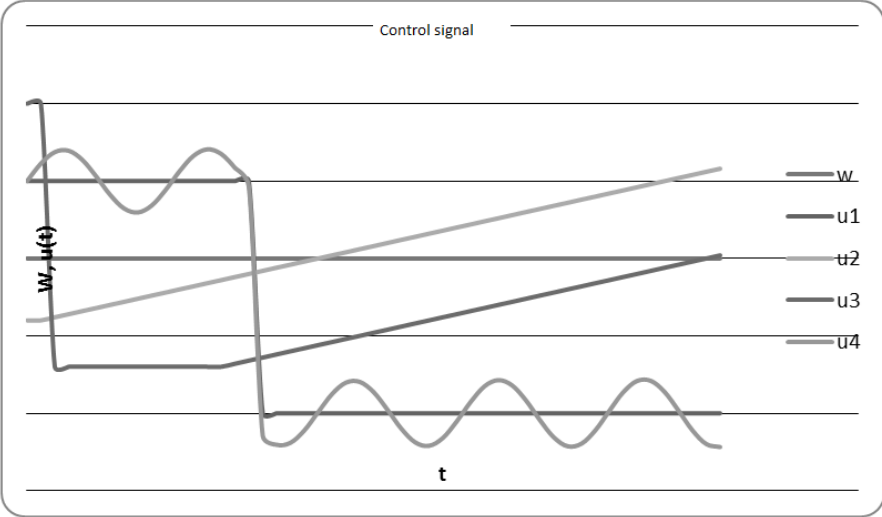
Fig. 1. Learning process in schools

The learning process is aimed at achieving certain objectives to be achieved within the given timeframe. Consequently, the learning process can be viewed as a system that has many features in common with technical systems.

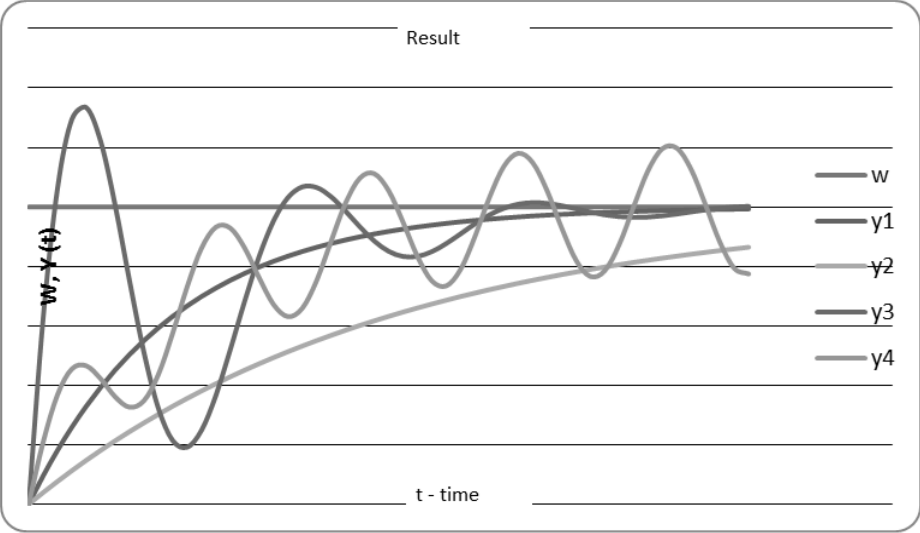
The purpose of the section is to disclose the concept of feedback in the learning process and its implementation with the use of modern information and communication technologies.

In the process of management of a machine or a person one must not only set a goal of this activity, but also to check the achievement of this goal. In case of deviations from the intended goal, one needs to change the input value to the controlled system.

In practice, there may be a few cases of the process development: the system detects a deviation, and outputs a one-time impact of moderate intensity; the system provides a short impact and a few small ones, which are summed up; the system strongly reacts to the deviation, and then gives a moderate impact and several integrating small impacts (Figure 2).



w - learning objectives, u1, ..u4 - control signals
 Fig.2. Change of control signal



w - learning objectives, y1, ..y4 - output signals
 Fig. 3. System reaction to impact signal

Depending on the system, strength, impact duration and deviation magnitude there can be achieved several results. The most significant result is a noticeable gradual tightening of the system to the desired result. The less acceptable result is the goal anievement with minor fluctuations. Typically, these variations require more energy input and / or may result in a violation of the system stability. If the impact is not enough tightening may continue for a long time and does not bring a positive result. The most unacceptable result is too much excitation of the system and the violation of its sustainability (Figure 3).

The main task of the management theory is the selection of the successful impact on the system. In technology, there are many methods of selecting the correct impact to preserve sustainability and achieve the objectives. It often happens that we reach only the first part - the sustainability and only then try to change a little the objective and achieve the modified one.

Learning management system is shown in Figure 4, where U - the lecturer; S - student; w - the object of learning; y - learning outcomes; e - deviation; v1 - the environmental impact on the lecturer; v2 - the environmental impact on the student; u1 - student's activity management.

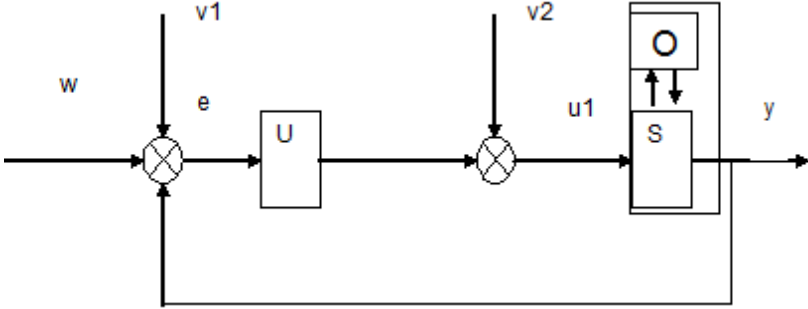


Fig. 4. Learning Management System

In comparison it is clear that the technical and educational systems are similar. The problem is only in determining the correct approach to learning. In the process of learning as a measurement of the knowledge level one can monitor both the students' reaction in the classroom and select one of the motivations, i.e. a test in order to stimulate and determine the level of their knowledge. One can spend a complex test and / or intermittently apply the whole range of test instruments and incentives [15].

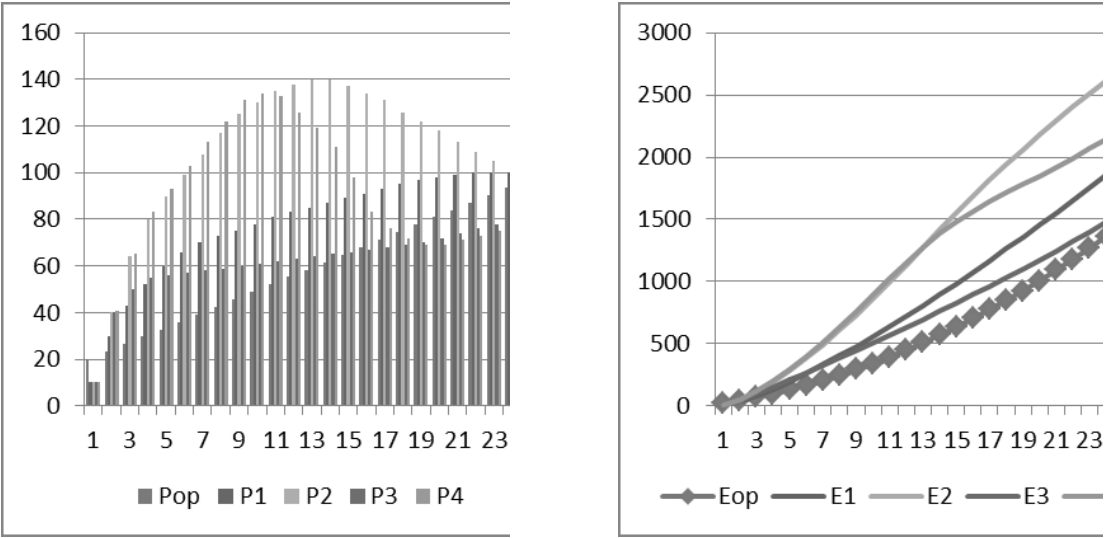


Fig. 5. Changes in expended energy E comparing to parameter P

Thus it is necessary to consider, as in the technical system, the magnitude, direction and frequency of selected stimuli. The wrong selection of these elements may have negative consequences. Too many tasks, assignments, tests, presentations, various consultations can lead to students' fatigue, sometimes even lecturers, and the disintegration of the system.

Therefore, every human activity is to be implemented with optimal labor costs. If the plane under the curve is considered as an equivalent to students' work, it is necessary to motivate them so that the costs will be minimal (Fig. 5).

So, do not set a lot of tasks, but give such assignments (Fig. 6), tests using modern tools (chat, forums, presentations, formative testing by computer systems, etc.), when the area under the curve is minimal, but students reach the desired result.

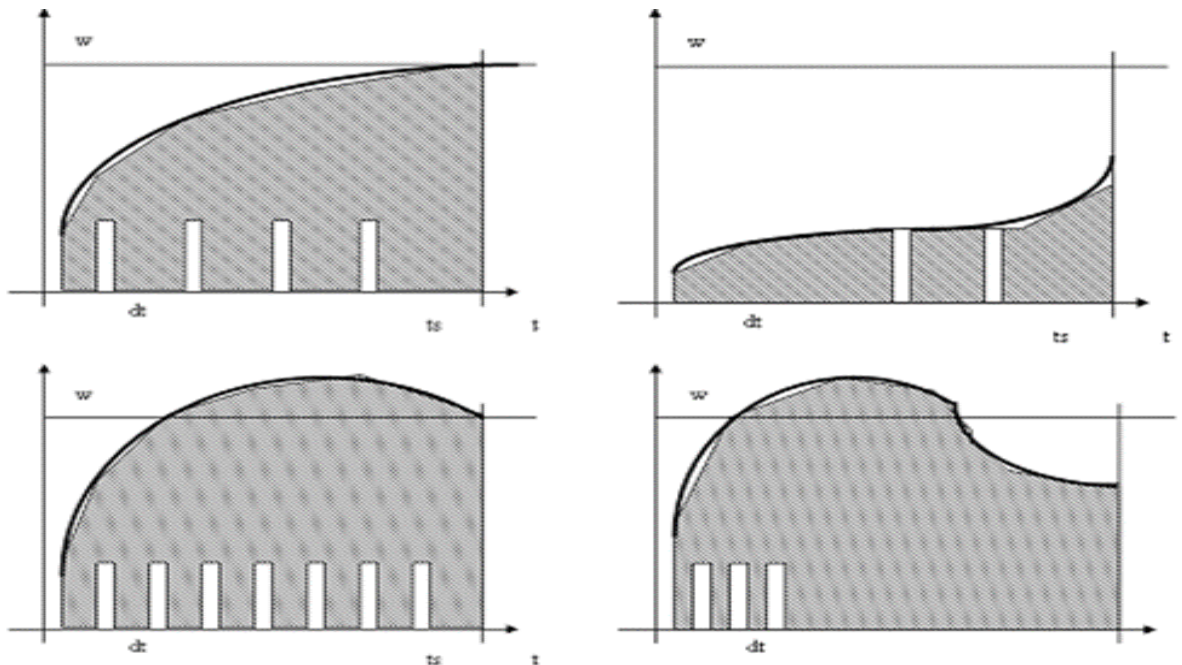


Fig 6. Selecting the number of control parameters

To determine the number and range of separate elements it is necessary to determine the improvement in students' results depending on the use of a stimulating element. For the calculation of the impact of the given element on the final result one can apply the following equation:

$$P_i = \sum_j^n p_{i,j}, \text{ or } P_i = \text{mod}(p_{i,j}),$$

i – element coefficient

j – student

n – number of students

P – element - impact test parameter to change the result of learning

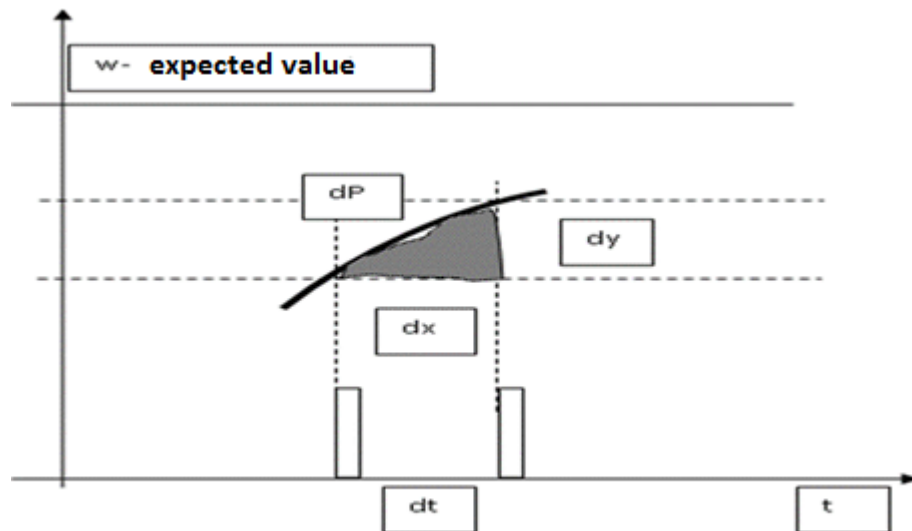


Fig. 7 Increase knowledge of the control element

After selecting the values of P (Fig.7) one can select so many stimulating elements and in such an amount to achieve the set objectives cost-effectively.

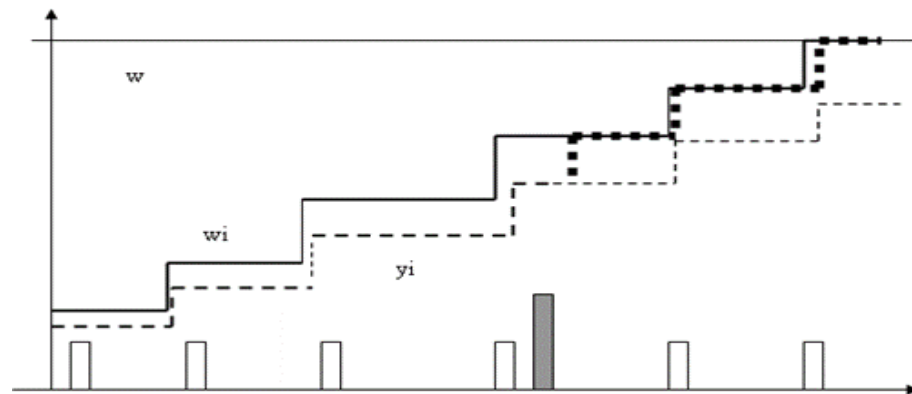
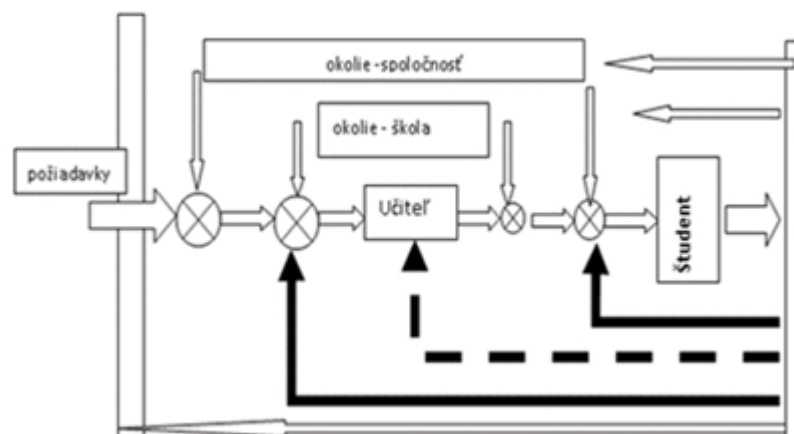


Fig.8 Creating a set of drivers

Currently, to achieve very fast and efficiently the desired result, it is necessary to break the process into several smaller processes. Then to add a stimulus (Fig.8). In the case of partial failure of achieving objectives, it is necessary to add another stimulus. Application of some ideas of control engineering systems theory can reduce the time to prove that work. For example, the position of the plane minimum under the control curve has already been proved, so lecturers only need to determine the increment used for each element of feedback.

As for solving the problem there must be more research, then for the implementation it is necessary to unite lecturers from many countries using modern technologies that can be GRID and CLOUD technologies, where are test systems, working forums, students chats, discussed the results of experiments , educational materials, etc.

Use of IT-technologies in teaching not only facilitates the work of lecturers, but also has an impact on the learning process. The ability to quickly find the necessary information, the possibility of rapid communication between the participants of the educational process can lead to a change in the learning process. The ability to implement multiple types of feedback (Fig.9) can also lead to changes in the learning process and delivering lectures.



požiadavky – requirements, okolie – spoločnosť – surroundings – society, okolie – škola – surroundings – school, učiteľ – teacher, študent – student

Fig. 9 Many Layered feedback

It is a new methodology with using IT-technologies to explain the new educational material, promoting the audience's motivation, which is especially important with increasing enthusiasm of young people with new technologies and their capabilities, without which they cannot imagine their existence. With the help of these technologies, they are communicating with their friends, use them for payments, listening to music, provide information about where they are, create their own nets of friends, etc.

The role of feedback is to provide information on the knowledge level and understanding of new material directly in the learning process. At the moment, lecturers have the opportunity to change the ways and methods of their work; can explain in more detail incomprehensible or not to spend time on something that is already known to everybody. The resulting additional time is used for the transfer of knowledge from other areas of science.

Since the implementation of feedback by classical methods is not rapid enough, we can use the technologies with which students prefer to work. For this purpose, a small application to mobile phones is designed, and the lecturer can make a presentation directly into a number of issues. Students vote and on the basis of their replies the lecturer receives full information about students' knowledge. The great advantage of this system is the feedback when the lecturer receives a response from all students and each student votes on their own, independently of the others.

Investigation of the impact of the introduction of continuous feedback with the application of Learning Management System (LMS) Moodle has been realized in the University of Economics in Bratislava (Slovakia) (Fig.10). The results of this research confirm the possibilities of the new method of supporting feedback improving the quality of students' training [17].

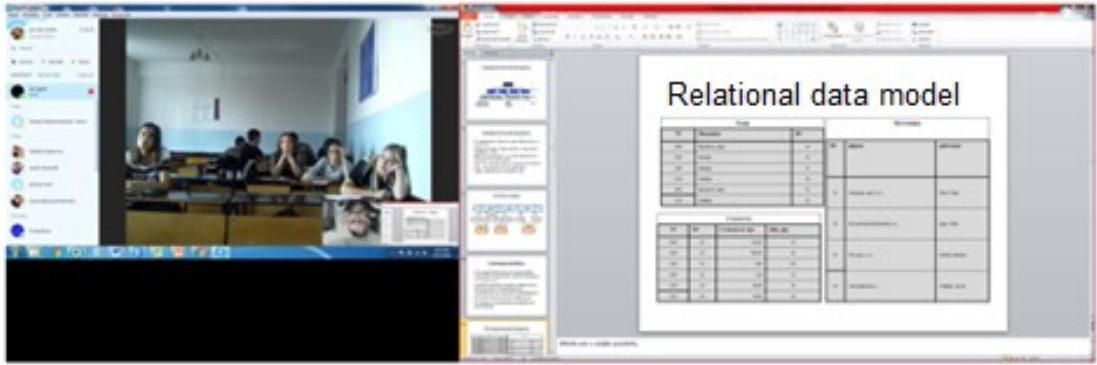


Fig.10 Use LMS in education virtual migrants

All students could be seen and heard, the requests could be checked in a chat, and the results of these requests on the server database system. If necessary, one could use the program Teamviewer to view the contents of a student computer screen. All the tasks the students solved on the server Oracle, which was installed on the server kultan.euba.sk:8080/apex or on the server MySQL installed on site hostinger.ru. Electronic verification and registration of the student's work made it impossible just to sit in the classroom but demanded high activities.

Based on the results achieved by students during the semester, one can add or remove tasks. The exam takes place in a fully on- -line mode and contains both a theoretical part and practical. Since students are not in the same room, the exam tasks should be formulated in such a way that they can not be solved by CtrlC CtrlV. The practical part of the exam takes place in the mode of direct connection to the server of the selected system (Fig.11). Students can choose the server on which they work better. The lecturer has the ability to check the performance of each student by means of the direct access to the desktop. The entire exam takes place under the supervision of the video camera, and the students already know that the exam is recorded. So, if in the classical exam the lecturer can distract or look the other part of the audience, the camera will not.

E-courses and methods of their implementation can be used in international cooperation with the active involvement of lecturers from different countries. Thus, one can manage joint training courses to improve the general level of education and reduce costs [18].

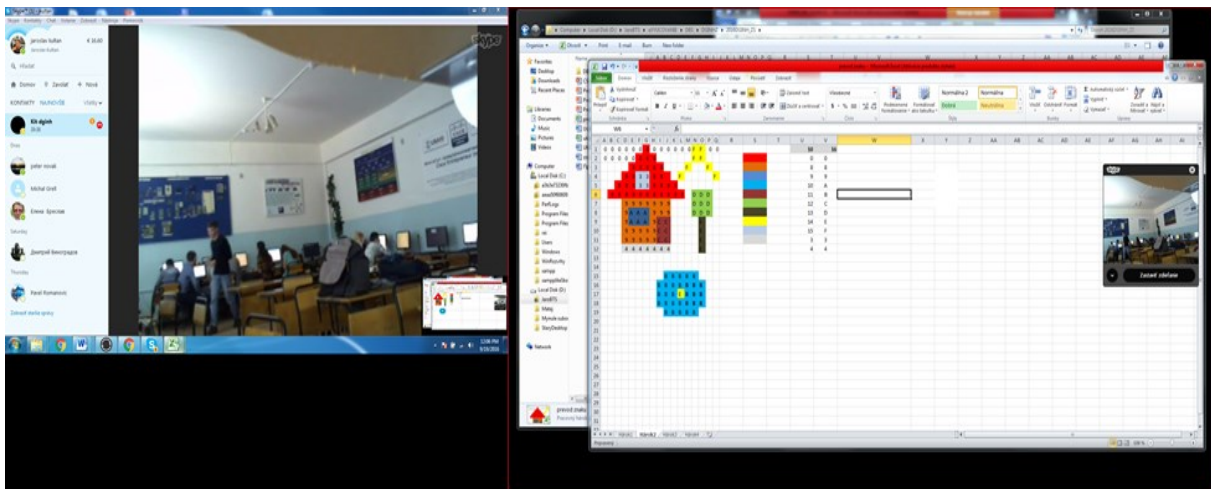


Fig. 11 Preparation for the practical examination with the use of virtual space

Based on these results, it has been decided to reduce the presence of foreign professors in the university in real mode, as it is enough presence of a lecturer for two weeks at the beginning of the academic year. During this time the lecturer delivers introductory lectures and holds introductory practical assignments. At the same time, there are created all the passwords for the access to the system taking into account the time shift between the two countries.

Conclusion

After analyzing theoretical and practical provisions relating to educational migration flows, we have come to following conclusions:

1. Effective educational migration can be one of the drivers for the resolution of a number of socio-economic challenges: the acquisition of highly qualified specialists in reducing the cost for their training, the use of foreign students' financial investments in the interest of local budgets, the sale of educational services at the international level.

2. Attracting foreign students creates a special kind of competition. To expand the influence and selection of the most promising candidates for highly skilled migration leading universities around the world have widely used virtual learning platforms, i.e. one can talk about a virtual educational migration.

3. Emergence of new forms of learning both the real and virtual requires new approaches in creating training programs, taking into account the peculiarities of cultural and cognitive profile of Generation Z in order to meet the expectations of students. Invalidly chosen method of presentation makes the learning process tiresome and creates a feeling of something alien.

4. There are a number of problems when using virtual platforms. Virtually, one cannot teach all specialties, there is a loss of socializing function of real learning, geographically expanding the influence of other cultures and language localization.

5. A properly designed open (virtual) education has a chance to select an individual learning path, use of IT-technologies and blended learning (virtual and real).

6. One of the important issues is to support the feedback (lecturer-student-lecturer), definition of its model and the possible ways of its implementation. Modeling of the processes of feedback is possible by the analogy with the modeling of the technical system control.

7. The main objective of the feedback control is the selection of the most successful impact on the system. The wrong selection of stimuli may have negative consequences. Therefore, the implementation of activities should take place with the best labor costs associated with the use of IT-technologies, with which the Generation Z prefers to work.

8. Use of these systems may be one of the tools for teaching migrants at virtual adaptation courses when they prepare to move to another country. Thus, they can show their professional competences that promotes faster decision whether to grant a residence permit and training.

9. With the creation of modern virtual educational platforms and programs economically feasible to limit the real presence of foreign lecturers at the host university to a certain minimum, followed by the virtual feedback support.

Thus, the education system is entering a new paradigm of real and virtual education, due to the interaction of international actors in this process, that requires the development of new educational courses and programs taking into account the cultural and cognitive features of Generation Z.

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SECURITY AWARENESS MEASUREMENT OF THE ROAD CARRIERS ACTING IN HUNGARY II.

Márton Lányi

ABSTRACT

The purpose of the article is to measure the security awareness level of the road carriers acting in Hungary. The topic is relevant as the largest portion of the Hungarian foreign trade is handled within Europe. The proportion of the road haulage in relation to the rail freight volumes is getting higher. Consequently, most of the shipments in foreign trade are travelling on road. The claims caused by security incidents during road transportation in Europe rose to Euro millions per year. [1] The article deals with basic questions and correspondences of evolving security awareness that can be a result of an earlier experience, the size of the company or a customer with a systemized logistics approach strategy. This article is the following part of a multiple article publication in this topic.

Keywords: security awareness, measurement, carrier

INTRODUCTION

In order to research the security challenges of our age, I have selected the area, which is part of our everyday life, most of the commodities are connected to it and subject to increasing number of crime committal. The area is the road haulage. The list of risks connected to cargo transportation does not end with theft or damage of the shipment. Beside security threat, personal and supply chain safety aspects occur too. Having a clear understanding on risks and security related challenges connected to different kind of road carriers is crucial to build and manage an efficient supply chain.

Goals and supporting aims

The objective of my research is to measure the security awareness level of the road carriers. How do their process flows, insurance policies, contracts and usage of security tools implicate security as a core value? The main goal is to discover what factors impact the security level. Concluding relevant correspondences enables to build a sophisticated supply chain with the utmost reliable transport capacity.

To support above main goal I have defined the next partial aims:

- Further verification of the trucker's subgroups based on their attitude.
- Examination of the carriers based on the security and safety procedure they apply.

- Find answer to what extent the security devices are used by the transporteurs.
- Measurement of the knowledge transfer by an analysis of the repeated audits.
- Verify my hypothesis, that the awareness would grow after a security incident has happened.

The structure of the research paper

Following the Introduction, the section of the State of the Art will summarize the relevant researches and their results as a literature review. The methodology section describes the technique used to understand the research problem, while the result section leads through the outcome. The discussion section describes the significance of the findings and explain the insights about the problem after findings were taken into consideration. Finally, the conclusion will reveal possible new research directions.

STATE OF THE ART

Analysing and profiling the road carriers related to their security attitude is a gap in the science literature. Many researches are to be found in the field of supply chain management theory examining a broader scope [2,3,4,5,6,7], which in its parts are relevant to the topic and provides the scientific background for the carriers evaluation. Supply chain is detailed examined, multiple aspect publications are available. A literature overview and summary focusing on the relationship in the Supply Chain is published by Ványi in 2012[8], similar approach was used by Karmazin in 2014 [9] aiming the logistic service providers. Other relevant research field is the innovation and development of the Hungarian companies [10,11,12]. Only a few Hungarian researchers were recently dealing with cargo transportation [13]. Analysis of the latest trends and effects of the trends on the transport industry is worked out detailed. Bokor[14] defined reliability as selection criteria, wich indirectly includes security and safety. The study is relevant to the road transport industry as it systematically defines the selection criterias of transport modes. As a conclusion the author expects further increase of the road services. Bank et al. [15]revealed the profitability of each participant of the Hungarian road carriers and anticipated the forthcoming trends of the industry. Furthermore, the logistic service providers are recently widely researched in Hungary [9,16], while the road carriers are not. International authors were lately looking for the safety culture within the transportation industry [17]. There are multiple studies dealing with subcontractor vetting and selection criterieas defining security as a core element [18]. International studies are also dealing with the security awareness in the scope of supply chain security being important part of managing business risks. Methodologies and systemized metrics were developed [19] in order to establish proper security design. While others were looking for the impact of the security culture on security operational performance [20].

This article is the following part of a multi article publication, findings of the first part of my research [21]is an integral part of the study. The main finding of the earlier article is the categorization of the carriers based on their different security attitude. The most typical parameter of the road carriers is the number of vehicles they operate. My target was to cluster the participants and unequivocally divide them based on their security attitude. In the course of my earlier research the following groups results showed significant correlation, therefore the rest of the article will use this grouping:

- *Group 1:* (companies with 1-2 vehicles), the driver is typically the owner or a close relative, administration is done by the same.
- *Group 2:* (companies with 3-14 vehicles), the owner drives trucks very seldom, they started act as a company, office employees are already present, but typically no own premises existing.
- *Group 3:* (companies with 15-30 vehicles), they typically have their own premises already, the company has good references, and the owner is a good skilled manager with a higher degree.
- *Group 4:* (companies over 30 vehicles), financial investors often show up in the background, they have a specific weight in the region they are settled. The company is able to handle larger demand by itself. [21]

RESEARCH METHODOLOGY

Based on Rubin and Babbie [22] the advantage of a questionnaire is it's ability to describe the characteristics of a large multitude, giving the possibility of detailed analysis and -dependent on the topic- leads to a good standardization. The disadvantage of a questionnaire lies in its attribute of collecting own admissions and the validity is typically low.[23]

My research covers the analysis of information given by the carriers own admission. I will furthermore put the findings of the interviews in context.

I did not aim during the sampling to represent the whole general hungarian carrier market, I rather concentrated on companies that applied for subcontractor status at a logistics service provider in a given timeframe.

Quantitative research: Subco Vetting Form¹ analysis

In the quantitative part of my research I am using statistical methods to analyse the pre-audit data collection questionnaires sent by an internationally and locally well established and recognized global leading logistics provider². The practice of the company is to screen the new road carrier applicants before the start of any commercial business with a multiple aspect questionnaire. The answers given are the basis of a personally conducted on-site audit in a later stage. The questionnaires are requested to be filled out before any audit, regardless of having the company first time under examination or conducting a re-audit of them. The procedure can be repeated when a significant failure eventuates or can be a periodically planned audit for already established partnerships. I examined 101 questionnaires in the time period between 2012 and 2014, regardless of the fact if the audited company was later accepted for business partnership establishment or not. The auditing company went online with the subcontractor vetting and registration in 2014. The online questionnaire is unified and globally used, which define its questions differently regarding the screened parameters, therefore the answers given can't be completely compared to the data received in the earlier period. The number of 101 samples is sufficient enough for observations and for finding vital correspondences, but it is insufficient in some segments to accept as representative assessment.

¹ Short terminology of the excel sheet used for the subcontractor's vetting.

² Kuehne+Nagel Hungary

Qualitative research: Interview

To be able to examine the results deeper and get a clear understanding, I used a qualitative tool as a supplement for the questionnaires, I made deep interviews. The objective of the interviews was to reveal the reasons of getting different results per company groups. The assumable explanations were assessed during the interviews and the discussions led to discovery of further reasons. The interviews were made with the security manager and the quality manager of the logistics company.

Introduction of the participating companies

The participation in the research is defined by the time period (2012-2014) and the returned Subco Vetting Forms. Parcel providers (Couriers) were excluded due to their different kind of work processes and expectations connected to their activity. Based on this fact, as a further criteria, it was defined to have pallet-based cargo transportation activity within the company. Furthermore I removed the completely inappropriate answers.

All together 88 vetting forms were classified based on the criterias, covering 66 companies from which 17 two, 4 three and 1 company were four times re-audited.

The number of vehicles in the examined multitude is 935 and 14 in average. The number of employees is 1322 in sum and 20 in average. The number of vehicles per company vary between 1 and 85.

Companies are mostly registered in Hungary as an Ltd., the exception is 8 Slovakian registered Sro.-s and 4 self-employed or general partnerships respectively.

During the crosschecking of the data some failures were detected, for example: zero vehicle unit given or less truck drivers than trucks, respectively more drivers, than employees.

The missing or non-coherent data were adjusted from other sources, like the Opten³ datapool or the companies own presentation materials. I have furthermore corrected any illogical data.

RESEARCH RESULTS

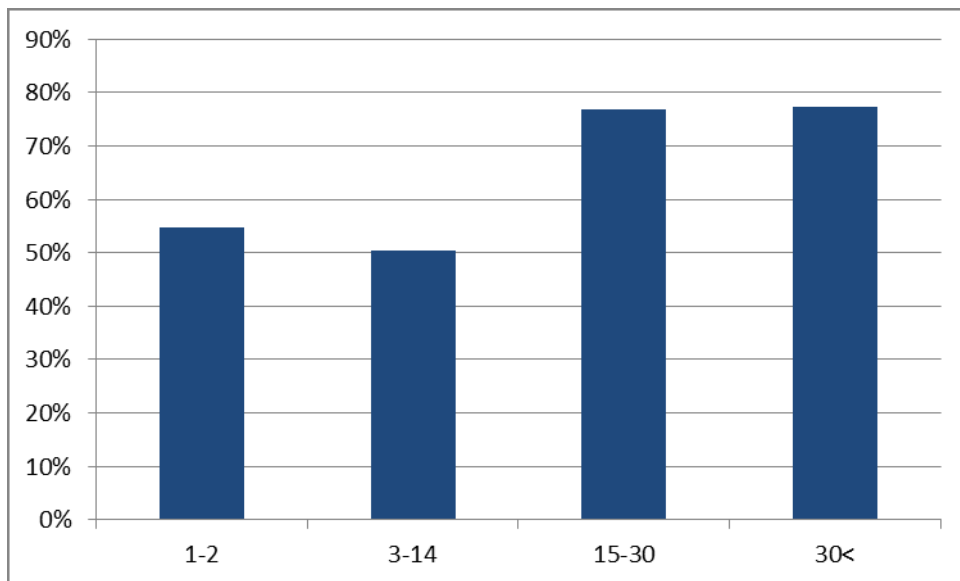
Based on my previous research in the same topic, measuring the security awareness level of road carriers, I continued the study of the Hungarian truckers. I have decided to examine the matter even deeper, because the earlier results highlighted new kind of relationship between the assessed companies and the security as core competence. At first, I have researched if the insurance conditions, the road carriers have, mirror any evolving security awareness. I have found correspondence between the company size and the security awareness level. Truckers operating smaller fleet (Group 1 and 2) have less awareness than their larger competition. Interviews have strengthened the hypothesis that these carriers do not even think of a possible security accident or barely trust these will happen to them. Not having sufficient insurance is just underlining this thesis again. High figure of 47% negative result on existence screening of the first group was measured, caused mainly by their small company size, as their operation is not yet company like. The image I got during the interviews is that entrepreneurs in this group are typically former truck drivers having substandard management knowledge [21]. I have deducted the conclusion that shippers should take different levels of risk into consideration which level can be well anticipated based on the carrier size. Similar to the previous stage of my research the Subco Vetting Forms are the basis of the analysis covering 66 companies.

³ Opten: information pool of company register data

Basic security procedures

The existence of basic written procedures will assure transparent operation with declared and segregated liabilities at certain fields of functioning. The questionnaire contained 16 questions asking for the availability of engineered procedures. Topics touched by the questions were selected based on past crime committals or known wide-spread modus operandi – all questions represented certain areas, where lack of control has ended up in losses, resulting serious financial consequences. Lack of regulation concerning the chosen areas also indicates increased risk and the audit declares the security and safety standards of the given company insufficient.

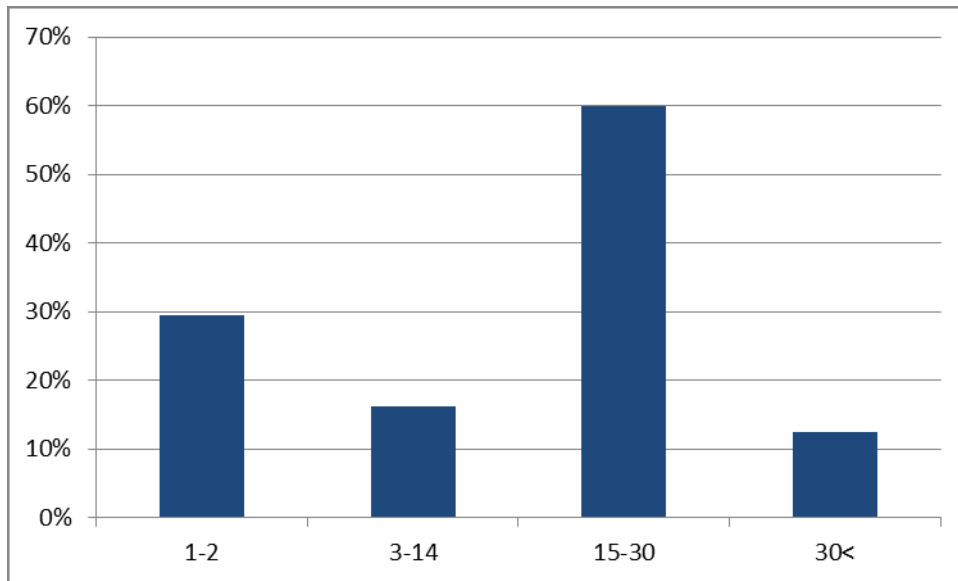
As a result the worst 20 truckers gave 5 or less positive answers. The top performing third contained only 32 carriers, which is less than the half of the total. The former employer's reference and the clean criminal history records check were by far the highest figures, 76% and 70% respectively. The document of clean criminal history records was however only archived in 45%; which means that the shown result is not controllable. I found that the disadvantageously low validity of the result is caused by the methodology of questionnaires itself, which is the unverified self-admission of answers. On condition, that a carrier is interested in showing better result than reality, the received answers overrate their company. As an outcome the reality must be worse than the image they communicate. Truckers are separated in two major clusters, the ones operating less than 14 trucks and the ones operating vehicles over this number. I have found significant differences between these groups, while the smaller carriers met the requirements only in 50-55% the larger ones did meet them in 77%.



1. Figure: Positive assessment of security procedures per defined groups.

The questions of this section were extended by asking for the usage of DiDb⁴ cards. The availability of the DiDb cards is considered as vital sign for the company's security awareness level in Hungary. The next diagram shows how the given groups comply with the overall assessment of the security procedures. The third group's flows comply the most with the requested standards. Interesting development is the result of the fourth group which fell back to 13% and the first group having better procedures than the second group, although company size would validate the opposite at both. The assessment was only successful in 26% of the total.

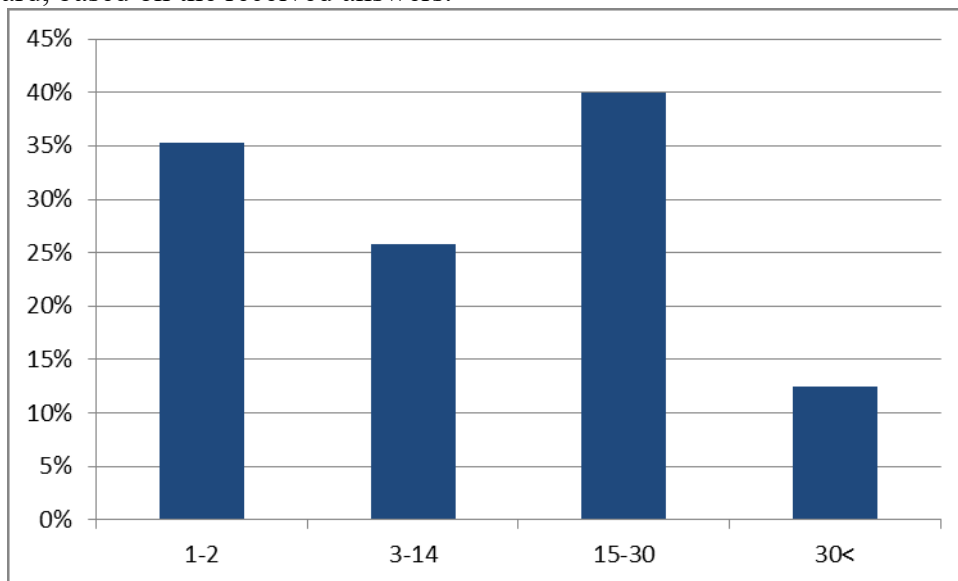
⁴ DiDb card: Magnetic card used by truck drivers as an online and active "white list" growing dynamically since 2008 that presently controls the data and the ratings of 24,000 European drivers.[24]



2. Figure: Positive assessment of security procedures including DiDb availability per defined groups.

Security devices installed in vehicles

The last section of the questionnaire is dealing with the type and number of security devices applied in vehicles, such as door opening detection sensor, panic button and intrusion detection alarm. The result is very similar to the previous diagram, although the absolute figures are smaller. The relative over performance of the group with 15-30 trucks can be observed again. Only 26% of the total had at least one of the above mentioned devices installed on minimum one vehicle. Nevertheless, 84% of the vehicles had a GPS tracking device on board, based on the received answers.



3. Figure: Usage of security devices in percentage per defined groups.

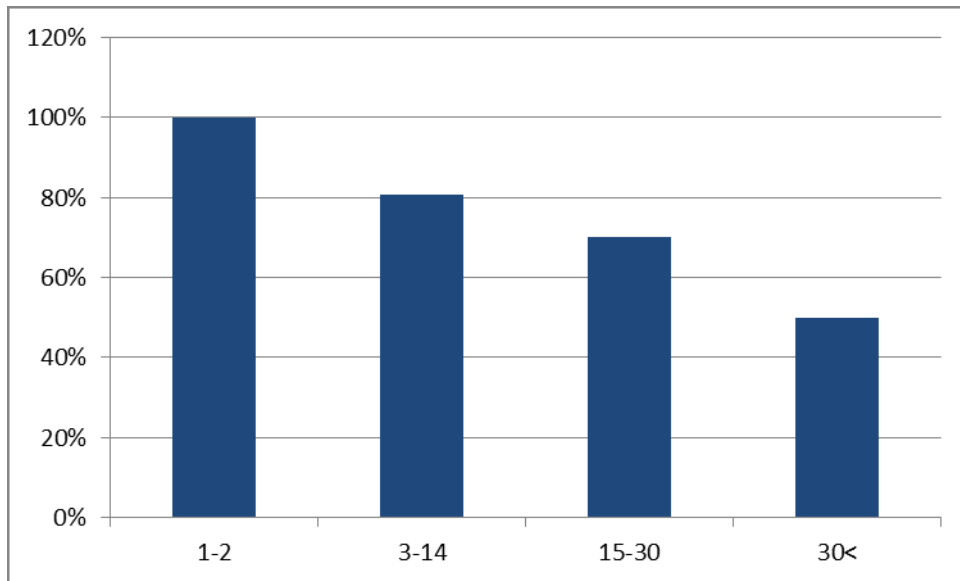
Measurement of the knowledge transfer and reflection by analysis of repeated audits

“Reflective thinking is conscious, connecting theoretical knowledge with practical experiences from the past in order to reach a certain target. Reflection can be shown as a circular flow, changes while the activities will trigger an analysis after the activity and an evaluation. There is a plan review and modification before the next activity starts.” [25]

The screening procedure is repeated if the affected entity performs significant failures in security field or eventually is planned for periodical recertification as an already used carrier. 22 truckers were re-audited minimum twice, 4 of them three times and 1 four times in the given timeframe (2012-2014). The analysis of the 22 re-audits gives me the opportunity to research the effect of transferring expectations, knowledge, norms and its reflection in their operation. Expectations of the auditing entity can be anticipated based on the questionnaire sent preliminary before the first face-to-face audit. I assume that, answers which are less controllable would receive more positive answers. In order to lower this effect the carriers are told that an onsite audit will follow shortly after the questionnaire is submitted. In the course of the re-audit the company answers are more prepared and as a reflection of the learning curve the expected procedures start to appear. The reflection can be described as the knowledge transfer from a central company, having a know-how, to the smaller members of its network. The re-audits are the measurement of the reflection simultaneously. I could demonstrate large increase in existence screening that developed from 68% to 91% conformance; insurance compliance developed from 23% to 45% and the level of adopted procedures rose to 32% from 23%. The availability of security devices decreased from 26% to 21% beside a slightly growing number of vehicles in the total fleet (from 518 to 521 units). Based on the results I draw the conclusion that the reaction for a security incident is mainly the review of existing insurance contracts and adaptation to a more convenient condition. The increasing company existence assessment is a sign of a more conscious organization concerning the back office activities and the willingness to enter a more open partnership.

Impact of security incidents

The audited companies were asked to report the security incidents which happened to them in the last 3 years. Result validity check for the received answers concerning the topic is almost impossible. Documents produced during a theft case can only be located accidentally, unless the carrier maintains its own administration about cases, which is not a frequent practice. Contracted insurance companies are bound by non-disclosure agreements and insurance law, which provide no possibility to publish damage and loss history of their partners.



4. Figure: Percentage of companies without reported incidents per defined groups.

Based on the provided answers Group 1 had in 100% no incidents, while Group 2-3-4 had 81%, 70% and 50% respectively. It is axiomatically and mathematically reasonable that carriers operating more trucks are more exposed on company level. The chances of being affected by a security incident per company are higher with 80 trucks compared to a 1 truck operation. The overall result showed that 80% of the questioned carriers had no security incident.

I have also checked whether there is any proof for changing defense habits as a consequential result of a security incident. I separated companies which reported incidents from the ones that did not. The only significant difference observed was the presence of adequate insurance, which figure grew from 28% to a double figure of 62%. Other parameters remained unchanged.

Result of the interviews

I have been looking for more explanation of the statistical analytics via personal interviews. I intended to discover the rational explanation, flows and the carrier's thinking behind the figures. The interviews were made with the security manager and the quality manager of the auditing company. Both of them have spent over ten years in the respective management area at leading logistics companies. I have asked the participants to validate the concluded result and amend it with their own experiences. I summarize their statements herewith below.

- Carriers first assess their insurance policy after suffering a damage case. This is typically the first time they are confronted with their liability based on the CMR Convention⁵ and the gap they have in their insurance policies related to the agreed reimbursement level.

⁵ The CMR Convention (full title Convention on the Contract for the International Carriage of Goods by Road) is a United Nations convention that was signed in Geneva on 19 May 1956. It relates to various legal issues concerning transportation of cargo by road. It has been ratified by the majority of European states.[26]

- Security devices are only seen as cost effect and are mainly applied due to customer pressure. GPS devices are an exception, this is a tool to locate and control their own property.
- Mentioned reasons of choosing the insurance update instead of focusing on the prevention of the loss:
 - “CMR insurance is an obligation, while the security devices are possibilities”
 - “Spending on both would give them a feeling of carrying double costs for the same.”
 - “It is obvious that the devices need further care, these systems do not maintain themselves automatically.”
 - “Devices on reasonable cost do not provide 100% prevention.”
- Draft processes are shown and explained; eventually insurance education is given at the first on-site audit.
- The experienced progress of the existence assessment section, were on one hand the result of defining better quality and quantity references, on the other hand the appearance of 24 hour service contacts and identifiable premise details.
- Based on the result, 80% of the truckers had no security incident in the past 3 years. The first group leads the statistics with zero incidents. I have registered the following answers in this topic:
 - “The first group has a relative high instinctual kind of security awareness level as the owner is driving the truck. The vehicle and the load are better controlled by the owner than an employee.”
 - “In some cases security incidents were only admitted during the personal part of the audit. The reasons explained are: forgotten cases, they thought it is not a thing worth mentioning or fear of negative rating.”
- The average age of the vehicle is in inverse ratio to the companies’ security standards. The attention of the owner is absorbed by the continuous maintenance activities.
- Generation change result typically in enhanced management knowledge and the entrepreneurs start to transform to companies.
- Carriers operating less than 30 trucks maintain a good overview on jobs, drivers and procedures. Their activity is fully under control by one person.
- Regrettably, the carriers independently of their size do not feel the necessity to screen the new employees. They do not ask for clear criminal history records sheets or a DiDb card. Most of the new employees are recruited via acquaintance or “acquaintance of an acquaintance”. In this respect the intermediary person will act as a guarantee and basis of the judgement regarding the quality to expect and the criminal background plausibility. Double-checking the earlier workplaces as a reference is not a typical practice.

DISCUSSION

The verification of the trucker's subgroups based on their attitude was successful. I proved that road transporters act differently related to security measurements, they can be clustered to a developed and an undeveloped cluster. The two clusters include two subgroups each. My interpretation of the result of the research is that sensitive shipments, which need higher security related care, are handled by the truckers operating 15-30 units the best. Their security awareness level is far the highest of all of them, although they also have a backlog related to the usage of security devices. The category operating more than 30 trucks has a decreasing awareness, which can be a result of a conscious decision, not to load high risk cargo. Carriers with 1-2 trucks showed negative result in some of the assessments, which are mainly triggered by their especially small operation, not having a company characteristic. However this category still proved higher security standards than the following group operating 3-14 trucks.

Examination of the carriers based on the security and safety procedure they apply highlighted differences between self-assessment and the objective measurement. As an example, major gap in understanding of new employee inspection has been verified by the interviews. Carriers trust in gossip, while the expected behavior would be the check of the clear criminal history records sheet. Due to this misunderstanding truckers rate their performance as highly satisfactory, although this is even the opposite: unsatisfactory.

I have been looking to find answer to what extent the security devices are used by the transporters. The main finding is that the usage of security devices is not an own initiative based on awareness, but adaptation to a requested business standard.

The measurement of the knowledge transfer was executed by an analysis of the repeated audits. As a summary I demonstrated that the carrier's security awareness level is generally low and needs more research on future solutions of the topic. An optimal solution can be given by a central company, as I have demonstrated measurable reflection in this study, to generate knowledge transfer to its network of carriers. However the effectiveness of the reflection is measured very low. Re-screenings and education is needed as part of the learning procedure, but it cannot be expected from the carriers to acknowledge their interest in cargo safety and security and lead the innovation themselves. The innovation would appear with the lead of shippers (central companies) using infocommunication and system logistics tools.

I could not verify my further hypothesis that the awareness would grow after a security incident has happened. In this case the investment willingness into security devices would increase, but I have even measured an opposite trend. The presence of security devices decreased from 26% to 18%. The only significant difference observed was the presence of adequate insurance, which figure grew from 28% to a double figure of 62%. The finding is, that road carriers first take financial stability via improvement of the insurance coverage priority, rather than prevention of cargo loss.

CONCLUSION

The main goal of the research was to get a better insight into the road freight carriers' security related attitude. I have defined and measured the elements of the security awareness. As a result of the measurement different security related attitudes were discovered by the described carrier groups. The study found different carrier clusters, a developed and an underdeveloped one representing various security levels. Using the findings makes easier to build a reliable supply chain. The research enables in the future to allocate certain risk factors

to the defined carrier subgroups, which can be well generalized. Further research area could be to reveal the reasons of the existing clusters and match the associated risks. My research will further continue in this topic in order to map all aspects and conditions of the security awareness evolution.

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THE PAST, PRESENT AND FUTURE OF BIOMETRICS

Csaba Otti

Abstract:

Biometric identification is an electronic system used for establishing the identity of people based on their unique biological and behavioural features. Its history started in the past 50 years, the first scientific publication was published in 1963. This article will review the past, with emphasis on the Hungarian respects of the topic, and the directions of the possible future development.

Summary

The necessity of trustworthy identification of people was a challenge even in the ancient times. Modern age development raised the need for automatic identification and with that, the first operational systems arrived in the 1970-s in the USA. Following this, the areas of deployment, the available technological solutions and devices spread very fast in security and policing.

The next step of development was the commercial deployment in trade and smart devices. It would be very hard to find any adult that has not met biometry in one way or another in the developed societies.

One of the future research directions will be continuous authentication, which can identify any person during their stay in a particular area with requiring only minimal cooperation from them. This mainly has a security benefit, but it serves as a convenience factor as well.

Experience shows that users like technologies, that are contactless and work from afar – or at least they care less about them. In a security respect, they work better against people, who do not wish to cooperate with the system at all.

A further tendency is multiple factor authentication, which can circumvent the drawbacks of the traditional technologies.

Keywords:

biometrics, history

Introduction

Automatized, electronic biometric identification has went through a tremendous development in the past fifty years. Policing organizations have an ever bigger need to identify people in a fast and trustworthy way at any given place. Parallel to this, there is a growing demand for identifying users and people accessing facilities at every aspect of life. [1] On the other hand, it can be clearly seen that the user acceptance of the devices and technologies is one of the determining factors regarding the success and usability of such systems. [2]

In security applications, users are much more suspecting and rejecting than in commercial ones, where they can decide whether they want to use biometry and the templates won't leave their possession – and it is convenient to use them. A good example for this is

that while general purpose biometrics are rejected by users [3] [4], 89% of iPhone users utilise biometry in their devices⁹.

The future direction of biometric identification are outlining, biometry is gaining ground, the convenience is becoming ever more important, and instead of discrete identification location solutions, the continuous, behavioural identification methods are spreading.

The history of biometry

The word Biometry stems from the greek „bios” (life) and „metrein” (to measure) phrases. [5]. As the word shows, it deals with measuring parameters connected to life – parameters that are unique to every person and thus identifies said person with certainty.

Bodily feature based identification itself has a long history. It has been used in the ancient Middle- and Far east to establish the identity of people (e.g. by height, weight, special features, etc.) [6].

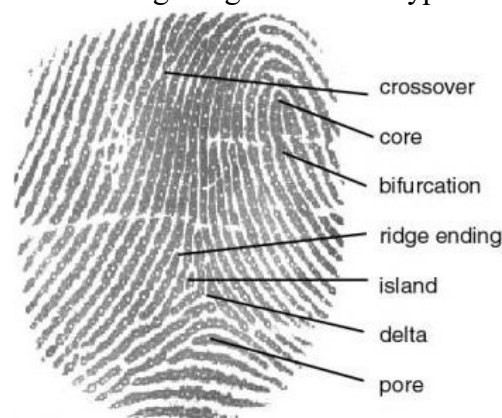
The first time the Hungarian police used biometric features to solve a crime (in a way that it became known and understood to the general public) was in 1907. An inn at Dános was robbed, burned down, with for people murdered. The utilised biometric feature was the fingerprint, which was found on wine glasses at the crime scene.[7]

One of the first institutionalized use of biometric data (in this case, fingerprints) was their usage in crime registers. In 1903, New York state prisons adopted fingerprint identification to verify the identity of criminals. This solution spread like wildfire among the various penal institutes and police forces. This process culminated in the founding of the fingerprint analysis department of FBI in the 1st July, 1921.

A. Bertillon French police officer designed a way to identify criminals by their various bodily features. Unfortunately, the solution could not be automatized and was rather tedious, and as such, was replaced with a more efficient one. Sir F. Galton and others discovered in 1888, that fingerprints are unique to each person, enabling them for usage in identifying their owner [8].

The first automatization attempt can be credited to Woodrow W. Bledsoe [9], who created a semi-automatic facial recognition system in the 1960s USA, at the request of the government. The operator of the system selected important features on the face for the system (e.g. eyes, mouth, ears, etc.) and the machine calculated the geometric relationships between these points.

Fingerprints are identified by minutiae, which are distinctive topological features on the surface of the fingerprint. The following image shows the type of minutiae:



⁹ Source: <http://appleinsider.com/articles/16/04/19/average-iphone-user-unlocks-device-80-times-per-day-89-use-touch-id-apple-says> , Time of download: 2016. 11. 12.

1. *Figure Elements of the fingerprint*[10];Source:
<http://www.barcode.ro/tutorials/biometrics/img/finger3.jpg>

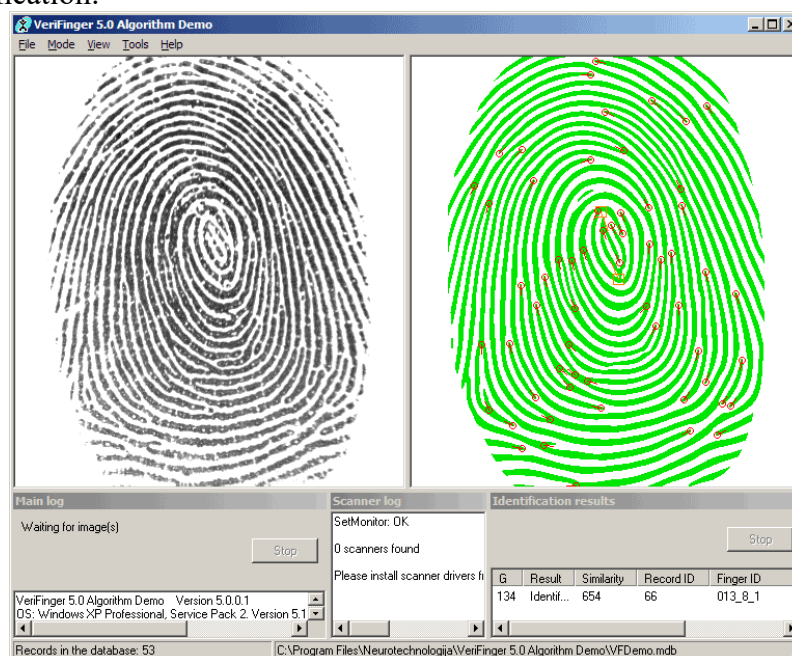
Naturally, the identification process was not yet automatized, it was done by human experts with the help of magnifying glasses.

The next big step in the history of biometrics was the creation of the identification system and databases supporting the process in the 1960s. The result of this was the first version of AFIS

(Automated Fingerprint Identification System) [11].

The first commercially available hand geometry identification system was launched in 1974. This can be called the first truly automatized system that could facilitate identification for the purpose of access control and attendance tracking.[12] This system was deployed in 2008 at Paks Nuclear Power Plant in Hungary.

The process continued in 1975, when the FBI launched a project to create a scanner prototype. This system only stored minutiae due to the high cost of data storage equipment. An algorithm was also created – the M40 [13], which was the first operational biometric algorithm ever used by the FBI. Its purpose was that with selecting from the database by user given parameters, it could provide a much smaller dataset for forensic analysts to sift through and perform identification.



2. *Figure The effects of technological development: a fully automated fingerprint recognition system; Source:: <http://www.lacp.org/Graphics/fingerprint4.gif>*

In 1985, Drs. Leonard Flom and Aran Safir [14] ophthalmologists discovered that no two identical irises exist. This concept was patented in 1987, and in 1995, an iris scanner prototype was created with the help of Dr. John Daugmann.

In 1987, M. Kirby and L. Sirovich [15] proved that identifying a properly positioned and normalised face requires less than 100 different parameters. This allowed M. Turk and A. Pentland in 1991 to create the first algorithm enabling real-time facial recognition. [16]

In 2006, the USA introduced biometric passports that stored personal biometric data within an RFID capable chip. [17]. The EU allowed this in the same year, and Hungary introduced the new passports in 2009.

The next step in biometric advances was the development of vein scanners by Hitachi. Based on their patent, published in 2009, the first device capable of personal identification was created. It used IR light to penetrate skin and identify the person based on their unique vein pattern. [18]

In 2011, India introduced a mass iris recognition system aimed at making people use their eyes for any matter concerning the state.

The Apple fingerprint reader

Biometric technologies otherwise known in the security industry did not penetrate general public very well right up until the Apple iPhone 5s was launched. Although, there were prior attempts by other companies to integrate fingerprint readers into laptops and Android based devices, they failed to become widespread. This changed in 2013, when Apple TouchID hit the market. A fingerprint reader was put in place of the physical button, which allowed the user to securely unlock the device. It is important to note, however, that a fallback option must be present as an alternative to the biometric method (which is usually a PIN, password or a pattern lock), so we cannot talk about a truly exclusive application.



3. Figure The Apple TouchID sensor; Source: <http://cdn2.knowyourmobile.com/sites/knowyourmobilecom/files/6/25/touch-id.jpg>

Stadium access control system in the Groupama Arena

One of the most relevant applications of biometrics in Hungary is the vein scanner system installed at the Groupama Arena in 2014. Its main purpose to make visiting football matches more secure and family friendly by locking hooligans out and also filter out anybody avoiding ticket purchases. This system uses a two-factor authentication: fans own an RFID card which holds the user ID, based on which the system selects the relevant user from the database. The template is then matched against the sample the user provides to verify the identity of the cardholder.



4. Figure The Hungarian solution; Source::

http://kep.index.hu/1/0/646/6461/64610/6461000_a84f5b40770134f6ad6261c27b03a79a_x.jpg

The development¹⁰ was made with devices manufactured in Hungary that use Fujitsu sensors at their core.

Fan groups, however, were not keen on this idea. As of the 2016 September standing in this issue, they attack the operator from multiple directions. In April 2016 the Authority for Equal Treatment issued a decree that the practice does not restrict any rights.

In 2014, the Társaság a Szabadságjogokért (a non-profit organisation) attacked the practice at the Alkotmánybíróság (AB)¹¹ on behalf of a football fan. The problem lies within the handling method of the biometric data¹², as it is held – although anonymously – in a central database. At the request of the AB, the NAIH¹³ performed an analysis, which concluded that the solution endangers the users, as any abuse of the database would allow for acquisition of personal data, and also, users might get monitored without their knowledge or consent.

With the decision of the AB, a strong precedent might be set regarding the storage and usage of biometric data, which will affect the future of biometric system. It will determine which systems can be operated and what technologies must be used to minimize the possible harm to the users.

The new Hungarian personal identification card¹⁴

Hungary issued personal ID cards capable of holding biometric data in 2016. It is a basic credit card format plastic card, but with an RFID antenna and a memory chip. The ID card can hold fingerprints, social security numbers, tax ID numbers and any penalties afflicting the particular person (like travel restrictions). The system conforms with the data protection questions as the template is stored on the card itself.

In 2016, Ghana announced that they will be using biometrics to verify voter identity in the parliamentary elections.

Windows Hello [19]

¹⁰ <http://index.hu/sport/futball/2014/07/30/venaszkenner/>

¹¹ Constitutional court – the highest authority court in Hungary

¹² <https://www.dropbox.com/s/c0dt2rt1fyjkg64/NAIH-2016-1729-2-V-1m.pdf?dl=0>

¹³ National Data Protection Authority

¹⁴ <http://nol.hu/belfold/tul-okos-aza-uj-szemelyi-igazolvany-1584895>

With the first Anniversary Update of Windows 10, a new identification system was introduced to unlock the computer, log in and identify accounts. The service is called Windows Hello and it allows for PCs to use a lightweight, native biometric solution.

The system supports multiple technologies, and currently works on PCs and Surface devices with built-in fingerprint readers, but the list will expand continuously in the future.

The biometric template in this case is stored on the user device and identification is performed locally. [20] The solution is not compulsory, the user can use any former login solution as well. Note, that by biometric template, the system means a code that was created from the presented sample. Microsoft says that they never save any actual biometric sample.

The Future

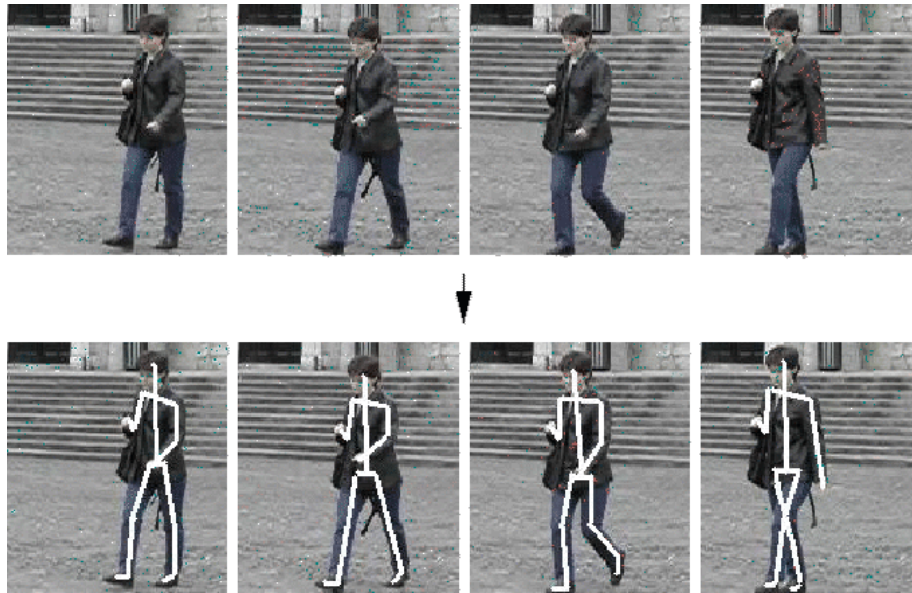
Traditional biometric solutions are not unerring and several factors rose during their use that may be avoided with the technology of the future.

1. Traditional technologies require serious will from the user to cooperate with the system¹⁵. [21] A solution for this is to expand the range of identification, for example, with camera systems.
2. Multi-factor authentication can circumvent the shortcomings of the individual technologies and make the usage of the systems much easier.
3. An attacker, if able to pass through discrete identification locations may move freely within a facility or network. Behavioural biometrics analyse people real time, and can force the users to re-identify themselves if any suspicion rise.

One direction of development is to use behavioural biometric identification methods. These generally deal with unique features which can be analysed without cooperation from the user. Examples to these technologies are signature identification, keystroke identification or gait analysis. [22]

Motion and gait based systems can work by several ideas. The first – and commercially more feasible – solution is video based. In this case, the gait and movement of the person are recorded by cameras and software based analysis determines the identity. [23]

¹⁵ The will to cooperate with the system is a that describes the willingness of the user to position the sample such that it conforms with all the requirements of the device to perform successful identification.

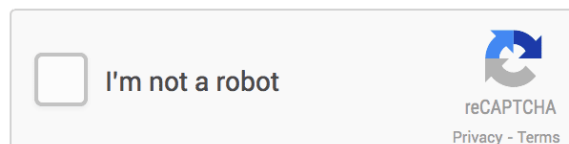


5. Figure Example for motion and gait based identification; Source: http://i.kinja-img.com/gawker-media/image/upload/t_original/19fh0dw40y2xypng.png

Another possible solution is to use sensors on the user (e.g. an accelerometer) which are generally available in one or more smart devices already held by the user. [24]

Gesture based identification is another type of behavioural biometrics. This is most feasible with touchscreen devices. Algorithms analyse the characteristics of the motions of the user fingers (such as length, strength, direction of strokes), which are unique to every user.

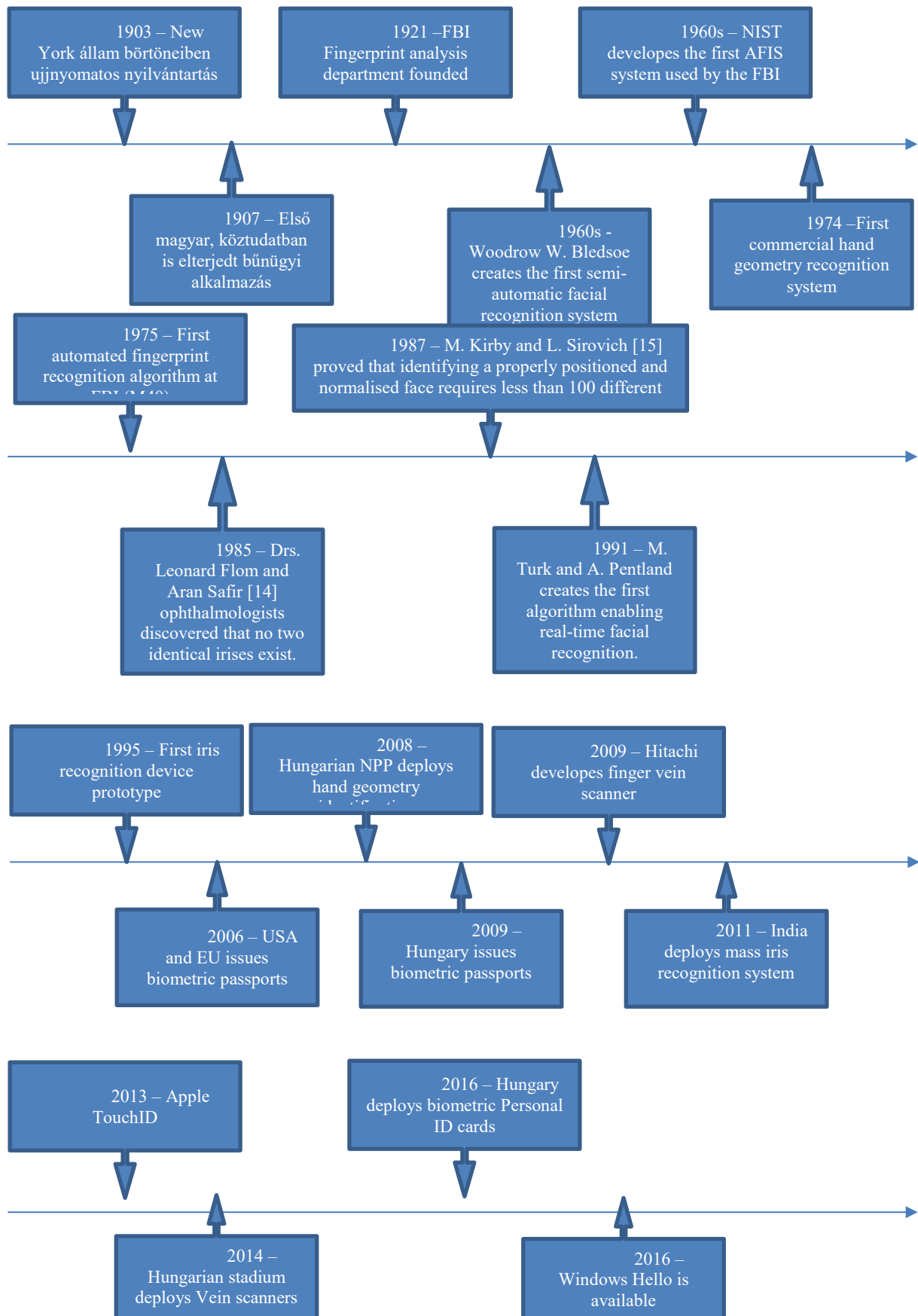
A more basic version of this technology is Google ReCaptcha, which protects websites from bots. The technology [25] uses the gestures – along with other parameters – to determine whether the visitor is a human or a program. If there is sufficient data to verify identity, clicking the checkbox will automatically solve the challenge. If not, then the program will present a picture puzzle that is only solvable by humans (e.g. select a type of animal out of 9 images).



6. Figure Google reCaptcha interface; Source: https://upload.wikimedia.org/wikipedia/en/c/cf/NoCAPTCHA_reCAPTCHA.gif

With the help of the solution, the required willingness expected from the user can be lowered along with the complexity of the task. With the proper amalgamation of the technologies, Continuous Authentication can be realized [26], which would allow to identify a person continuously as long as they stay within a location.

The timeline of Biometrics



Conclusion

By studying the history of personal identification, we can see that with the increasing risk factors and the secure and convenient solutions offered, biometry found its way into the lives of the general public. It is a real possibility and requirement for automated systems in the near future to identify users with a very high degree of confidence and in real time.

Biometry has already spread wide with the help of smart mobile devices and it increases acceptance significantly.

Beyond this, the general directions of development can be determined, and continuous, automated authentication methods that use multiple modalities seem to be the ones with the brightest future.

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LEARNING BEHAVIORS IN THE ONLINE WORLD

Edit Rubóczki

Abstract

This study elaborates on learning behaviors in the online world. There is a wide range of online learning tools available, which can be customized to individual needs, and the internet is inundated with applications. In my previous studies, my main focus was gamification as a potential platform, to ensure the security in the cloud platform. That study deals with the relationship between online learning behaviors, and serious games, while keep the focus on the cloud awareness. In my recent studies I present methods of online learning, habits, exploring the relationship between teacher and student within the online environment.

I examine how the latest online inventions influence student's motivations and their interactions.

Online World – What does it mean exactly?

Online world or the cyberspace is a space where a lot of real life situation or real life problems can be virtualized. Nowadays it is only a tool, which is used for solving problems, creating contact with each other for work together, applicable to entertain wide range of users with different digital content, or where the machines get contacts with other machines to get more processing power and work together. It is a lifeless space, no biological, where a lot of alive human love to connect. It could help for us, but the other hand it could be dangerous as well. It has the own policies and rules, own infrastructure and hierarchy, and there are some known problems which have any solution only in the cyberspace.

The Identity is could be different in there like in the real world, just think back to the movie, Avatar. In the virtualized environment the digital personal identity can be different from the personal identity in the real life. The difference is not only between the identities, but a big gap can be between the real personal behavior and the avatar behavior as well. Where avatar means the cyberspace personality. The avatar is chosen by the user, tailored by the user, so it is a tool to realization a dream, a desire, a habit or a will.

The main differences between real and online world are the policies – which are continuously changed and formed - and the invisibility, I mean the mask in front of person who enter to this space. With a different cyber personality, you can earn other goals you have never dream before, use other tools and other rules like in your life, and get another existence

level like you actually have. These factors could give the most of danger for the user, for the environment of the user, and the contacted users in the cyberspace.

„We are witnessing what amounts to no less a mass exodus to virtual worlds and online game environment” Edward Castronova

Learning Styles

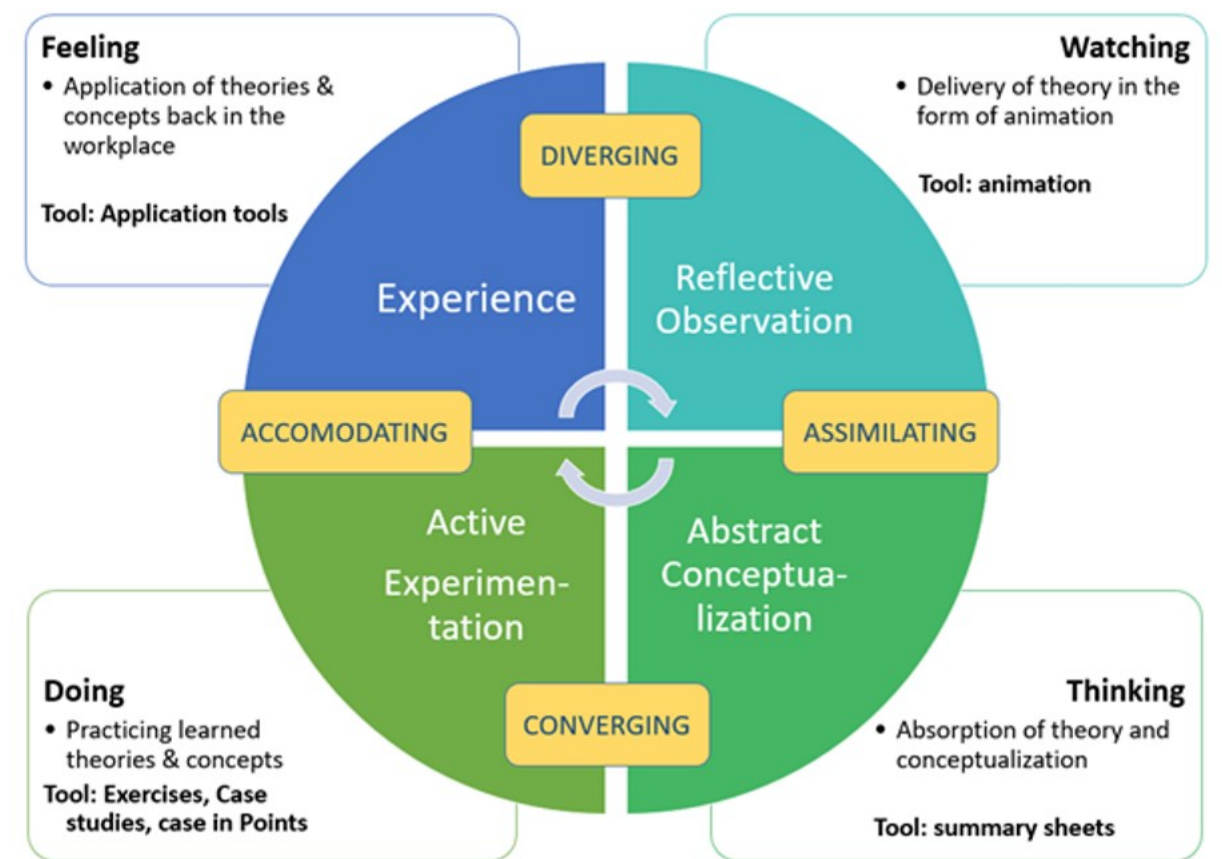
In my study to deal with the online learning opportunities, firstly I describe a constructively learning model by David Kolb in 1984. His model is built upon the idea that learning preferences can be described using two continuums: active experimentation-reflective observation and abstract conceptualization-concrete experience.

According to Kolb, the experimentation learning has 4 steps:

1. Experience,
2. Reflective observation,
3. Abstract conceptualization,
4. Active experimentation [1]

The result is four types of learners:

- converging (active experimentation-abstract conceptualization)
- accommodating (active experimentation-concrete experience)
- assimilating (reflective observation-abstract conceptualization)
- diverging (reflective observation-concrete experience)



1.ábra: The Learning Cycle (David Kolb)

In the model of Kolb's are defined 4 status and 4 learning types. Based on the theory every learner is classified to a learning type. So Kolb's theory can give us a tool, which tool promises learning in an easy and effective way.

Although the model is currently unproven, it is used for different purposes. In adult education, in training methodologies, is used for:

- Training and development has incorporated experiential learning
- learning organization concept focusses on how groups and organization learn

There are some other applications area in Public education:

- improved classroom learning through more appropriate learning opportunities
- classroom activities designed to offer learners chances to engage in suitable manner – shift from teacher dominated to participative learning environment
- educators can identify preferred learning style and application of experimental learning cycle
- use of better techniques likes case study methods for real life learning scenarios

In my study I consider Kolb's learning cycle important, because it is able to give a chance to learn alone. In online world the avatar can be a member of an online community, but the real person is alone in the real life. If the learner wants to learn any subject with any didactic tool, sooner or later starts to acquire staffs and skills to work up the curriculum alone.

Individual Differences

Kolb's model depends on personal factors. These factors can influence the result of the model, when the model is used for define the personal style of learning behaviors.

Influence factors [2]:

- Age, education, gender
- abuse, neglect, trauma
- race, ethnicity, sexual identity
- temperament
- parenting style
- illness
- disabilities
- substance abuse
- culture
- getting stuck

Success of Kolb's Learning Cycle is mostly influenced by age of learners. The model works for adults, who has solid of values and they have experiences in learning, in works and in communication. Because teenagers and young adults are in progress, their measured type's values are in development. It is hard to define a stable type for an unstable person. But in the Private sector – which is works with adults - , Kolb's theory gives exact results, and mostly it is used by training methodologies.

Digital Learning Possibilities

Nowadays the Public education mostly looks like it looked 150-200 years ago. If we see the desks, the place of the teacher, the teacher's desk, the chalk board position, all of these items are in the same position like at the beginning of education. In turn the world has changed more than education, and the direction of changing is different as well. Nowadays

the mostly part of communication goes through digital channels, and it is handled any kind of display or screen. But in the school the basis of teaching is frontal, and do not let the virtual world into the education. There are a lot of trying to use new devices and new trends of technologies for teaching, but not for learning. I mean teachers use these digital tools for helping or supporting their works, but not for individual learning. Unfortunately, there is a gap between digital knowledge and the digital possibilities. There is a need to improve digital awareness, and digital security awareness for all member of education. [3] [4]

In my study I collected all of those digital learning possibilities which are capable to build in the experience learning process to leave alone the learner. These didactic tools are improved success, and they have own developed infrastructure, tried and improved advantages and methodologies.

There is another requirement for these tools, to have high design quality, up-to-date storyline and elements to give engagement for the users. Unfortunately, in the Private sector has more resources to pay attention these requirements, and it offers more designed applications for users than the education can do. [4]

The digital learning process uses the tools of constructive pedagogy, like David Kolb. It offers more possibilities for individual learning, and the Experimentation Learning Styles is suitable for this process.

They are either two groups of digital teaching by time. First group is the offline digital learning possibilities, which are offer contained digital content. At this group the learner has to schedule the time for learning, and has to process the content alone.

Offline digital learning possibilities:

- **E-Learning:** eLearning is learning utilizing electronic technologies to access educational curriculum outside of a traditional classroom. In most cases, it refers to a course, program or degree delivered completely online. [5]. E-Learning has a lot of variant, most of this technologies has a framework and a developing environment.
- **Digital learning materials:** It is used for to refer to materials included in the context of a course that support the learner's achievement of the described learning goals. These materials consist of a wide variety of digitally formatted resources including:
 - graphics images or photos
 - audio and video
 - simulations
 - animations
 - prepared or programmed learning modules.
- **Learning Games:** An educational video game is a video game that provides educational value to the player. Edutainment describes an intentional merger of video games and educational software into a single product (and could therefore also comprise more serious titles sometimes described under children's learning software). In the narrower sense used here, the term describes educational software which is primarily about entertainment, but tends to educate as well and sells itself partly under the educational umbrella.

The online learning materials need online presence from all participants at the same time. The communication between the participants is online as well, and being online is the most important trait in the learning process, influenced the participant's behavior.

Online digital learning possibilities:

- **Webinars:** may be used as an umbrella term for various types of online collaborative services including web seminars ("webinars"), webcasts, and peer-level web meetings. It may also be used in a narrower sense to refer only to the peer-level web meeting context, in an attempt to disambiguate it from the other types of collaborative sessions. Terminology related to these technologies is inexact, and no generally agreed upon source or standards organization exists to provide an established usage reference. [6].
- **Virtual classroom:** A virtual learning environment (VLE), also known as a learning platform, simulates a virtual classroom or meetings by simultaneously mixing several communication technologies. For example, web conferencing software such as GoToTraining, WebEx Training or Adobe Connect enables students and instructors to communicate with each other via webcam, microphone, and real-time chatting in a group setting. Participants can raise hands, answer polls or take tests. Students are able to whiteboard and screencast when given rights by the instructor, who sets permission levels for text notes, microphone rights and mouse control. [5]

A virtual classroom provides the opportunity for students to receive direct instruction from a qualified teacher in an interactive environment. Learners can have direct and immediate access to their instructor for instant feedback and direction. The virtual classroom provides a structured schedule of classes, which can be helpful for students who may find the freedom of asynchronous learning to be overwhelming. In addition, the virtual classroom provides a social learning environment that replicates the traditional "brick and mortar" classroom. Most virtual classroom applications provide a recording feature. Each class is recorded and stored on a server, which allows for instant playback of any class over the course of the school year. This can be extremely useful for students to retrieve missed material or review concepts for an upcoming exam. Parents and auditors have the conceptual ability to monitor any classroom to ensure that they are satisfied with the education the learner is receiving. [5]

- **Social networks:** Group webpages, blogs, wikis, and Twitter allow learners and educators to post thoughts, ideas, and comments on a website in an interactive learning environment. Social networking sites are virtual communities for people interested in a particular subject to communicate by voice, chat, instant message, video conference, or blogs. [5]
- **Chat clubs:** On the Internet, chatting is a communication way between two or more people who are using the Internet at the same time. Usually, this communication is the exchange of typed-in messages requiring one site as the repository for the messages (or "chat site") and a group of users who take part from anywhere on the Internet. In some cases, a private chat can be arranged between two parties who meet initially in a group chat. Chats can be ongoing or scheduled for a particular time and duration. Most chats are focused on a particular topic of interest - chat clubs - and some involve guest experts or famous people who "talk" to anyone joining the chat.
- **Online learning games:** it is works like learning games, but the difference are, the gamers play the game at the same time, so it need Internet connection. Mostly the game has a story which is need the community skills and power, so the gamer or the learner cannot reach the whole success alone.

The Online Games vs the Learning Games

If it is emphasized only one didactic tool from listed above, the online games are the most excited learning elements, I would like to study. Online games are created for entertain us, but all of good and experienced teacher know that playing game is a very serious learning tool, games could be the most exciting learning tool for students.

Nowadays people between 2 and 40 spend their leisure time in virtual space playing with a video games. There is a survey [6] a child till age of 21 spent 10 000 hours with playing in cyberspace. This is a frightening number, because it is the same like spent time for an average student in the school between age 10 and 18 [7]. So we have to admit we like to play video games, and we spend a plenty of time doing this habit. The question is, why do we spend a lot of time in the virtual world? And if it is true, can do we use this habit for good causes, for example learning serious subjects?

The answer is more compound like it is seem for the first sight. I collected some reason for loving video games:

- Epic mission
- Different skill levels
- Concrete things to do
- Community
- Positive feedback
- Better instructions
- Better feedbacks
- Better Community

Nowadays the biggest problem is that the fun games, like the World of Warcraft, are entertainment products. These entertainment products are not able to afford and support the classic learning process. The learning games and online learning games is another part of the game market. The biggest problem is, that the learning games cannot provide high quality design, real epic hero story, wide palette of characters, and complexity for the students like in entertainment games. So the learning games cannot be attractive and motivated for students.

According to Daphne Bavelier a neuroscientist said, that learning games look like a broccoli, while fun and entertainment games are a table of chocolate. All of us have already known that broccoli is a healthy thing. But if we have to make a choice what is finer the broccoli or the chocolate, I am sure, the chocolate wins. The great mission is how can put together the broccoli and chocolate, but nowadays nobody eats a broccoli with chocolate.[8]

Roles and Relations in Online Learning Styles

The classic roles can be found here, although most of the roles during offline electronic tutorials are similar to traditional patterns. In the cyberspace these roles are blurred, and the gamer or the participant can be a tutor, who has the knowledge, and validate this knowledge. (In the online space, perhaps the most difficult task is validating any data or knowledge). This is not necessarily tied to the qualified tutor, but belongs to the owner of the knowledge. These roles are constantly changing, as is the knowledge itself. We need much more empathetic, accommodation, adaptation and cooperation from both roles.

Who has the knowledge

- Tutors, mentors, coaches, trainers, teachers
- Gives feedback for participants
- Find the way of communication

Who wants to have the knowledge

- Gives feedbacks
- Asks questions
- Informs the tutor about any problem

Functions and Duties in Online Learning Styles

The functions and duties of the roles of tutors is definable easier in learning games, than in other digital learning tools. This role is responsible for knowledge transfer, designing and creating the of the game belongs to the owner of knowledge. Other tasks belong to this role, choosing the platform, find out the story of the game. The game owner has to develop the game with gamer's feedbacks, ideas and suggestion in the interim development. He or she has to analyze the measured values [9] from the game. Feedbacks is good for statistics, and improve ore develop the game to keep it alive and keep it in the focus. so the feedback is an important part of the game, important for game designer, developers, owners, and all staffs in the production. Feedback should be more important in the online world than in the real life. Feedback means the presence in this world and represents the person from the real life.

The gamer – who wants to have play or have the knowledge – do not want to have only the game, the gamer wants to have fun and joy, but furthermore wants to have a part in the game, wants to form it or wants to have an influence on the game process. But on the other hand the gamer is able to go along on the learning process alone. Many of assistance are supported the gamer, but survive the game, the epic hero pass over the game is not enough to get the knowledge. [10] The acquired experience from the game has to be transformed to the real life, and utilize all of them to win.

Who has the knowledge

- Finds the right platform
- Prepares and delivers the learning materials
- Gives guidance during the learning process
- Gives feedback for participants
- Does the follow-up
- Ensure different learning levels

Who wants to have the knowledge

- Has a basic motivation for learning
- Capable for learning alone
- Gives feedbacks
- Capable to start and finish a level
- Does the examination process

Motivation, Presence, Interactivity and Personal Contacts

- Feedback – motivation
- Community for the same interest
- This community is open for new participants, but closed for outsiders
- Ensure and strengthen each other
- Common goals, common rules
- More time – more earned wins
- To be unique (get the firstly result, to be the fastest, the best, the biggest...)
- Personal contact via Internet, but in closed chat groups

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TOKENIZATION AS AN EFFECTIVE TOOL FOR SECURE PAYMENTS

Peter Schmidt

Summary

Tokenization in practice means that during the contactless payments, these payments do not carry credit card information, but only the security token created especially for a particular device, merchant and purpose of payment. Thanks to the tokenization service

access to other electronic devices will be simplified in the near future. Besides "wearables", i.e. devices worn on body, these devices can be automobiles, televisions, game consoles, refrigerators and washing machines. Tokenization allows easy connection with a digital credit card payment service, and at the same time it ensures sufficient credit data when paying on the Internet or in a shop.

Key words

Authentication, Multifactor authentication, Token, Tokenization

Introduction

Although people rarely pay by phones in shops, it does not mean that after years of focusing at this topic banks had forgotten mobiles. On the contrary, payment companies, financial start-ups and banks are looking for solutions to convince people to exchange cards - which can be stolen, copied and misused – with a phone that can be safer and in addition offers a variety of additional functions. Last but not least is the probability that you forget phone at home, is lower than forgetting to put card in the wallet. The basis of each payment is the authentication process to verify and establish the identity of the person with the required degree of assurance, that the person making any claim about his identity is really the person for which they are issued.

Authentication

Validation is a process consisting of several stages. In general, the user must subscribe to a particular service and then prove its eligibility. Demonstration of eligibility is performed in one of the following three ways:

1. demonstrate knowledge (password, PIN)
2. proof of ownership (hardware token)
3. demonstration of biometric features (fingerprint, voice, retina)

At the present, the absolute majority of people use one-factor authentication. This means that the user proves his identity by one of three types of evidence - evidence of knowledge, proof of ownership, proof of a personal characteristic. Most often it is a password that is linked to the identifier such as a user name or login ID. At present, however, should be oriented more authentication parameter, which is a solution based on a combination of two or three authentication parameters.

Multifactor authentication

Multi-Factor Authentication (MFA) is a security mechanism in which individuals are authenticated through more than one required security and validation procedure. MFA is built from a combination of physical, logical and biometric validation techniques used to secure a facility, product or service. MFA is implemented in an environment where an individual's authentication and validation is the highest priority. To gain access to a secured location or system, MFA typically requires three different security mechanism layers and formats, as follows: Physical security: Validates and authenticates a user based on an employee card or other type of physical token; Logical/knowledge base security: Validates and authenticates a user based on a required password or personal identification number (PIN), which is memorized by the user; Biometric security: Validates and authenticates based on a user's fingerprints, retinal scan and/or voice. Frequently used authentication method - Two-factor authentication (2FA) - is a method of confirming a user's claimed identity by utilizing a combination of two different components.

Multifactor Authentication (MFA) software tool that adds additional security measures (via smartphones and biometrics) to standard user name/password logins for a number of services and servers. By doing so, it prevents unauthorized logins, even when passwords have been compromised and were shared among many different services.

Many of number of MFA products are especially suitable for those organizations that want to make use of a variety of external software as a service (SaaS) products, such as Google Docs, Salesforce.com and Outlook Web App.

Multifactor authentication products can provide significant benefits to an enterprise, but the technology is complex and the tools themselves can vary greatly from vendor to vendor. A feature on MFA is looked at three primary use cases for MFA, which are:

1. Augmenting Active Directory or similar user logins to local network resources such as file servers or VPNs/remote access controllers.
2. Providing strong identity verification to third-party Web services, such as Salesforce.com or Google Docs, using the Security Assertion Markup Language (SAML) standards,
3. Augmenting Web server logins directly, such as a website or web-enabled applications such as Outlook Web App or Microsoft SharePoint.

Most vendors provides a solid MFA tools that have been around for years and can handle a wide variety of situations, token types and applications; and all come in both cloud and on-premises versions.

Tokens

In general, a token is an object that represents something else, such as another object (either physical or virtual), or an abstract concept as, for example, a gift is sometimes referred to as a token of the giver's esteem for the recipient. In computers, there are a number of types of tokens.

1, In a token ring network, the presence of a token (which is simply a particular bit setting) in a continually circulating transmission stream allows a device to change the bit setting (thus taking the token) and put a message in its place. The receiver of the message elsewhere in the token ring network removes the message and resets the bit setting (this putting the token back) so that someone else in the ring of devices will be able to have a turn at using that message space.

2, A programming token is the basic component of source code. Characters are categorized as one of five classes of tokens that describe their functions (constants, identifiers, operators, reserved words, and separators) in accordance with the rules of the programming language.

3, A security token (sometimes called an authentication token) is a physical device, that the owner carries to authorize access to a network service. The device may be in the form of a smart card or may be embedded in a commonly used object such as a key fob. Security tokens provide an extra level of assurance through a method known as two-factor authentication: the user has a personal identification number (PIN), which authorizes them as the owner of that particular device; the device then displays a number which uniquely identifies the user to the service, allowing him to log in. The identification number for each user is changed frequently, usually every five minutes or so. Unlike a password, a security token is a physical object. A key fob, for example, is practical and easy to carry, and thus, easy for the user to protect. Even if the key fob falls into the wrong hands, however, it cannot be used to gain access because the PIN (which only the rightful user knows) is also needed.

One-time password tokens

The recent phishing attack on Citibank's one-time password (OTP) authentication has questioned the viability of OTP tokens as a secure method for two-factor authentication. That concern is even greater among banks who had pinned their hopes on using tokens to meet the Federal Financial Institutions Examination Council (FFIEC) recommendation that they implement two-factor authentication to protect their Internet banking Web sites from malicious access. One-time password tokens can still be effective for two-factor authentication depending on how and where they're implemented.

OTP tokens generate new PIN numbers every 30 to 60 seconds and can be used in addition to static user IDs and passwords to log on to a Web site. The idea is that if the static credentials are stolen, say, in a phishing attack, the malicious user would still have to guess the PIN to gain access. But since the time window is short to guess the PIN, it would be nearly impossible to break in.

Information security professionals have known for a while that OTP tokens are susceptible to man-in-the-middle (MITM) attacks. However, as scary as a real-time phishing attack may be, it requires that the hacker be at his keyboard at the right moment and act very quickly (like in 30 seconds) to gain access to the victim's online bank account. So unless it can be automated, it doesn't make a lot of sense for the serious criminal. Remember, phishing attacks are committed by organized criminal groups interested in making a fast buck. This means constant monitoring of the victim online. Traditional phishing sites can harvest more prey, more efficiently, and make more money through passively harvesting credentials than the occasional one-off real-time attack, which depends mostly on luck. Of course, with the right combination of automated scripts and botnets, this could all change.

There are two strategies for successfully and securely implementing OTP tokens: architecture of the token implementation and physical security of the tokens themselves.

In terms of architecture, the first consideration is placement of the token in your system. The most secure use of OTP tokens is for logging in to workstations locally or for accessing an internal network behind a firewall. In an internal network, unlike the open Internet, where all servers are not monitored an MITM attack is not as likely. Therefore, a good approach for Web sites is to use Secure Sockets Layer (SSL) for the login page, where the OTP value is entered only for the following transaction pages. This encrypts all credentials – both the user ID and password, and the OTP's PIN – from the beginning. Login pages of some Web sites that use plain HTTP may pass credentials openly unencrypted over the Internet, where they can be sniffed. Unfortunately, SSL cannot stop a man-in-the-middle attack. SSL with mutual authentication enabled can provide some protection since both the server and client exchange certificates, preventing the type of server spoofing needed for MITM attacks. Is important design website with the latest version of SSL that has mutual authentication.

Tokenization

What is tokenization? Tokens itself means nothing. It is a unique cluster of characters, often disposable, which is the system processor card payments linked to the client. Dealer for payment by phone gets available only token through which implements payment card information never seen before. The token is not a cipher, one can not even break and can not be traced back to him from the card details. That is because credit card's data do not enter into the token making process. Sensitive card data remains in the strong security system of the bank or card company. In the case that the trader is hacked, attackers receive only useless tokens.

Tokenization, when applied to data security, is the process of substituting a sensitive data element with a non-sensitive equivalent, referred to as a token, that has no extrinsic or

exploitable meaning or value. The token is a reference (i.e. identifier) that maps back to the sensitive data through a tokenization system. The mapping from original data to a token uses methods which render tokens infeasible to reverse in the absence of the tokenization system, for example using tokens created from random numbers. The tokenization system must be secured and validated using security best practices applicable to sensitive data protection, secure storage, audit, authentication and authorization. The tokenization system provides data processing applications with the authority and interfaces to request tokens, or detokenize back to sensitive data. When tokens replace live data in systems, the result is minimized exposure of sensitive data to those applications, stores, people and processes, reducing risk of compromise or accidental exposure and unauthorized access to sensitive data. Applications can operate using tokens instead of live data, with the exception of a small number of trusted applications explicitly permitted to detokenize when strictly necessary for an approved business purpose. Tokenization systems may be operated in-house within a secure isolated segment of the data center, or as a service from a secure service provider. Tokenization may be used to safeguard sensitive data involving, for example, bank accounts, financial statements, medical records, criminal records, etc.

However, the client does not know anything about what is tokenization and how it works. He just knows that it is a secure system. The fear of abuse is still a major obstacle to the use of mobile payments. However, the advantages outweigh the drawbacks and shopping in e-shops through mobile devices are significantly growing year by year.

Token authentication vs. biometric authentication systems

Biometric systems have been around for a significant period of time, and they have successfully made the leap from science fiction and movies to the real world. Early issues such as revocation and replay have largely been resolved, though compromise of the biometric storage system still remains an issue. Consider what happens if your biometrics are compromised where they're stored. What do you do if your fingerprints or retina scans are pinched? You cannot very well go and get a new set!

Unlike swipe cards, tokens and passwords, it's hard to forget your fingers at home. The problem with biometric authentication is that some vendors are promoting them as a substitute for conventional authentication processes, but they're not. Biometric systems make an excellent addition to security, and could be considered a substitute for token-based authentication, but they will never be a substitute for a username/password/PIN. If you haven't implemented a second factor of authentication, then review both biometrics and tokens. Either would significantly complement your current security setup.

Conclusion

Tokenization greatly simplifies the use of payment applications for mobile phones. HCE solution (host card emulation) in mobile phones creates a space that was previously only found on the SIM card and was under the control of the operators. The exclusion of operator, as a necessary third-party, payment options opened up a greater number of candidates. Some banks offer mobile apps, which after downloading and activating, allow pay by pressing a single icon. No need to visit either the operator or a bank. Bank through the application connects mobile devices with a card of the client. Then, the mobile phone starts to behave like a contactless payment card, while not necessary to have the running application, but must be turned on NFC mode. These applications allow the generation of replacement data from which cannot clone a plastic card, but allows payment on websites which are unknown to

customer, . Shopping on the Internet will become safer and without establishing a PayPal account.

Contacts

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IMPORTANCE AND ROLE OF E-LEARNING IN MANAGEMENT DEVELOPMENT

Zuzana Skorková, Natália Tarišková

Abstract:

Management development in any company is one of the most important responsibility of human resources management. It allows managers to achieve a certain degree of satisfaction in their work performance and to gain competitive advantage in the labour market. In today's globalized economy with its rapidly changing environment, any company that isn't investing in professional development of the employees will fall behind. Management development is the overall concept that describes the many different ways in which companies help employees develop their personal and organizational skills and competencies either as managers in a management job or with an eventual management job in mind. Management development is important motivation element – if the company supports and promotes management development it is clear that employees are highly appreciated there. Thereby this company gives them perspective and strong motivation. Clark and Mayer define e-learning as instruction delivered by any technological mode intended to promote learning. Teaching and learning in an e-learning environment happens in different way in comparison with traditional classroom training and can present new challenges to teachers, instructors and learners participating in this online learning environment. The main objective of this paper is to determine the importance of e-learning in management development. We will observe the limits of e-learning and we will find the answer on questions about how to overcome the most important challenges in e-learning, especially low motivation, busy schedule of learners and technical skills of employees.

Key words:

human resource management, e-learning, management development, employee, motivation.

Introduction

Any organization need people with high and appropriate levels of knowledge, skills, competences and abilities. There is a constant need to rapidly train and retrain people in new technologies, products, and services found within the environment. Industrial Aged was replaced by the Information Age and now we are in the era of the Knowledge Age. Learning and development becomes the key for any organization to be able to obtain, assimilate and apply the right knowledge. Survival of any company will depend on their capacity to learn and develop their knowledge. Learning and development activities make a major contribution to the successful attainment of the organization's objectives and investment in it benefits all the stakeholders of the company. E-learning becomes a necessity of today. It brings flexibility and it helps people manage effectively their time, jobs, budgets and family life.

Learning and development

This need is fulfilled by business-led steps based on an understanding of the organizational strategy. Learning and development (L&D) is defined as the process of ensuring that the organization has the knowledgeable, skilled and engaged workforce it needs. It involves facilitation the acquisition by individuals and teams of knowledge and skills through experience, learning events and programs provided by the organization, guidance and

coaching provided by line managers and others, and self-directed learning activities carried out by individuals. (Armstrong, Taylor, 2014) Learning is at the heart of organization. Learning has the power to enable individuals and companies to meet their personal and collective targets and ambitions.

There are several components of (L&D):

- Learning – this process is defined as modification of behavior through experience as well as more formal methods of supporting people to learn including both – outside and inside workplace. Simply said – it is the process by which an individuality gains and develops knowledge, skills, capabilities, behaviors and attitudes.
- Training – formal process which systematic application help people to acquire the skills necessary for them to perform their jobs satisfactorily.
- Development – the growth of a personality through learning and educational experience.
- Education – knowledge development.

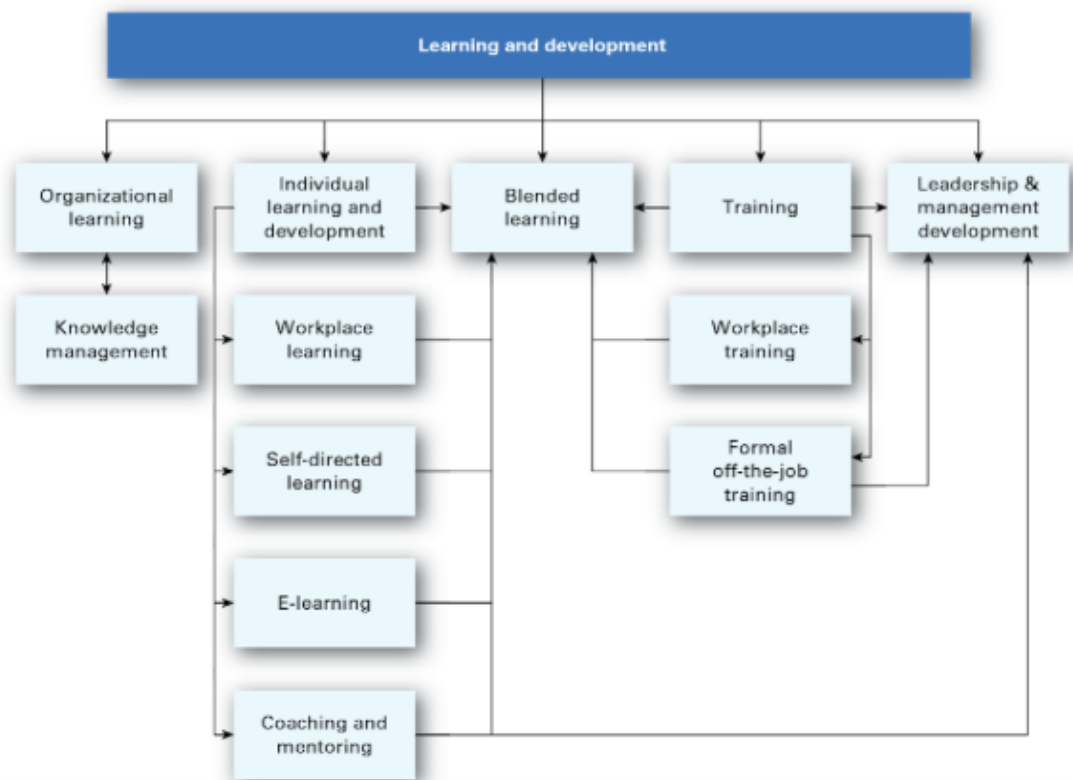


Figure 1 Components of learning and development, Source: Armstrong, Taylor (2014)

The design of different types of learning environments can depend on the learning objective, target audience, access (physical, virtual and/or both), and type of content. It is important to know how the learning environment is used, and the influences of the tools and techniques that distinguish the differences in learning outcomes as the technology evolves. (Moore, Dickson-Deane, Galyen, 2011) E-learning is a term encompassing many teaching approaches, types of technologies and administrative practices. The history of e-learning is short, and it can be characterized by rapid changes in technological development. A challenge in analyzing e-learning is that the technologies and their educational applications are developing extremely rapidly. Armstrong and Taylor (2014) define e-learning as a process involving the use of computers, networked and web-based technology to provide learning material and guidance to individual employees. It can be delivered through a firm's intranet.

E-learning transforms the learning process in several ways. It allows the firm to bring the training to employees rather than vice versa. *E-learning*: E-Learning is a term that refers to a wide range of electronically distributed teaching and training materials. E-learning also allows companies to offer an individual training to employees when and where they need them. This type of training, which is referred to as just-in-time training, helps alleviate the boredom trainees experience during full-blown training courses, and employees are learning management system (LMS).

E-learning systems need not be overly expensive. Many e-learning training programs use existing applications employees are familiar with such as PowerPoint, Word, Adobe Acrobat, and audio and video files that can be easily uploaded and viewed or listened to online with any web browser.

Figure 2 Comparison of e-learning and traditional classroom learning

	Classroom	E-learning
Advantages	<ul style="list-style-type: none"> • Immediate feedback • Motivating participants • Strong social community and its cultivation • Being familiar to both – instructor and training participant 	<ul style="list-style-type: none"> • Learner-centred • Time flexible • Location flexible • Global audience • Unlimited repetitiveness
Disadvantages	<ul style="list-style-type: none"> • Expensive to deliver • Time and location constraints • Instructor centred • Limited repetitiveness • Flexibility 	<ul style="list-style-type: none"> • No immediate feedback • Time consuming for preparation period • Lack of motivation for participants • Lack of comfort to some people • Increase of frustration, anxiety and confusion • Computers availability • Based on self-motivation

Benefits of E-Learning implementation in the workplace

The benefits of e-learning are mainly the cost efficiency, accessibility and flexibility in terms of time and place. E-learning allows learning to take place when the lecturer and the learner are separated both in time and space (Uys, 2003). It offers convenience for both tutor and the learner (learning anytime or anywhere). Other benefits of e-learning include:

- Ease of access to information.
- E-learning gives staff the flexibility to fit in training around work commitments and make maximum use of their available time. We have to mention as well the flexibility for busy employees, e-learning provides huge benefits for staff with disabilities or mobility problems, or whose irregular hours and shifts mean they are unable to commit to a regular external course.
- Just-in-time learning — e-Learning and performance support are available whenever and wherever needed by the workforce.

- Suitable for Millennials. E-learning is better suitable for the millennial workforce. Today's employees work not just for money, but also to continually learn. Classroom style learning environment is strictly limited by the number of training programs that an employee could attend over any given period of time. With e-learning, the knowledge is always available at the employee's disposal. This gives Millennials better access to subjects they are interested in and not necessarily those that would benefit them (only) at work.
- Enables conduct of lessons from a remote location and extends geographical access to education.
- Content is more timely, consistent and dependable with potential for re-use,
- E-learning lowers costs and improves cost-effectiveness of educational resources. low-cost delivery—upfront costs may seem prohibitive but in the long run, huge savings are made for the organization as access to training courses and materials will only incur a fraction of traditional classroom training costs.
- Eliminate travel costs and the time away from the workplace and job that travel necessitates.
- Offers the combination of education with work and family life,
- Facilitates the management of participant records and tracking participants' progress.
- Always up-to-date — with e-Learning and performance support resources available a finger touch away, updates are immediately available to all workforce involved.

Challenges in e-learning usage in the workplace

Based on Tynjala and Hakkinen (2005) e-learning is not a miracle remedy to the problems of any work organization. The success of e-learning is highly dependent on factors related to the overall work and learning culture of an organization. It is an organizational structures and an atmosphere at work environment that may include both opportunities and barriers to e-learning. Group work in virtual environment seems to be a major problem related to e-learning. Certain phases of problem-solving may be so complicated without face-to-face contact that the productive sharing and elaboration of knowledge through electronic tools is almost impossible.

Guiney (2015) described several barriers in implementing e-learning in the workplace are:

- High up-front costs that include new and/or upgraded systems, training the trainers, and developing interactive and/or personalized content.
- Employee resistance to e-learning.
- Organization's not having an appropriate learning culture in place.
- Lack of management support
- Adopting technologies and systems that are difficult to use and access, are unreliable, and/or lack technical support.
- Employees and trainers lacking the skills and capabilities to teach and learn in e-learning environments.
- Irrelevance to real-time work tasks and not integrated with business processes.

One of the most important disadvantage of e-learning is that this isolated method of learning may not be optimal for everyone. Individuals that are less aggressive in comparison with others may not ask for clarity when in doubt about certain content; and/or may find it difficult to navigate around the program because they lack good computer skills. Another drawback is the evaluation process that seems to be difficult for e-learning. Next disadvantage is employees who are not quite computer savvy may lack motivation and confidence for e-learning and would instead prefer face-to-face instructor-led teaching. All these facts, if not

dealt with appropriately, could interfere with increased learning ability and would ultimately decrease accurate productivity in the workplace.

Many other studies of e-learning support this conclusion; the best results have been gained by integrated solutions, that is, by combined face-to-face learning and e-learning (Dillenbourg, 2002). E-learning environments have often chiefly been used to deliver learning materials. This is a waste of time and resources as the aim of workplace learning is not to transmit knowledge but to transform and create knowledge. Materials delivery should occupy only a marginal role in e-learning environments. The most important events should take place in collaborative knowledge building modes. Freund (2004) has suggested that main reasons for unsuccessful e-learning initiatives have been:

1. (1) lack of personalization;
2. (2) lack of collaboration and interactivity; and
3. (3) that e-learning has not been learner oriented.

Tynjala and Hakkinen (2005) suggest that to enhance both individual and organizational learning and development e-learning solutions should include the following features:

- support of both individual reflection and collaborative knowledge building or epistemic social practices;
- integration of theoretical knowledge with participants' practical experience;
- learning tasks that lead learners to examine their work in the light of the
- conceptual tools provided;
- learning tasks that help learners to conceptualize their practical experiences;
- support for the invention and use of boundary objects;
- support for the explication of implicit knowledge;
- encouragement of collaboration and knowledge exchange between different groups of people (different professional groups, people from different domains, experts and novices, for example);
- real dialogue;
- a progressive problem-solving orientation;
- integration of different forms of representation and different forms of learning activities (reading, writing, discussing, using metaphors, audio, visual etc.);
- structured support and guidance for learning in all phases of the learning process; and
- integration of e-learning with face-to-face learning situations whenever possible.

eCampus in New Zealand

There are many ways in which eLearning can be applied in. Because the applications can be technologically complicated, and because their use does not always match well with traditional modes of teaching and learning, much care needs to be taken in the design, creation and implementation of eLearning solutions.

There has been developed a quality assurance system that assists to eCampus team in New Zealand to provide effective eLearning solutions. Based on a set of four quality assurance procedures that facilitate five distinct applications of eLearning, the system combines flexibility with an effective design structure. The system further benefits from its clear step-by-step processes and self-correction through planned project reflection time.

Quality is made up of many elements. For eLearning products, the following is suggested as quality criteria (based on Garvin, 1988):

- Performance – the finished product should operate in an effective way, as determined by the end-user.

- Features – the ‘bells and whistles’ incorporated into the finished product should be appropriate, and not detract from the overall objectives of the project.
- Reliability – the finished product should not be subject to malfunction.
- Conformance – the finished product should comply with industry standards, using standard technologies (though those technologies can be pushed to their utmost) and reflect established education theory.
- Durability – the finished product should be relevant and either timeless (in the case of teaching established principles) or easily updated.
- Serviceability – it should be easy to repair or adjust the finished product as required.
- Aesthetics – the overall ‘feel’ of the finished product should be professional and user-friendly.

To apply eLearning solutions in response to identifiable teaching and learning prerogatives, in turn making education more accessible, efficient and effective. To improve education efficiency by:

- Providing increased opportunities for collaborative and problem-based learning.^{[1][SEP]}
- Encouraging eLearning practices that can be used to ‘free up’ class contact time for more productive pedagogical approaches than didactic lecturing.^{[1][SEP]}
- Reducing the necessity of excess time teaching areas that can be more clearly illustrated using eLearning tools.^{[1][SEP]}
- Storing class resources in a Web-based repository for all hour access.

To improve education effectiveness by

- Enhancing delivery in areas that students typically find conceptually difficult
- Enabling and encouraging student interaction and structured discussion.
- Facilitating increased levels of tutor involvement with students as a group and as individuals.
- Providing opportunity for preview / review of resources online.
- Providing an overall education context that ensures the sound application of eLearning tools within a course.
- Working with subject matter experts to ensure that technology is applied in a way that identifies their unique needs, and that sets innovative approaches in ways relevant to the subject matter.

These objectives are underpinned by the following core values.

To believe in the potential of eLearning tools. Existing technologies can be powerfully and creatively applied to enhance teaching and learning, improving the access, effectiveness and efficiency of education.

To believe in quality education. The use of eLearning tools cannot be separated from quality teaching practice. To apply eLearning in the context of a sound understanding of education processes, supporting subject matter experts in the creation and integration of eLearning tools.

To use eLearning in ways that motivate and value students. Sound education engages with and values the contributions of students. To use eLearning tools in ways that are intrinsically motivating and empowering to students.

To know that good teachers interact with their students. The most powerful role of the teacher is as a personalised source of learning support. eLearning is applied in such a way that the teacher is empowered to spend more time responsively interacting with students as a group and as individuals.

Conclusion

From the broadest perspective, the goal of e-learning is to contribute to the organization's overall goals. Training and development programs should be developed with this in mind. Managers should keep a close eye on their firm's goals and strategies and orient their training and development accordingly. For example, is it the firm's goal to develop new product lines? If so, how should this goal affect its training initiatives? Is the firm trying to lower its costs of production so it can utilize a low-cost strategy to capture new business? If so, are there training initiatives that can be undertaken to deliver on this strategy?

Unfortunately, some organizations fail to make the connection between training and an organization's goals. Instead, fads, fashions, or "whatever the competition is doing" can sometimes be the main drivers of an organization's training agenda. As a result, e-learning training programs are often misdirected, poorly designed, and inadequately evaluated—not to mention a waste of money. One, not all of a firm's strategic initiatives can be accomplished with e-learning. Two, not all training programs—no matter how widely they are adopted by other organizations—will be a strategic imperative for any other firm.

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ONLINE PUBLIC MARKETING

Mária Szivósová

Summary

Online marketing is marketing that takes place in a specific environment of the Internet. Paper clarifies the use of the tools they use as Internet advertising and website, as well as marketing communication tools that are in the online marketing also apply.

Keywords

Online marketing tools, Marketing in social Media, SWOT analysis, website promotion,

Introduction

To understand the use of online marketing tools in practice is the most appropriate case study that represent the following article.

In this following article you will find all the necessary information to understand our company and to evaluate our marketing strategy. Thereby, in a first part, we decided to analyze our business by quickly describing our concept, our missions and goals and our target. Then, in a second part, we realized a micro-environment analysis of our business so you will see the SWOT analysis, who are our principal competitors and the survey that we organize on the market. To continue this assignment, in the third part, we focused on the marketing strategy with a definition of the market segment, the target and the positioning but also with the description of the 4 P's.

Finally, last part content is about the description of our website with an argumentation about the choice we made for the design for example.

1. Our business analysis

The service that we propose would be to create a website which allows you to rent an object, or a car for example, near to your localization safely. The owner will propose a good to rent, it can be almost everything, and the renter can search for a specific good around him. Once the renter found the good, he can speak directly with the owner on a safe messenger service. Then, the payment is done online and the renter receives a contract. At the end, the owner and the renter meet each other and do the transaction. It will be a C2C model.

Missions and goals

“RentItAll” aims to facilitate and to make people’s life more practical. We want to connect people between themselves and create a totally new service. Fast, interactive, based on geolocalisation, with a big geographical expansion potential, “RentItAll” will change the market. Our objectives are firstly to be implemented in Bratislava, then in all Slovakia and at the end, export our idea in other countries where there is a need. We would like to make a really big advertising campaign in order to touch the biggest amount of people. This is our main issue: Finding enough people at the beginning to create a “crowd movement”.

Our target

First of all, all people who have access to the Internet and trust in it. It will be not focus on a specific gender or race. People who use it will have to be a little open minded to be able to rent a good to people they don’t know about. Maybe the target will be in majority young people, because of their knowledge in informatics and their faith in new services.

Today, people are targeting their budget, they buy only the things they need. Moreover, if you are busy and you plan something at the last minute, this website could be a good way to save you.

2. Macro-environment analysis

SWOT analysis

STRENGTHS	THREATS
<ul style="list-style-type: none">• Innovative and modern concept in Slovakia• Not expensive to create• Not complicated to create• No intermediaries• No useless wasting = environmental conscientious• Cheaper for consumer to rent than to buy new goods• Optimizing the use of the goods	<ul style="list-style-type: none">• Not enough people at the beginning• Difficulties to make Slovakian population understand the concept• Lack of trust between people – For people to privilege specialized and well-known structures• Cultural differences = maybe it is not current in Slovak’s culture to rent in C2C (Consumer to Consumer)

OPPORTUNITIES	WEAKNESSES
<ul style="list-style-type: none"> • Connecting people • Possibility of exportation of the concept • New market = New customers • If it works in Bratislava, it will work all around the country and maybe can be extent to other central Europe countries 	<ul style="list-style-type: none"> • Everything is on the Internet = Afraid of financial transactions • Not so many possible innovations • Old people might be excluded of the market • The concept can be lost on the immensity of Internet really fast

Competitors

First of all, we tried to observe the web to find, if they exist, our direct competitors. That is to say, competitors who have the same concept than us: a website which allows one person to rent a good to another person without professional intermediaries. In consequence, we didn't find direct competitors because this concept is really innovative. Nevertheless, other websites and companies can compete with our business. It includes all the websites that propose renting service, specialized like "Rentalcars" for the cars or even "Airbnb".

3. Market research – questioner – 55 answers

Were you aware about a concept like ours before knowing us



Would you be seduced by our service?



Is the online payment (Paypal, etc) would be a curb for you?



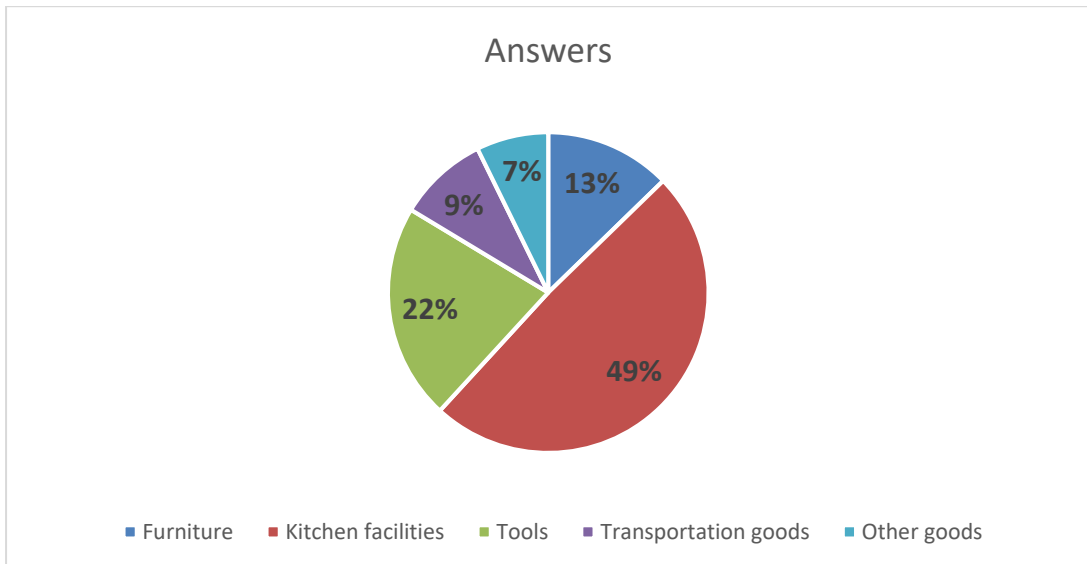
Would you think that you trust people enough to rent your own goods?



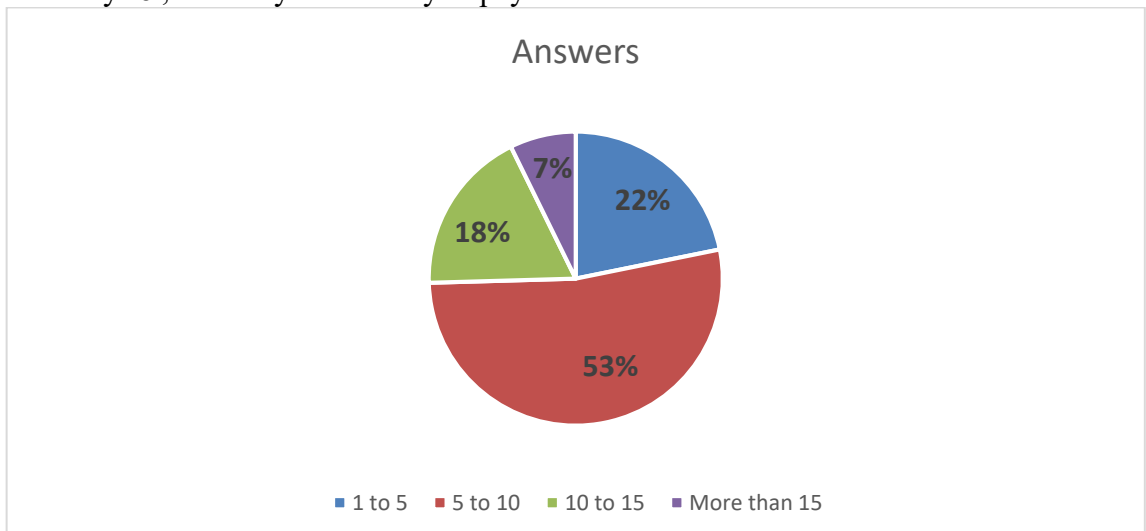
Would you be ready to download a mobile application in order to use our service?



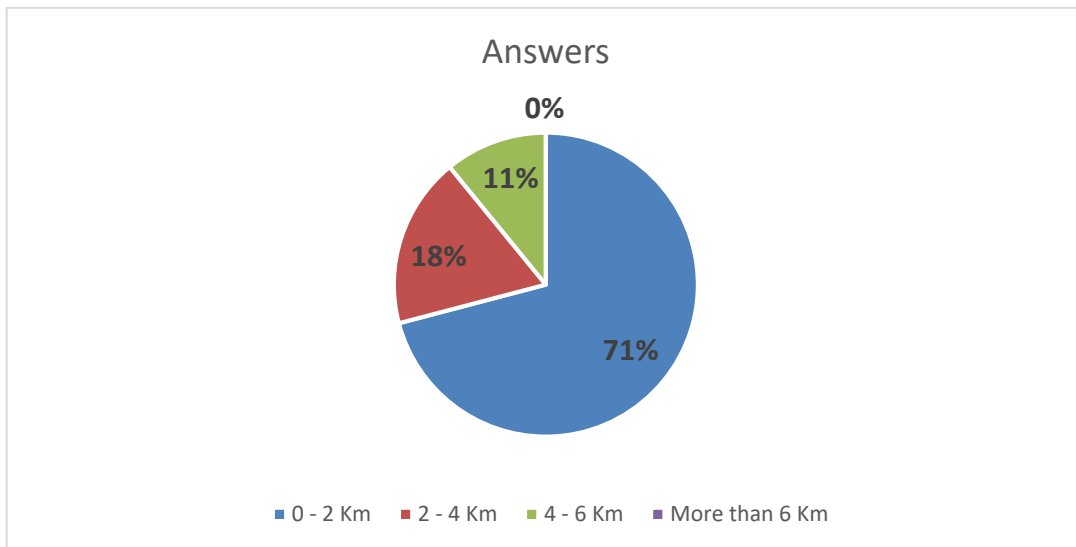
If you would use our service, which kind of goods you think you would be more used to rent



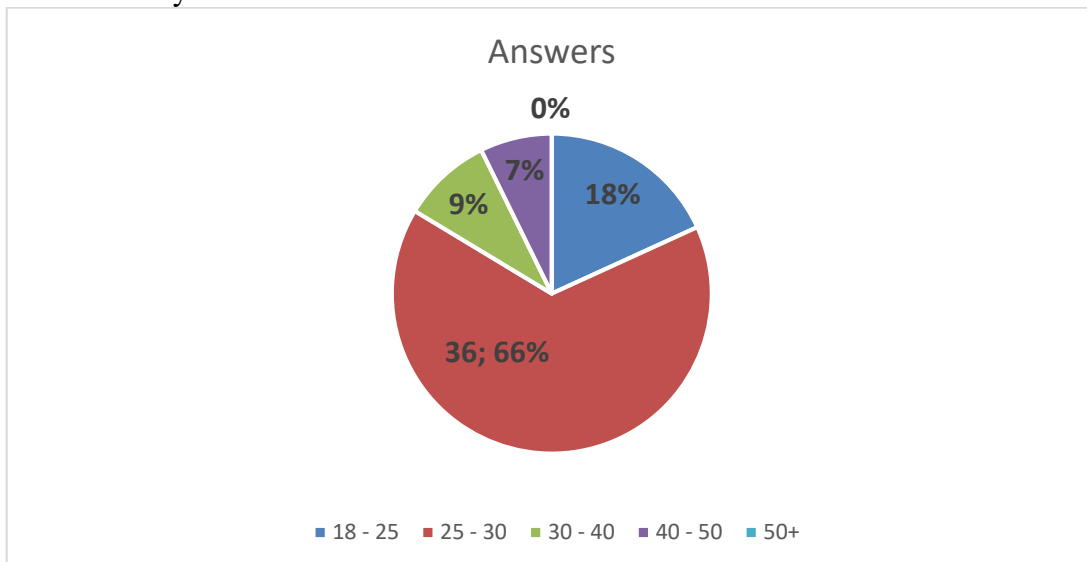
Pricing: You need to rent a bicycle for one day. You choose to use our website. Which amount of money- € , would you be ready to pay for it?



Place: Which distance would you be ready to travel in order to rent the good you want?

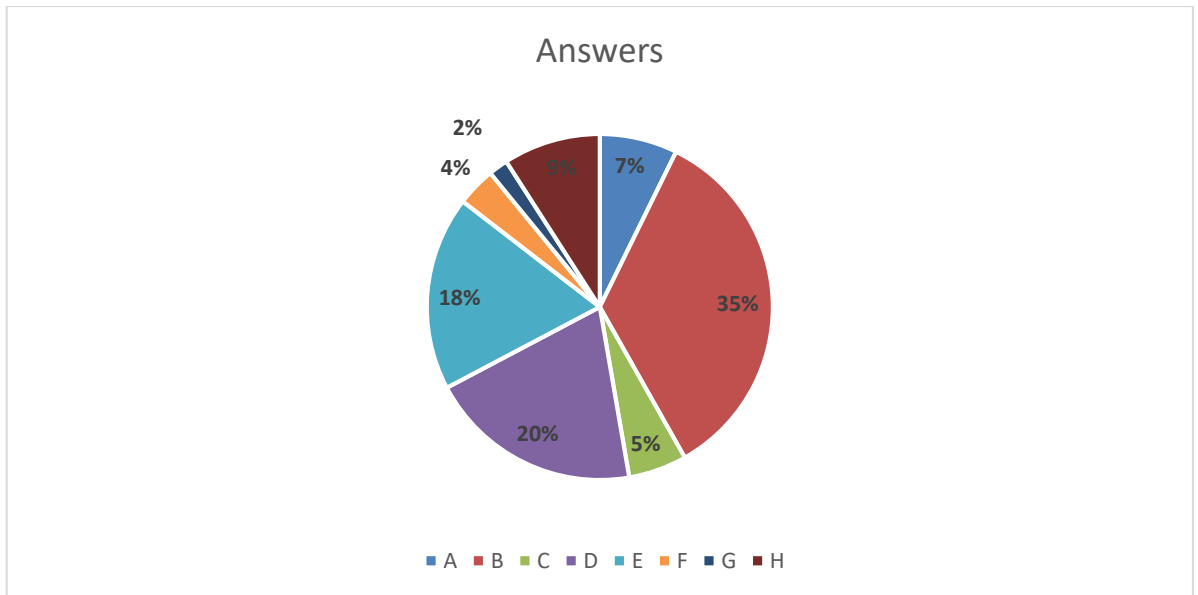


How old are you?

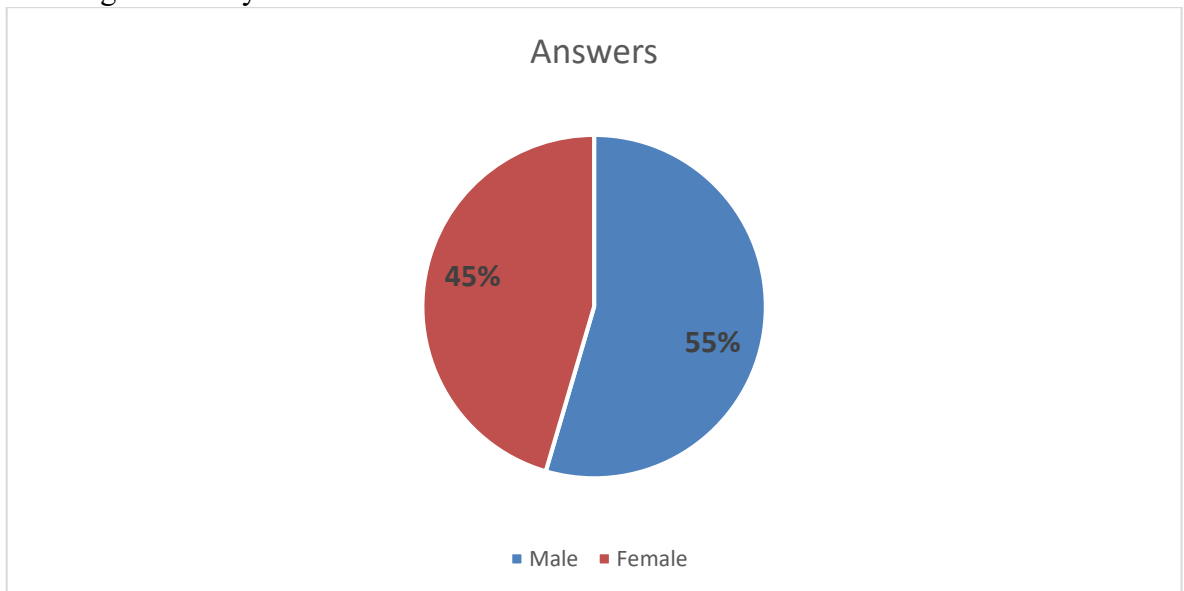


In which socio-professional category are you?

- Higher managerial and professional occupations
- Lower managerial and professional occupations
- Intermediate occupations (clerical, sales, service)
- Small employers and own account workers
- Lower supervisory and technical occupations
- Semi-routine occupations
- Routine occupations
- Never worked and long-term unemployed



Which gender are you?



4. Marketing strategy

Segmentation, targeting, positioning

Segmentation of a market is “the process of defining and subdividing a large homogenous market into clearly identifiable segments having similar needs, wants, or demand characteristics. Its objective is to design a marketing mix that precisely matches the expectations of customers in the targeted segment.”¹⁶ With RentItAll we choose to operate on the market of rental, but in a different way, because we are not the owners of goods to rent but our website exist to relate a private individual owner to a private individual renter. This is what we call C2C: Consumer to Consumer. So, for RentItAll, the market segment that we

¹⁶ <http://www.businessdictionary.com/definition/market-segmentation.html>

choose referred to people who are skillful on Internet and who are curious. Then, they need to be sensible to the ‘no wasting’ cause. That is to say, people who prefer rent old goods than buy new ones. They also have to be people who will be able to trust the others as much as an owner than as a renter. Finally, we think that the segment will be mostly focused on young people because they are not beginners and unfamiliar with these types of concepts (Blabacar, Airbnb...).

Consequently, our first target will be a ranch of people between 20 years old to 30 years old. But only at the beginning to make the project work and gain in visibility and reputation. But, of course RentItAll has been created for everybody.

The 4 P’s

PRODUCT

When people want to rent something they will spend time to search for it. With our website they will avoid this process. We thoughts about this website to answer to our consumers’ needs: simplify their research for goods they will need only few times. We want to propose a lot of different categories on our website so that the users would dispose of a wide range of products and the closest solution to their demand. But of course, the diversity of the offer will depend of the owners’ goods. They have, first, to know the concept, to understand it and to trust us so that they will be able to put a good to rent on RentItAll. To allow this big diversity, the concept has to be well-known before, but we will talk about this later in promotion.

PRICE

How will we earn money? How will we set up the price of the rented products?

First thing to know on our website is that the price of the exposed products are not set up by us but owners set up prices. Of course, we cannot let them put any prices because it could be too high or too low. In this step, we are here as an advisor: if the price is too high we will warn the owner that there is a risk for him to not rent the product because the price is not adapted, and vice versa. So, owners are independent they have the possibility to choose the price but in a reasonable way so that our website can be one’s in which people trust.

To be able for the company to “stay alive” and to survive on the Internet, we have to earn money somewhere. Our idea to do that is to take 10% of commission on each rented product. We also wanted to set up a subscription system for the owner, at the beginning it will be for free (like a trial period) and then if they want to stay on the website they will have to pay a subscription.

PLACE

Everything is happening on Internet, through our website. To take contact with us if owners or renters have problems, it is happening through e-mails or phone number that we put on the website. We will not have physical office to meet people because we are not supposed to be an intermediary, we are just RentItAll creators and we only have in charge the good development of the website and its security. Of course we will have a private office to be able to handle after-rent service for dissatisfied renters, but also to take care of all bureaucratic issues: accounting, website creation and design, etc. However, this office will not be open to the users of RentItAll, it is not a retail point only an administrative point for our company.

PROMOTION

Like we explain a little bit before, our main target is supposed to be mainly young people because of different factors. Thus, for the promotion concerning RentItAll we thought that it was clever to target social Medias first. That is to say, big social Medias like Facebook (by creating a page), Twitter, Instagram (through our account we could post pictures of our new product online), etc. This kind of promotion will give us quick visibility and is cheaper than TV ad or posters in the street.

5. Website content

Our company is an online company so our only tool is the website. When a user arrives on our website, we only have a few seconds to convince him to stay. You should know that he judge the quality of the site according to his first impression.

The home page is the first thing the consumer sees, everything must be clear and easily discernable. On this page you can find our logo and slogan « When your needs meet other's ones ». Landmarks are the most important things, it is comparable to a store window: this is where the user will decide whether to continue to visit your website. We have five different landmarks. The first one is « home ». This one is like a summary of our website. You can find all the category, news products available and at the end of this page there are our email address to contact us, the different payment we accept and a box where user can add their email address to join our mailing list. After there are three other landmarks which are « transportation », « kitchen » and « tools », it's the three category of object that users can find on our website. They give a direct access to the page that includes all objects of these categories. The last landmark is called « more » and it contains tabs « contact » and « about us ». The last thing that users can find on the home page is the cart which contains product that user want to rent.

When a user click on one product he can find all the necessary information about it. There is a product image, the rental price per day, the quantity (how many days you want to rent it), and the functionality « add to cart ». There is also all the information concerning the product and the owner as his name and address.

Finally, when the user has finished filling his cart he only has to click to validate the « rent agreement ». On this page you can see a summary of its locations with different objects, price, number of days and the total amount payable. It is also on this page that can contact the owner to discuss the real act of rent (when the renter will fetch the product in question from the owner)

Conclusion

The concept of RentItAll is simple, if you want to save money, reduce waste and find what you need in your neighborhood area in few minutes, you just have to visit our website RentItAll.

After realizing an analysis of our business by quickly describing our concept, our missions and goals and our target to well understand us, we realized a micro-environment analysis with SWOT analysis, who are our principal competitors and a survey on the market.

To continue this assignment, in the third part, we focused on the marketing strategy with a definition of the market segment, the target and the positioning but also with the description of the 4 P's.

After all these analyzes, we tend to believe that our concept, as new as it is, can work very well here in Slovakia. Having still a little apprehensive, we leave a year to positively or not evaluate the success of our project and then why not develop it in the other countries of Central Europe and Eastern Europe?

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OPTIMIZATION OF BIG POPULATION'S MULTIMODAL BIOMETRICAL IDENTIFICATION WITH A COMPLEX NEURO- FUZZY LOGIC CONTROLLER

Gábor Á. Werner - László Hanka

Summary

In this paper we presented a method which could be used for biometric identification of a greater population. Usually the biometrical identification suffers from practical limitations. Meanwhile the accuracy should not lessen, in the big populations more and more data have to be transferred, thus the classification and evaluation of the information is getting crucial. We presented an algorithm that examines two different type of biometrical trait and

assigns them a fuzzy vault in multiple steps to calculate a compound assessment about the subject. The attribution of the soft-computing techniques are creating the opportunity to teach the outlined method, so the fuzzy rule base and the inner limits can be taught in an automatic way by the genetic algorithms and neural networks. The applied neuro-fuzzy controller can be able to shorten the border crossing, access to highly secured installations or the automatic person identification in public places.

Keywords

component; biometrics, multimodal, soft-computing, artificial intelligence, human perception

1. Introduction

The processing time will be soon a significant limitation in the biometrical identification. Some country already uses biometrical identification not only in forensic investigation but also in the field of border control, or for surveillance in high-traffic areas. Presumably this technique of identification will be widely applied in other institutions, for example in social insurance, health care and even in the economic operators like banks or multinational organizations.

The big issue with the biometrical identification is the correlation between the failure tolerance and the reliability. Due to the classical measurements of the biometrical systems and devices, the False Acceptation Rate (FAR) and the False Rejection Rate (FRR) can be addressed as index numbers of the operation [1]. Our challenge to solve the contra version, because these are inversely proportional. The Receiver Operating Characteristic (ROC) can show the correlation, which is usually a hyperbolic shape function, just like it has been drawn below (figure 1) [2].

When the reliability grows the failure tolerance has to decrease simultaneously. Regarding to some other attributions, it is possible to find a little bit more optimal curves and working points, but the basic problem is still appears. Just like in this paper, in some former ones a new approach had been revealed, which assumes that it is possible to solve this contradistinction.

As the source of failures has been investigated, a new phenomenon showed up. Each failure separately has a background which leads to some elemental failure through the detection and analysis of the Individual Identification Marks (IIM). In the fingerprint analysis the IIM are called minutiae, but they can be any personal marks which is selective enough. As it has been found these elemental failures are not independent from each other, because the probability of a failure can be determined by a beta-binomial distribution [3].

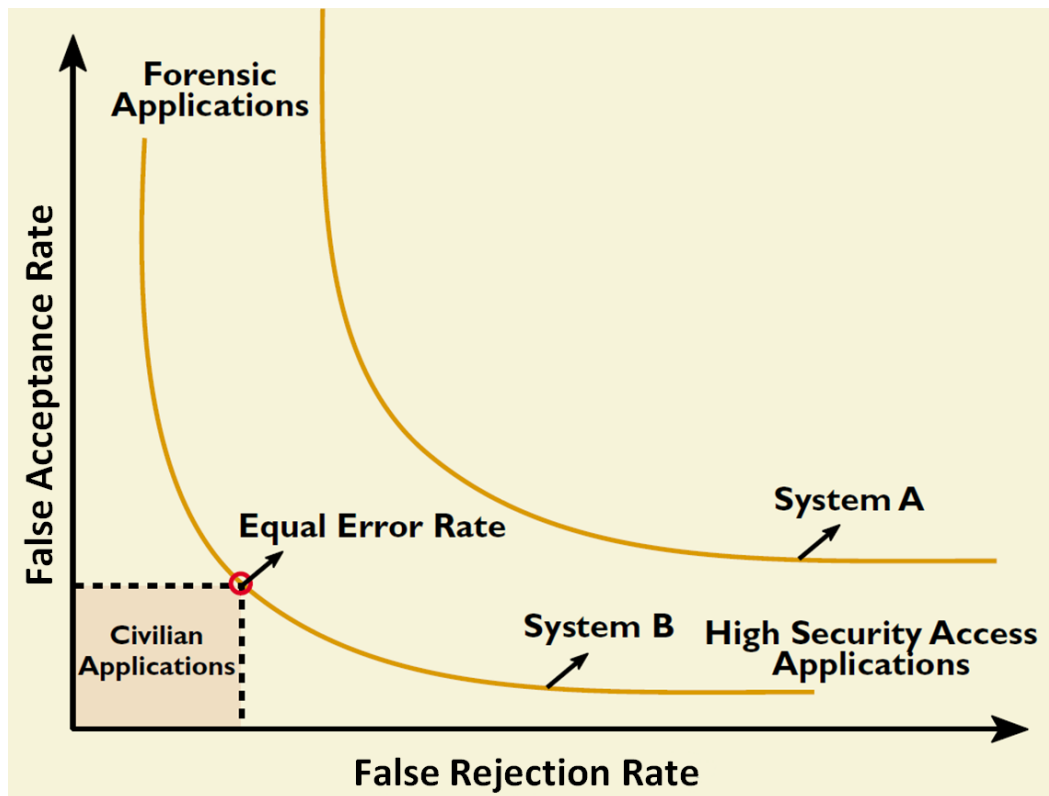


Figure 7. ROC curves at different biometric systems (source: [2])

The beta-binomial distribution has two parameters which are characterized by the person or the population of the users, and the type of the biometric templates in an exact environment. Thus if not only one type of biometrical templates would be identified then the ROC can get better. So the multimodal biometrical identification is leading toward a new approach of biometrics but we have to find the algorithms which are able to calculate with more non-linear input and able to adapting into a continuously changing environment.

Before the analysis of the mathematical background of the artificial intelligence which has been used in our algorithms, it is necessary to made a mention about the big populations analysis and its difficulties.

2. Theoretical Background

2.1 Difficulties of Big Population Identification

As the databases are increasing, the processing time getting longer, but the correlation isn't linear. This fact means that after a discrete amount of the users, the most system will be unusable due to the long processing time. On the one hand the processing capacity of the computers probably will increase¹⁷, but on the other hand the capacity of data transmission will be limited so far. The institutions which were mentioned above use a kind of virtual or real private network which implements the TCP/IP protocol. Nowadays the gigabit routers spread but the bigger part of the ports use 100 Mbit/s data communication. According to the study of the AADHAR PROJECT (INDIA) only one non-compressed fingerprint image is

¹⁷ It is worth noting that the increasing of the processing capacity is growing some external factor as well (size, cooling needs, costs, etc.)

about 7,5 MB, thus in a normal port approximately one and a half fingerprint image could be transmitted in a second, while in a gigabit port this could be 136 images [4]. However this number of users is appropriate in a small company, but absolutely inappropriate in a governmental or multinational organization. Thus it is obvious there is a need for a solution which is able to cooperate with the current data speed. There are more possibilities how to decrease the transferred data size: it is possible to compressing, and converting the information, or to clusterizing into different sets of the templates by the main attribution, like the Henry classification¹⁸ [5]. All in all that has to be highlighted, if we are using different type of biometric detectors – which is absolutely possible in a worldwide usage – we cannot encode the biometrical information into different datasets, because the interconnections are usually missing among these solutions. So far one of the most important future task is the standardization of the biometrical devices and algorithms, regarding to the appropriate encryption.

In the biometrical identification the recognition can be done with two methods: “one-to-one” (verification) and “one-to-many” (1:N identification). The first method is basically “searching the similarity” between the stored and the captured image. This verification mostly used in criminal identification, nevertheless it can be also used in some biometric identification system, especially when the user carries his or her personal code which is his/her own biometrical sample. This technique could be installed in facilities which are separated, working with an off-line communication, or the risk of theft or hurt of the database is significantly higher than caring the biometric sample by the user. The other, more commonly used technique is the “one-to-many” identification which is looking for the “most similar” sample from the database to the captured image. Generally the verification is easier and quicker than the identification, because the latter one has to investigate many stored image and find the most suitable one [5].

In fact the identification is not about the comparison of images, it’s a bit more complex. The algorithms which are generally used are separated into two main different methodologies. One is investigating the whole sample and generalizes a kind of a mask. The other one is looking for personal identification marks. These points make a vectorial network that is unique and able to used as a biometric pattern. The preprocessed (enhancement, gray level adjust, ridge thinning, etc.) images after the feature extraction (overall or by points) will be compared with the stored template [6] (figure 2.). There are many methods for feature extraction and comparison, however, in this paper we would like to emphasize the process time non-linear depends on size of the database and the ROC (Receiver Operating Characteristic).

Suppose that we would like to identify a subject by the fingerprints. Commonly used method the minutiae¹⁹ analysis. Basically in this technique the algorithm is looking for the minimum of the differences between the vectorial network of template and the sample. According this philosophy it is necessary to analyze all the possible pairing minutiae by minutiae, which further increases the processing time of the identification. Which finally leads to a similar problem like the “travelling salesman problem”, which is an NP-complete

¹⁸ Henry Classification System is a long-standing method by which fingerprints are sorted by physiological characteristics for one-to-many searching. Developed in the late 19th century for criminal investigations.

¹⁹ In biometrics and forensic science, minutiae are major features of a fingerprint, using which comparisons of one print with another can be made.

problem²⁰, the possible number of the pairing which have to be examined is $(n-1)!/2$ (n means the number of the minutiae). Evidently, this is an uncountable variation, thus the algorithm has to somehow separate geometrically the sample and pairing those points together which are in the same block. This movement is a possible solution for the classification, which is necessary to decrease the data transfer. In this study the main objective is to delineate a theoretic process for the quicker and more accurate identification. Beside many other options the soft computing, especially the fuzzy logic and the artificial neural networks are well implementable.

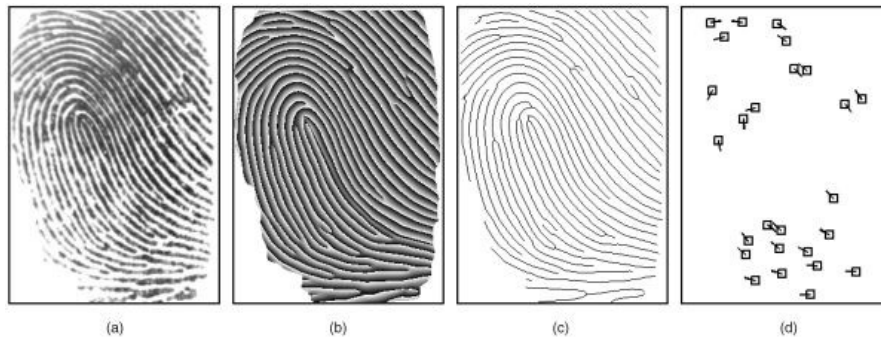


Figure 8. Minutiae extraction by points (source: [7])

Independently from the type of the biometric identification one of the most effective way of reduction is a well chosen Region of Interests (ROI). Usually the IIMs in the ROI has higher significance in the total sample, and less sensitive to geometrical distortion. In the AADHAR PROJECT both the fingerprint and face images have been reduced by 90% with a well chosen ROI method [4].

2.2 Multimodal identification

In the biometric identification it is also possible to apply multimodal identification. In this study the multimodal means multiple and parallel use of biometric identification devices, without any classical identification method like RFID, password, etc. Eventually the multiple usage of different kind of authentication (like knowledge, property and attribution) is called multi factor authentication. The main difference is rather about logical background than reliability or security issues. Compared to the unimodal, classic identification the multimodal identification's advantages is significantly higher security, more complicate to illegally steal or copy, and more robust against the failures and impostors. It has to be stated there are disadvantages as well, like it is more complicate to install, it is more expensive and usually it can take more time to identify the users, although as it'll be shown, this last point can be slightly changed. In fact in this model the AI controller itself makes a kind of classification process as well. In the multimodal biometrics the focus should be on the fusion of the information, those origins from different sources [8].

An unimodal biometric system has a similar structure to the conventional access control systems, it has a sensor module, a pattern extractor and recognizer module and finally it matches with the stored templates. This structure is susceptible and inferior against the

²⁰ In computational complexity theory, a decision problem is NP-complete when it is both in NP and NP-hard. The set of NP-complete problems is often denoted by NP-C or NPC. The abbreviation NP refers to "nondeterministic polynomial time."

spoofs and deficient patterns. This weakness can be improved by multimodal verification. The different traits regardless more surfaces are identified with the same device (one fingerprint reader checking more fingers), or there are more biometric devices (e.g. fingerprint, face, hand geometry, vein, iris, voice, etc.) make it possible to miss more or less a deficient or inferior trait, meanwhile the strict requirements are performed as well [8][9].

There are very different method for multimodal biometrical identification, but only a few subscribe the problem with Artificial Intelligence (AI) and hardly any tried to based that on the human perception, like the algorithm presented in this paper. To emphasize our horizontal view, it is easier to show that how it is possible to combine the different biometric methods as a multimodal authentication (figure 3.), and then the framework going to be shown.



Figure 9. Possible combination of the biometrics in multimodal authentication (edited by the authors)

It this presented method we divided some basic perceptual process into three different artificial steps in the algorithm. The classic biometrics devices are basically just sensors, and act like the human senses (seeing, hearing, etc.) but the processes and final decision is happening in a Smart Controller Interface (SCI). This SCI received the role of the brain, it has to decide which senses are meaningful, compare the samples and associate with the memory and finally decide that there is any reliable matching or not. According to the complexity of the whole algorithm, in this paper only the first step, the decision between different sense's meanings have been deeply investigated. Slightly inclining forward, we outlined the entire algorithm block diagram in the figure below (Figure 4.).

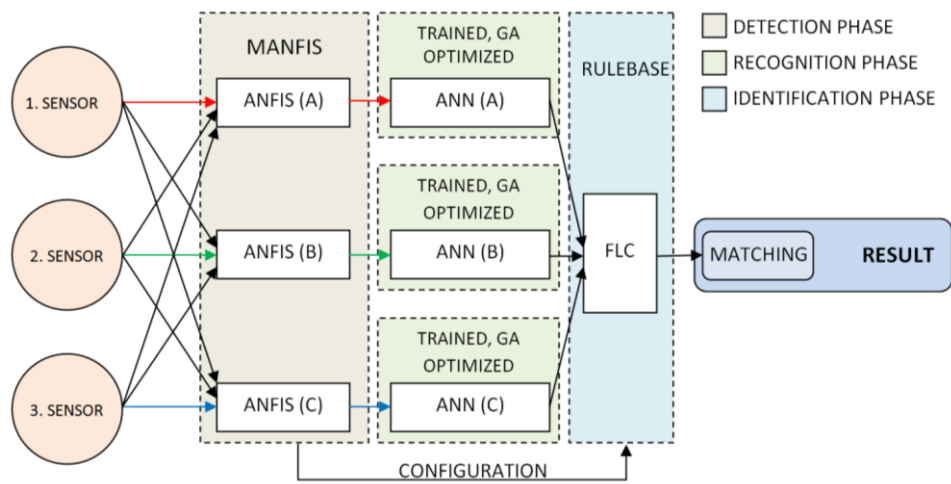


Figure 10., Framework of the Smart Controller Interface in Multimodal Biometrics (edited by the authors)

2.3 Mathematical background of the applied AI

As it was mentioned in this paper we investigated only the detection phase, however the mathematical background of that is quite complex so far. The designed algorithms is based on a neuro-fuzzy solution the Multi Adaptive Neuro Fuzzy Inference System. This is a well mixed structure of the Artificial Neural Networks (ANN) and the Fuzzy Inference Systems. Both techniques are the part of the modern mathematics as a soft computing method, and commonly used in artificial intelligence controllers. The soft computing methods can be divided into three independent sections, however the chaotic theory can be added as well as a fourth part. Nowadays it is a common techniques to combine these departments, which are the fuzzy logic, the neural networks, and the genetic algorithms [9][10].

2.3.1. Fuzzy Logic

The fuzzy logic is known as the mathematical implementation of human thinking. Therefore we can notice similar attributions: fuzzy logic doesn't give us as exact results as numeric computation methods, but it is able to handle more variable and non linear connections. During the classification process we do not need for so exact results, just like we are not able to measure someone's height by looking at him, but we can state that he is tall or not. In fact these linguistic variables are characterized in fuzzy logic. The fuzzy logic compared to the conventional Boole Algebra is more compliant. While in the Boole Algebra the outcome can be true or false, the fuzzy logic outcome is more nuanced. [9][10].

2.3.2. Artificial Neural Networks

The Artificial Neural Networks (ANN) based on the biological background of the human brain, which means that, there point (neurons) and linkages (synapses) among them. These linkages have a weight number which represents the strength of the connection between two neurons [11].

According the ANN the main peculiarity is the layered structure, where it is possible to pointing out input, output and hidden layers. The basic concept is a blackbox model, thus there is no information about the correlation or functional connection among the input and output data. However there is an exact pattern which can be revealed. The ANN during a

training phase is able to find numerically this pattern, and implement is as an inference. All ANN has to be tested after the training to validate the success of the training. The ANNs are commonly used in shape recognition tasks, like carplate recognition and etc [12].

2.3.3. (Multi) Adaptive Neuro Fuzzy Inference System

According to the multiple advances of the fuzzy and neuro systems, it is worth to implement them in a mixed algorithm. One of the possible combination is the Adaptive Neuro Fuzzy Inference System (ANFIS) or the multiple outcome type of this the MANFIS. The role of this module in the detection phase is to set up the reliability index of the different sensors. According to the hidden neural network attribution it is able, to find a pattern in the database among the input and output values during the training. The neuro attributions are the unknown premise and consequent parameters, which ones have to be set during the learning. Although it has to be stated these parameters are represents the parameters of the fuzzy membership functions and the Sugeno type implication [9][13]. Figure 4. shows the structure of the implemented MANFIS and ANFIS.

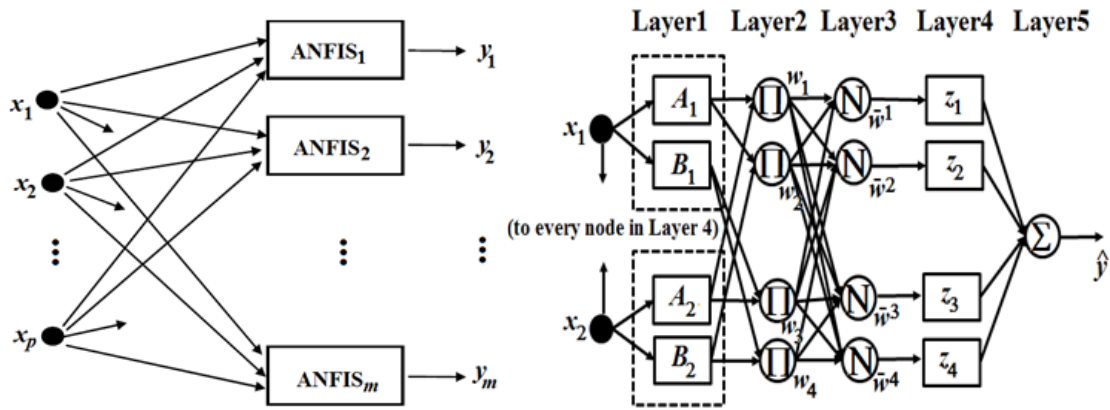


Figure 11., The structure of a MANFIS and an separated ANFIS (source: [13])

Premise parameters:

$$\mu_A(x) = \frac{1}{1 + \left| \frac{x - c_i}{a_i} \right|^{2b_i}} \quad (\text{Eq. 2.1.})$$

where i represents the degree of the granulation in the fuzzy sets ($i=2$, in our algorithm)

Consequent parameters:

$$f_i = p_i x + q_i y + r_i \quad (\text{Eq. 2.2.})$$

where i represents the degree of the granulation in the fuzzy sets ($i=2$, in our algorithm)

The shape of the membership functions in the layer one is Bell Shape Function, which curving is determined by a_i, b_i, c_i adaptive premise parameters. In the second layer \prod as a fix,

recapitulative operator stands. The outcome of the second layer (w_i) is the computed strength of the incoming firing membership functions:

$$w_i = \mu_{A_i}(x) \cdot \mu_{B_i}(y) \quad (\text{Eq. 2.3.})$$

The role of the third layer fix neurons are the norming of the incoming values: (\bar{w}_i):

$$\bar{w}_i = \frac{w_i}{\sum_1^i w_i} \quad (\text{Eq. 2.4.})$$

In the fourth layer the Sugeno type implications (which uses the original input variables) multiplied by the normalized firing strength of the membership functions, where p_i , q_i , r_i represents the linear combination's parameters of the incoming variables, as it has found by Sugeno [9]. adaptive premise parameters. In the second layer [] as a fix, recapitulative operator stands. The outcome of the second :

$$\bar{w}_i f_i = \bar{w}_i (p_i x + q_i y + r_i) \quad (\text{Eq. 2.5.})$$

In the last layer there is only one neuron. Its task the summarizing of the previous values.

$$o_{ANFIS} = \sum_1^i \bar{w}_i f_i \quad (\text{Eq. 2.6.})$$

3. Methods

3.1 Classification according to the human perception

We can examine the human perception as an example: during the human perception process the brain makes a primer (fast) inspection that based on a inaccurate but complex image and thereafter makes a secondary, deeper (slow) inspection based on the significant details (actually laterally more divided and not totally separated, as it will be shown later). This method mostly happens in any identification regardless we examine a forthcoming people or a moving object. In this study we would like to subscribe a model that applies the process of the human perception [15].

The fuzzy logic has a really important task in whole SCI model, because it doesn't only help to filtering the database's relevant information (as a neuro-fuzzy classifier), but it is also able to make a more accurate final decision. It's known during the human perception to detect the personal identification marks depends on the carrier (the subject who'll be identified) and depends too on the person who detects. The perception is mostly a cognitive process which affected by the prior experiences and the natural intelligence of the detecting person. Thus this process lightly could be named objective, but this process could be taught.

In the everyday life in the identification we use more senses to identify each other, and even one sense is more complex than a singular biometrical identification method. On the

Figure 5. we have shown the basic model of the human perception. As it is shown there are mostly non objective points, and there are many possibilities to interfere or loose signs which confirm our presumption about the importance of multimodal identification.

As a human preceptor we are detecting more modals, and if these signs make a sense, then we can understand and evaluate those, and finally make a decision. The human thinking is complex, subjective and less accurate, but we precisely want to highlight these attributions. Data forwarding and processing is limited as it is mentioned above, so far it is necessary to decrease the amount of transferred data. The main methods for reduction are:

1. transmit only sensible signs, which depends on sign/noise rate
2. classify and evaluate the mostly fitting set of templates
3. teach the system for better classification and evaluation

These simple steps are able to improve the efficiency of the identification. What's more, we just have to organize again the logical order of the classical identification model. We have separated the steps into the human perception model, this is shown of Figure 6.

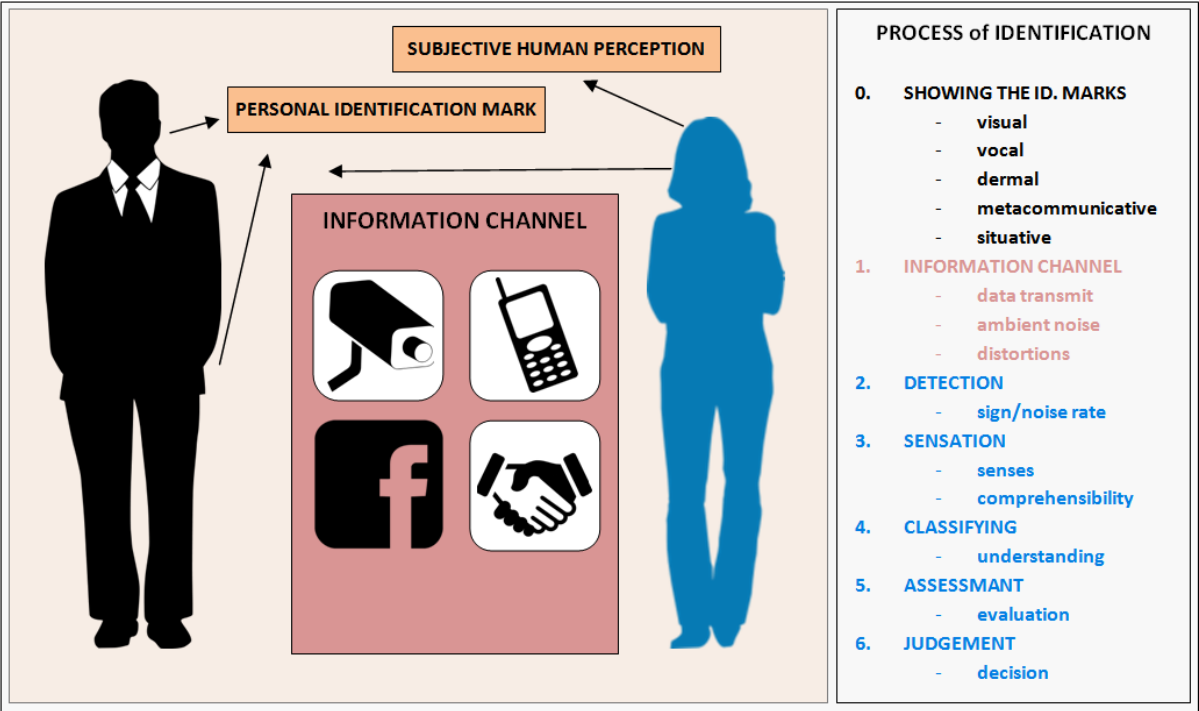


Figure 12., Basic model of human perception (source: edited by authors)

In the following we present a method that implemented the human perception model. In this model we applied soft computing methods. First of all we focused on the ANFIS, but it has to be stated it is only the first part of whole model, which continuous a Genetic Algorithm²³ optimized ANN and a final Fuzzy Logic Controller.

²³ In computer science and operations research, a genetic algorithm (GA) is a metaheuristic inspired by the process of natural selection that belongs to the larger class of evolutionary algorithms (EA). Genetic algorithms are commonly used to generate high-quality solutions to optimization and search problems by relying on bio-inspired operators such as mutation, crossover and selection

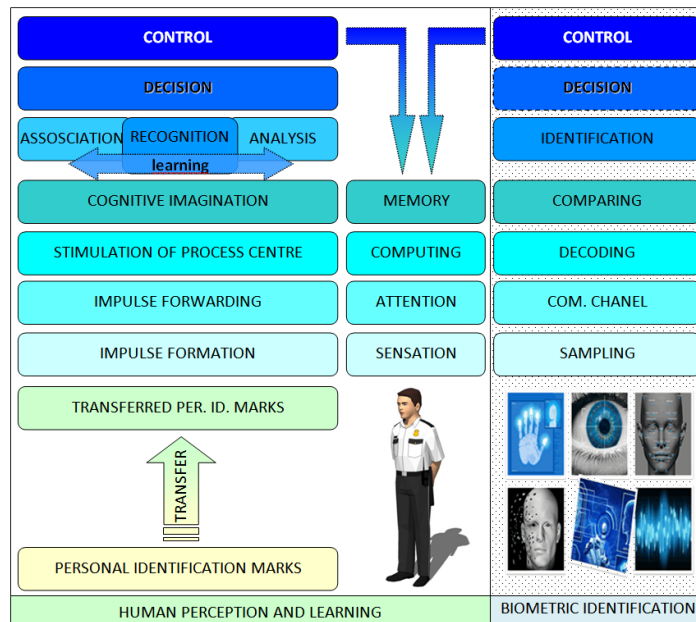


Figure 13., Comparison of human perception and biometric identification (source: edited by authors)

3.2 Implementation of the human model into AI

As it's published in the Journal of British Psychological Association during the human perception the recognition process stimulates independently the different parts of the brain. Only the face recognition stimulates almost dozen sections. As Vaidehi Natu and Alice J. O'Toole found, the processing of the visual impulses divided into two main centers. The brain investigates the physiognomy, the changes of pupils and the lips movement in the superior temporal sulcus, meanwhile it also investigates the face's identification marks and whole image as well. The recognition process itself isn't totally known, but we already know that the colors, the forms, the partial details and the whole images are examined in different regions of the brain separately, but there should have some interdependency and linkage between the regions [16].

According to this natural process we've imagined a similar artificial solution. More kind of patterns had been used as the different senses or processing regions. These patterns could be implemented by different biometrical sensors (fingerprint reader, vein scanner, voice recognizer etc.). These sensors are not taking a part in SCI, so they can be exchanged, if it is necessary. The output of these sensors are investigated from two aspects. The first is the ANFIS which needs for the exact number of IIM by sensors. The second aspect is investigating not only numerically but by the total performance, this is the GA optimized, and previously trained ANN. The final decision is taken by an FLC according to output of the ANFIS and the ANN.

As it was previously stated, in this paper the ANFIS and classification of the sensors have been highlighted. It is supposed that the more individual identification mark been found, the fitting is better between the sample and the template. This supposition is the consequence of distribution of failures, which follows a beta-binomial distribution. [3]. The possibility of multiple failures usual follows an exponential decreasing trend, so the bigger number of individual identification marks means less relative failures and smaller difference between the template and the sample. Thus the number of Interpretable Individual Identification Marks (IIIM) represents the basic input into the ANFIS, and the outputs are the reliability index of the sensors.

As the main idea is a method for an accurate biometrical identification of big population, the process below (Figure 7.) has been created. According to this tool, it is possible to decrease the necessary data and time, if one of biometrical traits is significantly better than the rest, but it is still possible to get low FRR in multimodal mode, because the a new authentication process can be avoided. In Fugure 7. the I. FUZZY MACHINE is actually the MANFIS which has been implemented and tested in the coming section. The II. FUZZY MACHINE is a normal FLC, but its rule bas is not static. The values and ratios in the rule base are adapting to the outcome of the MANFIS.

After it was decided how many traits should be investigated, the algorithm makes a classification on each trait. The classification methods are different, and depend on the examined patterns. It can use the ANN, but it is possible to replace that with other methods. The main goal to minimize the size of the database that has to be compared with the actual sample. As the current class was found the comparison starts, and investigates the stored templates. As a result of comparison it gives a vault in each modal, and finally these vaults will be processed by the second FLC. According to the settings and the goodness of the biometrical traits we got the identification is succeed or not.

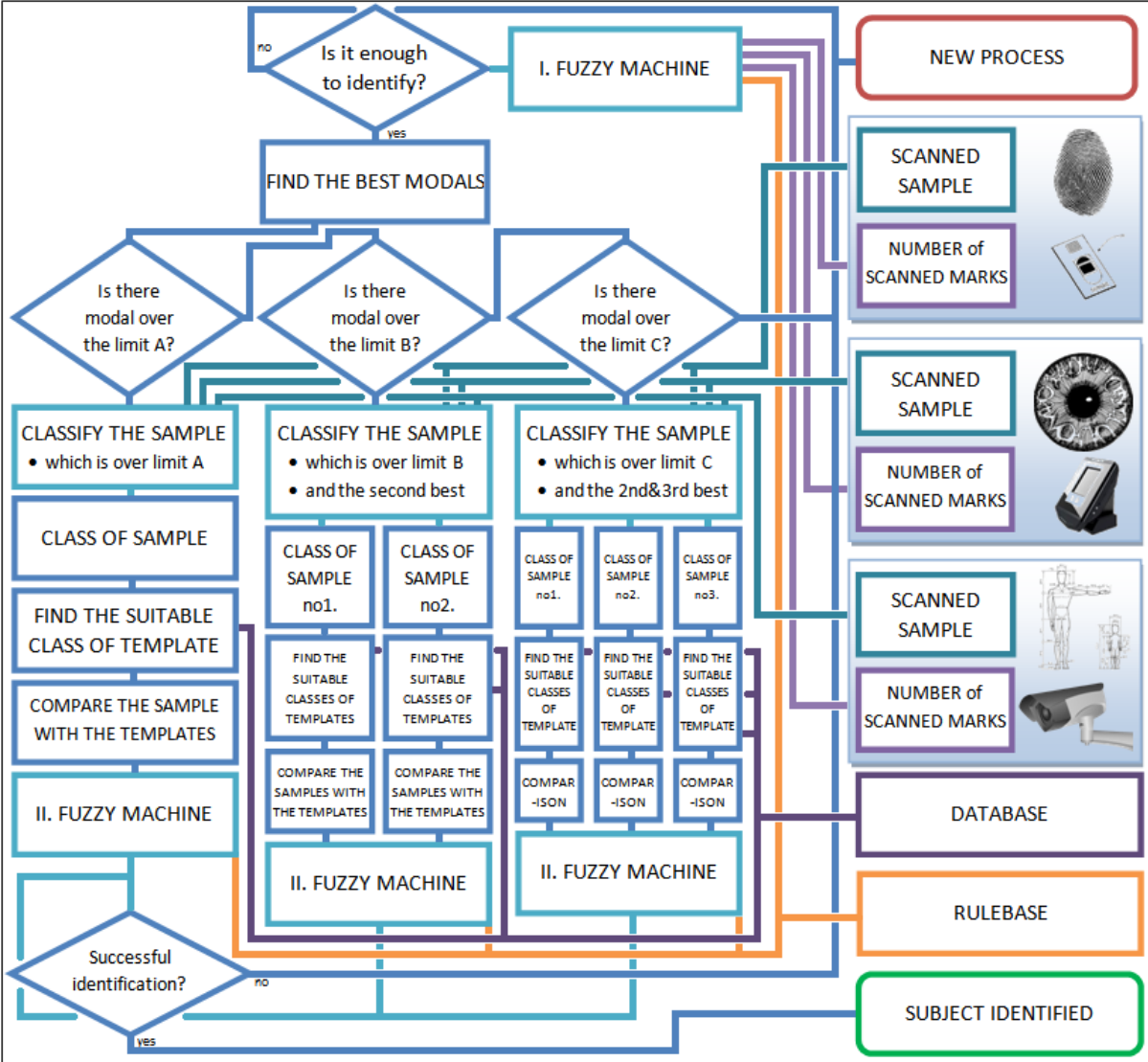


Figure 14. Detailed algorithm of the identification (source: edited by authors)

3.3 Designing and Training Algorithm

Although it is possible to add more input, at first only two inputs have been added as a biometrical source, these are x and y . Through the fuzzyfication the degradation of the fuzzy sets is only two, with three parameters for each like a_{xi}, b_{xi}, c_{xi} and a_{yi}, b_{yi}, c_{yi} , where $i=2$ (like in Eq. 2.1.). According to Wang and Elhang it is inappropriate to choose three or more Membership Functions (MFs) for each input because the parameters needing to be learned in that case will be greater the number of training samples [17]. These 12 variables will be the premise matrix (*premise*).

According the Sugeno type inference, there will be p_{ij}, q_{ij} and r_{ij} , parameters, where $i,j=2$, these are the consequent matrix's components (*consequent*) (like in Eq. 2.2.). These two matrices have to be optimized during the learning phase, which can be implemented in various ways. According to Jang [14] it is possible to train in a forward pass and a backward pass. In this approach the backward pass has been chosen with a gradient descent method, that is precisely a special back propagation, the Resilient Back Propagation (Rprop) learning rule (Eq 3.1.) [18].

$$\Delta w_{ij}^{(t)} = \begin{cases} -\Delta_{ij}^{(t)}, & \text{if } \frac{\partial E^{(t)}}{\partial w_{ij}} > 0, \\ +\Delta_{ij}^{(t)}, & \text{if } \frac{\partial E^{(t)}}{\partial w_{ij}} < 0 \\ 0, & \text{otherwise} \end{cases} \quad (\text{Eq. 3.1.})$$

$\Delta w_{ij}^{(t)}$: direction of weight update

$\partial E^{(t)} / \partial w_{ij}$: summed gradient of the error partial derivates (Error is the different of target and the current output)

In this kind of back propagation the size of the partial derivates are not used, only the sign is important, which determines the direction of the weight step ($\Delta w_{ij}^{(t)}$). Certainly it is necessary to find a way to determine the size of the correction steps, which is the following. The update-value ($\Delta_{ij}^{(t)}$) based on a sign-dependent adaptation process (Eq. 3.2.) [18].

$$\Delta_{ij}^{(t)} = \begin{cases} \eta^+ \Delta_{ij}^{(t-1)}, & \text{if } \frac{\partial E^{(t-1)}}{\partial w_{ij}} \cdot \frac{\partial E^{(t)}}{\partial w_{ij}} > 0 \\ \eta^- \Delta_{ij}^{(t-1)}, & \text{if } \frac{\partial E^{(t-1)}}{\partial w_{ij}} \cdot \frac{\partial E^{(t)}}{\partial w_{ij}} < 0 \\ \Delta_{ij}^{(t-1)}, & \text{otherwise} \end{cases} \quad (\text{Eq. 3.2.})$$

The η^- and η^+ factors are proposed to be 0,5 and 1,2, according to the author of this Rprop.

3.4 Testing and Verification

All the soft computing method based algorithms is preferable to be tested and verified before the real usage. In this case the 70% of the preorganized database has been used as training values, and the rest (30%) for the testing. Regarding this quite new approach of biometrical Smart Controller Interface, the ANFIS's desired output was chosen to an exact functional target. Thus it was feasible to calculate an accurate error.

Basically a 1-20 scale has been determined to the input values (x,y) , which are representing the numbers of the recognizable IIMs by detectors. This scale has been normalized into 0-2 interval. The target value (T) was chosen by the following function:

$$T = \frac{\frac{x}{20}}{\frac{x}{20} + \frac{y}{20}} \quad (\text{Eq. 3.3.})$$

Due to the training and testing cycles the optimal number of the epoch²⁵(s) has to be checked. In the table 1. below, the number of the epochs and average error have been shown. The *error* is determined by the actual output (O) and the target (T) . The average was calculated for the total test data (30 cases).

$$\text{Error} = \frac{(O - T)^2}{2} \quad (\text{Eq. 3.4.})$$

Table 1., Number of the necessary epochs

Number of Epochs	Av_Error	Number of Epochs	Av_Error
1	0,8731	13	0,2582
2	0,6730	14	0,2068
3	0,4633	15	0,2072
4	0,6033	16	0,2326
5	0,4856	17	0,2216
6	0,4265	18	0,2965
7	1,1100	19	0,4007
8	0,1280	20	0,5300
9	0,2115	21	0,7980
10	0,1774	22	0,7097
11	0,2391	23	0,9351
12	0,0492	24	1,3375

4. Results

According to the minimal error, the optimal number of the epochs is 12, although it has to be stated, the different size of the databases and even the nature of training data can relate to the optimal epoch number. The output of the ANFIS is not totally correlate to the desired output, which means that the way of thinking seems to be good, but requires further clarification.

The experiences have shown us, the more the epochs the better the separability of the outputs, but the scale is wider and less correlated to targets. Meanwhile the number of the epochs is less, than the opposite consequents were experienced, the scale is well correlating, but the separabilty is not preferable.

5. Conclusion

²⁵ An epoch is a measure of the number of times all of the training vectors are used once to update the weights

The multimodularity and the soft-computing methods convert the biometrical identification into the next dimension. The nature of the problems confirms the necessity of the Artificial Intelligence. In this paper as totally new approach, the Smart Controller Interface was introduced, with all the relation and linkages to the natural perceptual processes. As the background of the typical biometrical failures were investigated, we found that, the beta-binomial parameters, which determines the posteriori likelihood of the FAR and FRR have to be changed through the identification. This is possible with the multimodal biometrical identification, because it uses multiple traits or samples from different sources.

The comparison involved a new algorithm the SCI. At the first phase of this SCI, it is necessary to decide which "senses" (detectors) can be used further, and how they should take a place. This part was coded with a multiple ANFIS. The ANFIS, which is combination of an Artificial Neural Network and the Fuzzy Logic is more than useful for this purpose. The relation between the input and the output is probably not linear, and even not expressible by a common function, regarding to the flexibility and the various user attribution.

The implemented ANFIS was trained by a Resilient Back Propagation, which was more suitable as an error back propagation method for learning. The outcome has shown that, it is possible to find the correct number of the epochs, where the difference of the desired and the current output is minimal.

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