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Conference Proceedings

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Foreword

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On this CD you find the electronic version of the contributions presented at the International Workshop on Knowledge Management (IWKM) organized by Vysoká škola manažmentu (School of Management) in Bratislava on 20 and 21 October 2016.

The series of workshops started in 2006. Its main aim is to support building a network of researchers, to give them room for presenting their newest research results, and to inspire them to develop their knowledge by exchanging their ideas and thought. The first two years it ran as a national Slovak event. Between 2008 and 2010, IWKM became a part of Summer School „Introduction to Knowledge Management" – a collaborative ERASMUS activity for students from Czech Republic, Finland, Lithuania and Slovakia. Since then it is an international event. In 2015 our workshop was a part of a larger scientific event named EAI International Conference on Mobility Opportunities in Danube Region (where EAI stands for European Alliance for Innovation). As the conference moved from Bratislava, 11th IWKM in 2016 is again organized as a separate scientific event.

IWKM did not return to its previous format fully. It has obtained another innovative mode – it started with two pre-conference seminars targeting not only researchers but also a wider audience:

- **Petr Berka** and **Renata Janošcová** organized *Big Data* seminar. Its aim was to spread awareness about this innovative method of obtaining knowledge from large data sets and to demonstrate practical examples in Slovak business practice done by **Miroslav Koseček** and **Michal Rosik**.
- **Jozef Hvorecký** and **Lenka Filkaszová** prepared a seminar named Knowledge Management as an Education Tool. It shows the importance of exploiting Knowledge Management concepts and rules for making teaching and learning more practical and giving to the students a feeling of practicality of their knowledge.

Their introductory speeches, slides and other relevant materials are included to this proceedings.

Sonia Ferenčíková sr. and **Sonia Ferenčíková jr.** contribute to Knowledge Management applications by their analysis of Uppsala model of internationalization and the role of knowledge in internationalization process of companies. They conclude that globalization, ICT technologies, Internet, company networks, nature of the products and services changed dramatically the internationalization framework. Regardless those seemingly dramatic changes, basic rules and principles in this domain have stayed unchanged.

In her contribution, **Lenka Filkaszová** pays attention to communities of practice. She defines them, shows their distinction from social networks and gives real-word examples from the. In the end, she makes some predictions on their future development.

Jana Hrdličková points to the fact that the right knowledge management practices develop and leverage the potential of knowledge and help the organizations to stregthen their position.At the same time, there is time to study a relationship between these practices and various performance indicators such as productivity, effectivity, customer retention or direct financial results of company including return on investment, revenues and profit. Disclosing (some of) relations might help to managers to apply a right method in the right time.

Renata Janošcová in her paper discusses Big Data – a new category of business analysis. In particular, she shows WEKA, a tool tak can be used for a variety of investigation methods that can be used for both effective knowledge discovery as well as for making predictions.

The article of **Alena Lipovská** describes the possibilities of Knowledge-Management-based innovations that the businesses can implement in their Human Resources department. In the first part of the paper, the general possibilities are described and their advantages are presented. As a conclusion, three ways of how to implement relevant IT solutions are offered.

Ilkka Mikkonen, Jonna Nikula, Oona Huoponen, Milla Parviainen regularly studies behavior of student teams. In our proceedings, they deepens our knowledge on chosen knowledge transfer models and presents two real life cases from university environment in Finland: one from Oulu University and the other from Oulu University of Applied Sciences.

Martin Miller opens in his contribution an interesting problem – to coach or not to coach. He studied effect on couching in his company. Despite his initial expectations, the coaching itself did not improved its economic parameters. Nevertheless, it has a very positive effect to human resources dropout rate. Read his paper for other interesting details.

In her contribution, **Alena Piknová** analyzes people's motivation to their knowledge development. She asks questions like: What motivates people to be interested in gaining new knowledge? Despite the fact that similar questions will hardly be ever answered completely, unfolding some indicators can be very useful.

Gradual continuous improvement is the subject of **Michal Pružinský** and **Mariusz Iskra** contribution. They argue that having small improvements is fine, but a sensible company builds a culture of continuous improvement. Only this approach can yield substantial results to improve the overall business over time. As there is no single model of improvement activities, every enterprise system has to develop one tailored to specific conditions. At the same time, many features of such models are similar. The paper concentrate on those based on the implementation of the Kaizen method.

Eva Rakovská solves in her paper the problems caused by the fast development the Internet, mobile technologies and other IT (grid, web services, cloud etc.). Sometimes it is too difficult to connect a traditional perception of the management with a turbulent and very fast changing IT environment. The paper sketches hidden aspects of Knowledge management which should be oriented on right coverage of the knowledge life cycle by IT within the enterprise. As the main task of knowledge managers she sees building bridges between software and people.

In **Monika Šestáková** contribution, a specific category of knowledge workers – specialists in the financial sector – is analyzed. She points to the fact that the knowledge intensity of the financial sector increases and the share of work places requiring lower knowledge is declining. The financial specialists are therefore supposed to flexibly acquire and use their (mainly tacit) knowledge of local conditions and respect specific requirements of the basic segments of local clients.

Collaborative consumption is the key concern of **Mária Tajtáková**'s paper. From the marketing perspective the collaborative consumption represents a hybrid marketing model of peer-to-peer exchange. As it runs on the online market, it has to apply online marketing techniques. Her main aim is to discuss new trends in collaborative consumption from the view of disruptive market exchange modes.

Andrea Zacharová concentrated her research on The relationship between R&D expenditures and productivity in studies on industry and/or firm level – review. She monitored the methods and models and compared their independent and dependent variables. She showed that in most of the studies the positive relationship between investment in R&D and increased productivity has been proven.

As the editors, we would like to express our gratitude to all authors for their efforts in preparing their contributions as well as for their participation in discussions to the presentations of their colleagues at the workshop in Bratislava. Their involvement makes the IWKM an unusually vivid event – and is the biggest reward to us.

Our special thanks to all members of Program Committee and of Organizing Committee for successful run of the event, in particular to **Sonia Ferenčíková, Monika Šestáková** and **Michal Pružinský** who have intensively collaborated with us on reviewing the published papers.

Trenčín and Bratislava, 1 November 2016

Renata Janošcová

Jozef Hvorecký

editors

Changing role of knowledge in internationalization (analysis of Uppsala model)

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Abstract: The authors analyze Uppsala model of internationalization and the role of knowledge in internationalization process of companies. They conclude that globalization, ICT technologies, Internet, company networks, nature of the products and services changed dramatically the framework for internationalization, however some basic rules and principles in this domain in knowledge area have stay unchanged.

Keywords: Internationalization, Uppsala model, knowledge.

1 Introduction

Named after the University of Uppsala and developed by Johanson and Vahlne in 1977, this model is based on empirical observations of Swedish manufacturing firms. It describes firm-level internationalization as a process of incremental adjustments to changing environments, driven by experiential knowledge and learning (Johanson & Vahlne, 1977).

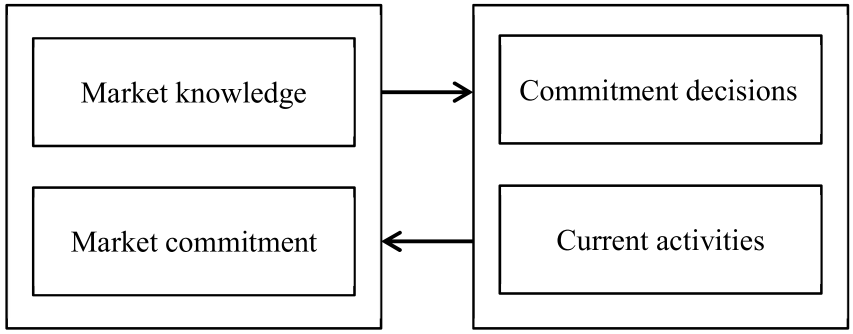
The foundation of this dynamic model dates back to 1966, when Swedish economist S. Carlson analyzed a firm's foreign decision process. The core concept of his pioneering research concludes that lack of knowledge in doing business in a foreign market represents a significant obstacle for firms which have the intention to internationalize (Carlson, 1966). Due to the recent changes in business environments and theoretical advances made in the process of firm-level internationalization, the Uppsala model was revised in 2009 offering new insights into the internationalization process. (Johanson & Vahlne, 2009).

2 Uppsala model I.

As observed in Swedish and some US manufacturing firms, the Uppsala model introduces a new dimension of internationalization - the pattern of the *establishment chain*. Johanson and Vahlne believe that internationalization should occur in multiple stages in order to successfully increase firms' commitments in foreign markets (Johanson & Wiedersheim-Paul, 1975). In most cases, firms start by exporting to foreign markets via independent representatives, develop sales subsidiaries later and eventually, begin production abroad (Johanson & Vahlne, 1977).

The model considers two aspects to explain the internationalization process of firms: state and change aspects (Johanson & Vahlne, 1977). While state aspects are represented by the market knowledge and market commitment of resources to foreign markets, change aspects are focused on the decisions to commit resources and the performance of business activities (Johanson & Vahlne, 1977). The Uppsala model mechanism is described in Figure 1.

Fig. 1 Uppsala model – Original



Source: Johanson & Vahlne, 1977

The fundamental focus is paid to the aspect of knowledge and learning, and the explanation how firms learn to gain knowledge throughout their international operations. According to Johanson & Vahlne (1977), the most efficient knowledge lies in the firm's own operations. Unlike the objective knowledge, which can be taught, the model believes in experiential knowledge, which cannot be easily acquired, and thus relies on the lifelong experiences of individuals. It is assumed that this knowledge and experience not only helps to analyze problems, influence the decisions to commit resources, and generate business opportunities, but also evaluates the market environment prior to performing business activities abroad. With this respect, the lack of experiential knowledge at specific stages of the internationalization process in a new market explains why firms pursue a gradual, step by step, process of internationalization (Johanson & Vahlne, 1977).

As seen, in the original model (Johanson & Vahlne, 1977) the knowledge is particularly important in the internationalisation process. To sum up, this knowledge has following characteristics (Pedersen, Pedersen &Sharma, 2000):

- The knowledge of crucial importance to firms' internationalisation process is market-specific, i.e. the knowledge is about how to do business in the targeted foreign country. Considering that all foreign markets differ from each other, this kind of knowledge acquired in one foreign market can be used only in a limited extent in another one. (On the other hand, we have to admit that the experience from one market definitely helps while penetrating another ones – see personal experience).
- The knowledge is experience-based. It originates from the current foreign business activities, and as such the knowledge acquisition is a learning-by-doing process. (The longer and broader the experience is, the better is entry situation while entering new markets).
- The knowledge is embedded in individuals, i.e. the market-specific knowledge is acquired through personal experience. (These individuals could be in-company resources, however the company can also hire new individuals with a lot of international experience from their former employer.)
- The individually embedded experiential knowledge does not mean that i tis automatically and easily disseminated throughout the organisation. The transfer of essential knowledge from one employee to another, and from one organisational unit to another, may be very difficult.

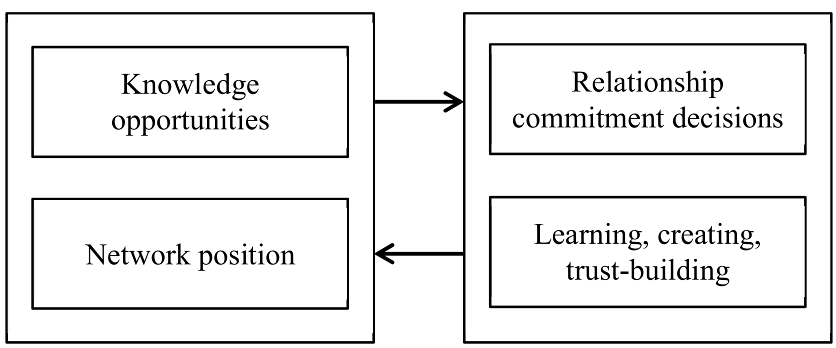
- The international involvement, including commitment of irrevocable resources to foreign markets, increases proportionately with knowledge acquisition (and vice versa).

Besides the aspect of knowledge and learning, special attention is paid to the aspect of psychic distance as well. Typically, the stronger the language, cultural or environmental differences are, the greater the psychic distance is. Johanson & Vahlne (1977) believe that firms choose psychically close markets for expanding first in order to reduce possible risks and market uncertainty.

3 Uppsala model II

Due to the recent changes in business environments and theoretical advances made in the process of firm-level internationalization, the Uppsala model was revised in 2009 offering new insights into the internationalization process. Firstly, it claims that firms operate in markets defined by networks of relationships, rather than being parts of independent webs of suppliers and customers (Johanson & Vahlne, 2009). With this respect, “insidership” in close networks is necessary for firm’s successful internationalization, while “outsidership“ from such networks represents a significant obstacle in the process. Outsidership from a particular network can additionally cause a greater uncertainty than the psychic distance alone (Cassia & Baronchelli, 2008). Secondly, such networks of relationships foster knowledge creation, trust and commitment building for firms. Johanson & Vahlne (2009) therefore, emphasize the importance of networks as the key influencing factor for the firm-level internationalization.

Fig. 2 Uppsala model – Revised



Source : Johanson & Vahlne, 2009

The revised model, as presented in Figure 2, puts more emphasis on opportunities. They are assumed to be the most important element linked to knowledge that drives the process of internationalization (Johanson & Vahlne, 2009). The authors also believe that the business network concept along with great opportunities can explain why some firms deviate from the originally proposed establishment chain and why some firms, mainly small new ventures, internationalize very rapidly (Johanson & Vahlne, 2009).

Even though the model is still considered up-to-date and used as theoretical base for related research, it is still criticized for the following reasons: Firstly, the conclusions are based on observations of only four Swedish manufacturing firms and therefore, do not have the sufficient explanatory power. Secondly, the pre-described internationalization process does not fully explain the rapid internationalization of some firms, or why some firms result in skipping the intermediate stages of the establishment chain (Pignatti, 2009). Lastly, the psychic distance proposed in the model does not take legal and competitive environments into consideration and thus, is not the only significant factor that influences firm's selection of foreign markets. Size, value and opportunities of the potential markets are also being considered (Pignatti, 2009).

As for the knowledge opportunities, the model could be enlarged and deepen by introducing several layers that influence it:

- ***ICT technologies*** that help to transform tacit knowledge into explicit knowledge. However this may be easier for big companies and very difficult for SMEs. Explicit knowledge cannot replace personal knowledge and managerial capabilities of experienced managers.
- ***Internet*** – Internet dramatically lowers cost of acquiring new knowledge, marketing, logistics, communication etc. However the filtering of all the information and the choice of the relevant knowledge related to the internationalization could be a problem. What is however undeniable, is the access of the companies, including SMEs to the new distribution channels via Internet what lowers the necessity of that type of information that is related to the direct form of internationalization, especially creation of subsidiaries abroad.
- ***Globalization*** – Due to lowering obstacles for internationalization, the companies internationalise much faster than in the past. There is a widespread belief that the companies in global industries internationalize much faster than the companies in classical industries (see for example Petersen and Pedersen (1999). It is still a remaining question whether the role of knowledge has changed in relation to the globalisation effect. Faster internationalisation of firms may be explained by increased competitive pressure as a result of the globalisation. But it may also mean that many companies are pushed to internationalize without the relevant knowledge.

4 Uppsala model and its implications on CEE countries

The situations of the CEE firms have changed significantly after the fall of communism and the transition to market economy at the beginning of the 1990's. Before 1989, the firms had very limited knowledge and exporting was possible only through very few foreign-trade institutions. If some of the biggest local players had access to the foreign markets, they usually focused on the Eastern Block, hence the COMECON countries. However, the beginning of the 90's meant several unexpected challenges for local CEE firms. Lack of foreign-market knowledge, know-how in operations and inadequate foreign language capabilities forced local firms to concentrate their foreign activities on neighboring countries, primarily. The political history of the CEE region supports the idea of psychic distance as well. The division of Czechoslovakia and Yugoslavia for example, initiated a big trade concentration among the succession states (Ferencikova & Schuh, 2012). After all, close historical ties, cultural, language and economic similarities of the countries must not be neglected. Aside from the aspect of psychic distance, the pattern of the establishment chain of the Uppsala model was typically used by the local firms; mostly by the classical industries, such as agriculture, which entered neighboring markets first, established manufacturing facilities later and eventually, started manufacturing products and services abroad (Ferencikova & Schuh, 2012).

Multiple studies on firm-level internationalization with the focus on the CEE region confirm the patterns of the *establishment chain* and *psychic distance* introduced in the Uppsala model:

for example the study of Jaklič and Svetličič (2003) examines recent growth of multinational firms emerging from Czech Republic, Estonia, Hungary, Poland and Slovenia. The main findings of this research show that firms internationalize primarily to neighboring countries (Jaklič & Svetličič, 2003). Additionally, the study underlines the significance of both, firms' past experience and ambitious plans, as they experienced positive effects from the outward foreign direct investment. Another paper: the study of Mockaitis, Vaiginiene, & Giedraitis (2006) examines the internationalization patterns of Lithuanian manufacturing firms. The main objective is to examine the foreign market entry decisions of firms through the analysis of their size, age, knowledge base, risk aversion and commitment toward the internationalization process (Mockaitis, Vaiginiene, & Giedraitis, 2006). The study states that the degree of internationalization is positively related to a firm's age and size (Mockaitis, Vaiginiene, & Giedraitis, 2006). According to the authors, young firms usually suffer from insufficient experience, network connections and knowledge, which relates to the Uppsala model and the incremental process of internationalization, gradual knowledge and experience acquisition (Johanson & Vahlne, 1977). The study of Ferencikova and Hluskova on internationalization of ICT companies from Slovakia concludes that its internationalization is the result of specific resources (specific knowledge), network relationships and globalization trends that allow them to internationalize rapidly via internet. (Ferencikova & Hluskova, 2015).

5 Future avenues of the research

The authors believe that globalization, ICT development and Internet change the ways of acquiring, and implementing knowledge in internationalization process. However, they believe that the personal factor remains the most important in this process. His role may decrease in bigger companies given the potential of the change of the tacit knowledge to explicit one in them, however it has remained unchanged in smaller companies. These are the assumptions that require further research in this area. The authors believe that the case study method would be the best method for the relevant study in the Slovak conditions.

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The Evolution of Communities of Practice

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Abstract: In this document we introduce communities of practice. We define them and give examples from the real-word. In the end we try to foresee their development for the future.

Keywords: community; practice; domain, interest; communication.

1 Introduction

The prosperity of a country is today looked upon by measuring its gross domestic product and its growth over time. Little attention is given to other factors that may have an effect on the inhabitants. The GDP does not show all that is influencing the everyday quality of life of a country's population. That is why scientists have been trying to find an alternative way to measure people's well-being. One such example is a study done in Hong Kong [18] to identify the main areas of concern and quality of life for the locals. These were identified to be Education System, Environmental Protection and Healthcare.

Environmentalist Edward Lorenzo is considered to be the founder of the so called Chaos Theory or Butterfly Effect. He said that „A flutter of a butterfly's wings may cause a hurricane on the other side of the plane“ [5]. This quote has since then taken on a life of its own with manifold interpretations. However, predominantly it took on an environmental connection where any action that we do has some kind of, even if unforeseeable, consequence somewhere in the world. This is true for both, positive and negative deeds. The reality of today shows that this is indeed true. We can no longer consider any actions involving the environment to be autonomous to the country where such changes happen. From disasters such as Chernobyl, to hydro power plants, we see that the repercussions are not only environmental, but also ethical, economical and social.

With the exponential of growth population and the onset of globalisation, the issue of sharing is becoming more and more prominent. We all need to learn to share with an ever-increasing number of people the space that we inhabit, the resources we need to sustain our life, the means to survive. The sharing of these resources can be voluntary or may arise from a need that is natural to humans. However, this sharing can also bring on a positive result. That is when people realise that they can gain certain benefits from sharing their thoughts, ideas and even knowledge. The technology today enhances such communication of ideas in an unprecendented way. Let us take a closer look at how people used to share their thoughts and what the future may hold for the so called „Communities of Practice“.

2 Goals and Methodology

The aim of this paper is to define the Community of Practice. We shall look at how such communities are formed. Further we will look at different viewpoints in this newly coined term. Later we shall describe the communities of practice that are involved in activities related to sustainable development. We will look at their formation, background and also what the future may hold for them. In the end we conclude that such activities should not be only left up to the initiative of the private sector, but should be suported by the government as well, as they are so important.

To do the above, we will need to analyse secondary resources. We shall find these in the Proquest Online Database, scholarly papers and textbooks. The emphasis is on academic articles and textbooks for the theoretical part.

The examples of communities of practice described are a result of primary research done over years of cooperation with these organisations, numerous personal encounters mostly in the organisations themselves or at events they organised, or at guest lectures they themselves offered at City University of Seattle in Bratislava. One could boldly say that by this, these organisations themselves have become a community of practice since they cooperated and contributed to improved environmental education of university students on regular basis.

3 Definition of Communities of Practice

To be able to discuss the issue further, let us examine the definition of the term „Communities of Practice“. Anthropologist Jean Lave and Etiene Wenger coined the term while studying apprenticeship as a learning model. [19]

Wenger et al. [19] defines Communities of Practice as "groups of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis.“ The author then goes on to define the three crucial characteristics of a community of practice. These are: the domain, the community, the practice.

According to Wenger, community of practice „has an identity defined by a shared domain of interest. Membership therefore implies a commitment to the domain, and therefore a shared competence that distinguishes members from other people. ... The domain is not necessarily something recognized as “expertise” outside the community.“

In other words, the domain could be any interest the group has, even a passion for some rock band or the knowledge of some illegal practices. It is also important to stress that the fact that you belong to the same network may not even be known to you.

“In pursuing their interest in their domain, members engage in joint activities and discussions, help each other, and share information. They build relationships that enable them to learn from each other. A website in itself is not a community of practice. Having the same job or the same title does not make for a community of practice unless members interact and learn together.“ [19] This view is supported also by Asbjorn Karlsen who in his work *“Cluster” Creation by Reconfiguring Communities of Practice* [7] shows that just by gathering in one place and forming a cluster, companies do not necessarily benefit from this. The author studied 6 Norwegian municipalities and came to the conclusion that it is actually beneficial to allow new start-up companies to join the industry from outside. While these new startups learn from the big enterprises, the enterprises also benefit as they are pushed into communication about the latest developments in their industries.

Here what is crucial is the necessity of communication that enables a community to form. The members of this community need to share their knowledge. This does not have to be on daily basis, but the interaction needs to happen. Being only part of the same institution, therefore, is not enough to actually create a community. This is often a misconception in schools or organisations who think that by simply sharing the same space, they have become a community and interactive learning will occur. This proves that large classes where interaction among students is not encouraged hinder the creation and later exchange of knowledge by the students among themselves as well as with the teacher.

This characteristic would also prove that if an organisation with an environmental cause truly wants to make a change, it is not enough just to „get together“. They must have a clearly defined domain and provide a platform for the community members to communicate. Simply presenting its own agenda is not enough. In other words, any organisation that wants to become a community of practice must provide some forum for the exchange of ideas. This is done more easily today with the advance of social media. However, the threat is that an organisation may feel that by simply having a Facebook page, they have fulfilled this criterion. However, they must constantly be checking the opinions and exchange presented and should manage these converstations and direct them to some goal or form some tangible outcomes.

Lastly, the domain and community must be combined with practice. **„**A community of practice is not merely a community of interest- people who like certain kinds of movies, for instance. Members of a community of practice are practitioners. They develop a shared repertoire of resources: experiences, stories, tools, ways of addressing recurring problems—in short a shared practice. This takes time and sustained interaction.“ [19]

We see that for a community of practice to function, all three conditions must be met and applied at the same time. Otherwise, the community of practice does not exist and it is merely a group of people in perhaps the same place, working even on the same project, but once the interaction fails, no practice occurs. Again, we could look at examples in real life where this could be applied. Even families become dysfunctional unless they actually work together on solving issues rather than just sharing the fact that they exist.

From all of the above we can see that the concept of communities of practice can be applied in organisations, schools, the social sector etc. Smith and McKeen [16] state in their paper entitled *Creating and Facilitation Communities of Practice* that: „Communities of practice (CoPs) are an emerging, unstructured organizational form that many believe will help companies to truly leverage what they know. CoPs appear to have the potential to galvanize knowledge sharing, learning, and change thereby improving a company's performance and making it more competitive. However, a major problem with them is that their organic and informal nature makes them highly resistant to management supervision and interference in their activities. CoPs are therefore controversial because there is no clear role for management in them. In fact, if management does get involved, the community often dissipates. Yet paradoxically, CoPs require specific managerial efforts to develop and support them so that their full power can be leveraged.“

We can see that we have a peculiar situation here where the nature of the community of practice requires informality while its creation may require formality. It can, therefore, be inferrred that communities of practice will thrive in an environment with liberal or democratic leadership style. These seem to be supportive and not afraid of not having utter control over all the happenings in an organisation. In a more centralised institution, from the point of view of power and management, we can expect the formation of communities of practice to be very difficult, if not impossible. Or they may form without the knowledge of the management and are thus useless for the benefit of the company's further direction. In this case they may be looked upon as the source of apprehension or even revolt.

4 Real-life Examples of Communities of Practice

In order to better understand the activities of communities of practice in the real world, let us now look at several examples. The first is an example from Finland, where the state has taken the initiative to create a community of practice from basically the whole country. This project is called Team Finland. It is an example of cooperation that reaches far beyond a single department, company or even market sector. It was officially launched on September 10, 2012 with the goal to create economic synergy by "avoiding the fragmentation of export oriented activities through various players"[15]. The "network promotes Finland and its interests abroad: Finland's external economic relations, the internationalization of Finnish enterprises, investments in Finland and the country brand"[17]. Cleantech is at the core of Team Finland's agenda. [15]The Finnish government annually approves the shared goals of these actors at home and abroad. The core of the "Team Finland network are three Ministries – the Ministry of Employment and the Economy, the Ministry for Foreign Affairs and the Ministry of Education and Culture – together with publicly funded bodies and Finnish offices abroad (including Finland's diplomatic missions, the offices of Finpro and Tekes, and national culture and science institutes), all operating under the ministries' guidance". They put large emphasis on the long-term perspective and continuity"[17]. In many other countries or companies the emphasis is more or less on the short-term. In many cases it also seems to be the problem of nobody wanting to assume responsibility, which in fact is what politics should be all about. Just like in the case of Nokia, the Finnish government is now focusing on creating a favorable business environment for Cleantech. Their "aim is to commit all actors to the achievement of a mutual goal" "[10]Such sentences are not rare in business, but usually they mean to commit people within perhaps just one company. In this case they apply to all the 'actors' that can influence Cleantech 26 growth- not just one or two companies, but all companies in the Cleantech conglomerate including their employees and even the Finnish government. The politicians are more than aware of the importance of the task and aim to optimize national and foreign policies to suit. They are committed to "identify and eliminate [...] legislative or practical bottlenecks hindering or decelerating growth"[10]. An example would be to allow foreign labor to have a low and flat income tax, just like they did in the case of Nokia. The main advantage of the Finnish system is that it does not favor any specific political movement.

Looking back at the criteria of a community of practice, Team Finland fits. It has a domain, a common interest or goal. In this case it is the issue of defining Finland's future focus and direction. It also has a community as all the actors are sharing and communicating with each other. It also has a practice as they are producing materials and know-how that can be used for the future development of the country. The fact that the public and private sector are sharing this common goal is truly remarkable.

Finland is not the only example. In their article Insights into Operationalizing Communities of Practice from SSM-Based Inquiry Processes, Ison, Blackmore, Collins, Holwell and Iaquinto [6] look at the case of Australia forming a community of practice in order to change their knowledge management strategy. The government realised that it is not possible to carry out by conventional means and they actually based their approach on Wenger's article.

Another example of a community of practice that is more local could be the Slovak Green Building Council. Essentially it is a Slovak version of the World Green Building Council that has its headquarters in Canada. It has branches in almost 100 countries, has more than 27,000 organizations under its wings and over 50 corporate and institutional partners. The main goal of the SKGBC is to be the main ambassador for green buildings in Slovakia. [14] What the organisation does is that they try to recruit companies involved in the building industry to become their members and to change their business to a more sustainable one. They do this by organising different events, such as conferences, workshops, field trips etc. as well as by publishing different education materials. They form strategic partnerships with other institutions, such as the Slovak Technical University, Eurostav etc. so that they gain credibility and access to a greater knowledge base in the given area.

Again, they share a domain - they strive for a more sustainable future. They have a community – members and partners. These communicate regularly at events organised by the Council or even as part of their business operations. They also have a practice as they produce new knowledge base based on the unique experiences of individual members. This is then stored in their so called „green library" together with publications about this exclusive topic from around the world.

With the onset of new technologies, it was only a matter of time before they would be used to form communities of practice. In their extensive study, Cheung, Lee and Lee [1] looked at an interesting phenomenon – the formation of online communities of practice and what is behind. Apparently people have an inner drive to share their knowledge and communicate it to others. The authors proved by their extensive empirical study that communities of practice may indeed function in the online environment. They conclude: „results show that when members' expectations of reciprocity and capability of helping others were fulfilled, they were satisfied. In addition, when members found that their contributions could successfully help other members in the community, their knowledge self-efficacy was enhanced.This in turn increased their level of satisfaction with the knowledge-sharing experience. The post-knowledge-sharing evaluation processes have been validated in the context of online communities of practice."

An excellent example of such a community where members actually help a good cause is the community Solved. [11] They started as a public-private company, partly financed by the Finnish government, partly by a private Slovak-Finnish company. Their motto is that „Together people achieve great things". The stress is on the word „together". Their goal is to provide a platform where experts from the whole world come together in order to cooperate on projects that help sustainable development in the world. Their view is to do it primarily through innovation. The platform works in such a way that different experts are recruited from all over the world and without ever meeting each other they cooperate online on solving problems connected to the environment, society or community. The project goes through three stages. First it is defined and then presented to the experts. The next phase is cocreative and the last one is the solution.

This unique concept shows that innovation in the field of sustainable development is brought on with the help of the internet and joins people that would otherwise never know about one another. It further saves a lot of costs and brings great results as the projects are carried out by true experts in their fields.

Again, we can see that Solved is indeed a community of practice as it has a domain, members – the experts, and they have a practice. They produce an utterly new knowledge base of innovative solutions for new projects around the world.

The Green Watch (Zelená hliadka) is the name of a non-government organisation that had a fable-like start. In 2011, Matúš Čupka, the founder, cleaned up an area of Bratislava in order to make the place look cleaner for the upcoming ice hockey championships. He was later joined by his brother and family and once they shared the photographs of their actions on social media, more and more people got inspired. In the space of one year they already had almost three hundred „fans“ that joined them in their cleaning effort. [2]

What began as the result of an individual's frustration with non-functioning municipality has turned into a full-blown NGO with hundreds of followers. The organisation was able to attract media and the attention of local governments. Currently, the cleaning events are being suggested and organised by the Green Watch with the support of the local council. The Green Watch has also managed to push for changes in environmental policies, perhaps the most publicised is their campaign against visual smog in Bratislava and illegal billboards.

Not only is Green Watch a great example of a grass-roots movement, but also of the evolution process of a community of practice. Initially an individual action later amassed many followers. These have a domain – to clean the city and make it more attractive. The members are still on the rise and organise themselves via Facebook. They certainly have a practice. The results of their work are not only bags full of rubbish, but changes in policies and legislation regarding environment in Bratislava.

5 Closing Remarks

Returning to the study we mentioned in the introduction, the areas of Education, Environment and Healthcare should not be left only to the initiative to individuals and the private sector. From all the examples shown, it is clear that while communities of practice may be formed by individuals, government intervention enhances such a practice. To further prove this, more cases would need to be examined.

It could also be concluded that the activities of each community of practice grow in diversity, complexity and quality over time. This happens as more members of community join adding their own expertise. In this way a community of practice creates its own knowledge base that can then be shared with other communities. This differentiates communities of practice from purely information societies as these are deeply based on information. [9]

From what we have discussed we may conclude that communities of practice are examples of learning organisations. Their knowledge base grows over time and the education they go through is an ongoing process based on the experience of the community per se as well as its individual members. [8]

All the examples shown had in common was that they were connected to environmental issues. This, maybe naturally, meant that government interest, involvement or even support would be called for. However, according to a study done by Rivera and Carlos [13] it is important also for private companies to support the creation of communities of practice. They claim that organisations that are good in knowledge management tend to focus mainly on technological and strategic dimensions. The formation of a community of practice should, according to them, be highly encouraged, as it „integrates all aspects of organisational knowledge.“

Today the formation of a community of practice is seemingly easier due to technology available. Even from the mentioned examples we can just how crucial the online environment is. Of course, this also brings challenges together with the obvious benefits. Wei Zhang [20] talks about the issue of knowledge absorption in an online environment. Since the members cannot see each other or meet regularly face to face, the knowledge absorption can be distorted by different external elements. The author states that better design of software systems will help overcome this phenomenon. This brings us to the topic of virtual teams, but these were not the primary subject of our study. An overlap with communities of practice cannot be denied though and they have been named Virtual Communities of Practice by numerous authors. (for example, Davis [3], 2010, Goettsch [4])

We can conclude that the idea of a community of practice is as old as humankind. The term has been formed recently, but communities of practice have been in existence for centuries. What is new today is the interest countries and companies are paying to the benefits of communities of practice. However, for them to function they must have a domain, a community and a practice. Real-life examples show that they are a beneficial form of sharing knowledge and that people are naturally inclined to share knowledge even in the online environment. This brings a lot of optimism for the future as long as the knowledge shared is of benefit to more people than just the given members of a community.

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Measuring performance of knowledge management in companies

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Abstract: Knowledge is nowadays very important resource for companies and in case this knowledge is unique and refers to strategic enablers of doing business, it may be the source of company´s competitive advantage. Knowledge management covers all processes related to knowledge processing and circulation within the firm. The right knowledge management practices develop and leverage the potential of knowledge that helps the organizations to stregthen their position in respect to their competitors. There are many studies that validated the positive effect on knowledge management on company performance applying different models or framework. The outcomes of the working knowledge management program are reflected in various intermediate performance indicators such as productivity, effectivity, customer retention or direct financial results of company including return on investment, revenues and profit.

Keywords: knowledge management; knowledge management performance; measuring knowledge management; knowledge management indicators

1 Introduction

The following article looks at the importance of knowledge for the companies, the factors that influence knowledge management program in the firm and mainly reviews the alternative ways of measuring knowledge management results. Some authors propose to link knowledge management practices to non-financial KPIs, the others judge the impact of knowledge management on financial performance – either directly or as a consequence of some intermediate results. An alternative way to measure knowledge management program is via a dedicated knowledge management performance index. All of the mentioned approaches are introduced in the paper.

This paper is limited through the scope and content of the reviewed original studies, it does not conclude on authentic findings and recommendations. It serves more as a food for thought for those who start to explore managerial dimensions of knowledge management, mainly the possible benefits coming from the knowledge management practices. All of the researches from the sample articles used for this review paper suggest that working knowledge management program is improving the performance of the company in various areas.

2 Methodology

The article is constructed as a review paper. The initial articles were searched in the databases ProQuest and google scholar using multiple key words such as knowledge management, knowledge transfer, company performance, knowledge management measures, knowledge management results. At the first stage few dozens of articles were pre-reviewed based on their abstracts and many of them were excluded from detailed reading as they were usually too specific, with strong regional or industry focus or a peer review was missing. The articles that were finally selected as references for writting this paper stand for a limited number of views of academic and scholars on the topic knowledge management and company performance. Nevertheless the submitted paper introduces interesting points related to knowledge management discussed by the senior researches as well as their conclusions on several studies focused on knowledge management impact on company performance.

3 Knowledge and its importance for the companies

During the twentyfirst century characterized by the shift of the economy to knowledge economy and the strengthening globalization, many of the countries have made the development of knowledge their national goal. The knowledge intense industries are starting to replace the traditional capital and labor oriented industries and one may expect that orientation on knowledge will become common across the economies. Digital industries have already progressed to the top of the economy [5].

The increasing entrepreneuring pressure has made knowledge the vital company resource for building competitive advantage. The ability to identify, create, share and use knowledge in order to desing new products and technologies is essential mainly for highly competitive markets, resp. very attractive markets or markets requiring high investments. Knowlege is the information enriched by personal experience, interpretation and reflection and include the context and added value. Information is the sum of data, knowledge is derived from information grounded in the individuals´ belief in their plans and acts. The explicit knowledge can be transfered by the formal means and language. Therefore the explicit knowledge has a lower value since it is available to broader public. The tacit knowledge is more subjective, which makes its codification and formalization more difficult. The tacit knowledge tends to be incorporated into human´s behaviour and specific context, it can be very personal and integrated in one´s acts, hence it is a challenge to communicate it properly [8].

The increasing amount of the tacit knowledge, more complex environment, very common learning by doing and observation approach, the collective knowledge and the expensive knowledge transfer via moving of the personel, have made the knowledge codification and sharing more difficult. The traditional hierarchies are not sufficient for the creation of tacit knowledge and together with the lack of ability to share the best practices could explain the diverse performance of the subsidiaries of multinationals. The multinantionals face an issue to share the knowledge due to knowledge specifications, the skills of the recipient and sender and the complex context. It is easier to share the general processes possible to codify [11].

The knowledge matrix by Ordoñez de Pablos is based on two criteria: knowledge uniqueness and strategic value and forms 4 quadrants:

- Idiosyncratic knowledge – high originality and low strategic value. This knowledge could be differentiating factor for the company. The company objective should be to increase the strategic value of idiosyncratic knowledge, however the short-term pressure for cost reduction often prevents the managers to invest into this knowledge. In the long-term are mainly innovative companies able to find appropriate utilization of idiosyncratic knowledge.
- Ancillary knowledge – low originality and low strategic value. The optimal strategy is the investment reduction into emploeyees who are generating the general knowledge; the company will decrease the costs, increase its flexibility and can re-direct the resources into more promising knowledge.

- Core knowledge – high originality and high strategic value. The benefits from this knowledge exceed the costs for its creation, therefore it is essential to establish the environment that fosters the generation of core knowledge.
- Compulsory knowledge - high strategic value and low originality. There is a risk that employees transfer this knowledge to competitors – the quick way for companies to get this knowledge is to hire the knowledge workers. As a risk reduction, compulsory general knowledge could be adopted to company environment to prevent its usage by the rivals [11].

The individuals have skills to overcome knowledge ambiguity, noise related to its communication, understand the full context. The contextualization resonates often in the multinationals that are geografically and culturaly diversed [8]. The knowledge ambiguity has a significant affect on knowledge transfer: the higher the ambiguity, the less knowledge successfully passed to the recipient. The ambiguity is on the other hand the barrier for knowledge immitation. The factors that have an impact on knowledge ambiguity are: tacitness (increasing ambiguity), complexity (increasing ambiguity), experience (decreasing ambiguity), cultural and organizational differences between partners (increasing ambiguity). All of the mentioned factors affect the knowledge ambiguity in similiar scope. In the joint ventures and aliances which partners cooperate closely is the importance of complexity and cultural and organizational factors lower; the units can more easily overcome the barriers related to those factors [13].

According to focus the knowledge strategies can be either explicit or tacit oriented. The explicit oriented knowledge strategies aims at improving organizational effectiveness via codification and re-use of knowledge, often driven by more advanced IT. The tacit knowledge strategies require personal contacts; tacit knowledge is usually communicated face to face and through socializing. According to knowledge resources one can differentiate internal and external knowledge strategies. External knowledge strategies bring in knowledge from external environment e.g. via its acquisition or immitation. Internal knowledge strategies generate new knowledge within the boundries of the company [6].

Companies have different resources that could be allocated to knowledge management that leads to difference in knowledge management levels. Bigger companies could afford higher investments into knowledge management and also during the crisis, usually requesting savings, they manage to maintain some level of investment. On the other hand the small companies could establish knowledge management almost with zero investment. Small companies can create knowledge program involving all employees, which ensures high acceptance by staff, thus managing the knowledge is not only managerial project. The clearly defined knowledge strategy with articulated objectives could lead to substantial progress while having limited financial investment. There is no one general solution for knowledge management that would fit the needs of all types of companies. Big multinationals usually create knowledge programs for functional areas or hierarchy levels. The headquarters monitor the performance of the knowledge systems among units and encourage their introduction in new divisions. IT companies have in their core the work with knowledge that helps them to implement knowledge management activities. The factories are usually less knowledge intense than IT, but new knowledge is still important to them. The progress of knowledge management in banks and financial institutions has been weak due to the fact that the level, which they had already achieved is sufficient, hence the motivation to further invest into knowledge programs is not in place [3].

4 Knowledge management, approaches to measure its performance

Knowledge management appears as a program that introduces important changes to the strategies and in traditional management practices. Introduction of knowledge management requires effort to develop new knowledge, its dissemination and protection, continuous learning, understanding organization as a complex system, creation of innovative culture, focus on individuals and their skills, developing of company competences and competence based management. Knowledge management includes all company functions, employees and also partners that the firm cooperate with [9].

Ecological view on knowledge management mentioned in literature strengthens the idea that good knowledge management systems exceed the boundries of technology and integrate social dimensions: culture, processes and structures. Eco view appears as human dimension of knowledge management concerning internal environment and its impact on knowledge management. The knowledge comes from organizational culture and takes on diverse forms, e.g. experience of employees or their know how. Culture has the biggest impact on knowledge the company and together with company vision that defines company direction and goals stimulate changes to the organization. The structure can support or hinder knowledge management practices; friendly culture together with flexible organization help to implement knowledge management. The cooperative atmoshpere, trust and employee development have positive influence on knowledge sharing. Established learning processes will raise employee acceptance of the changes, supports the continuos improvement, generates new innovations and overall promotes knowledge practice. Rewarding programs and assignment of appropriate employee status have positive effect on knowledge sharing. Centralized organizational structure requires employees to follow formal communication channels, blocks free information exchange and creation of new ideas and decisions take longer. On the other hand, decentralized managmenet strengthens the importance of individual units, opens the opportunities to create and share new ideas, encourages employee contributions. Should the company maximize the benefits of knowledge management, it needs to adapt it to internal socio-technological environment [4].

Organizational structure has a great impact on knowledge flows – the cooperation, trust, learning capabilities, expertise as well as innovative skills are supporting the dissemination of knowledge in the company. Some flexibility of formal structures allows employees to find their own room for efficient task fulfillment, further development of their skills which will translate to improved firm competitivness. The implementation of knowledge management programs motivates the experts to stay in the company, since they can exchange their views, use different communication channels to stay in touch with peers, take part on decision making process, grow professionaly, are able to navigate themselves to quick and effective problem solving [4].

The companies own diverse competences as well as the skill to develop new competences, leverage and protect them which is an antecedent of building of competitve advanatage. Competence based view suggests that companies compete through learning process which drives competences in various areas and serves the enhancement of company products [4]. The properly working knowledge management needs two competence dimensions: infrastructure with technical, structural and cultural elements and process dimension with knowledge creation, conversion, utilization and protection [2].

Knowledge creation requires sharing of individual experience, the cooperation between different levels of the firm (individuals, company and its partners), gaining knowledge from outside of the firm via technology sharing, personel move, alliances or joint ventures. The conversion stands for a process that transforms the knowledge into usable form. This process requires the ability to discover the knowledge, integrate, structure, combine, coordinate and distribute it. The knowledge utilization is the process of real implemenation of the knowledge and helps the company to increase the effectiveness and decrease the cost. Knowledge protection prevents the misuse of the knowledge via legal protection (patents, trademarks, usage rights) and also internal practices (access definition, rules for knowledge usage, monitoring of employee access of knowledge databases). The phases of knowledge process provide a framework for combining and sharing of knowledge, they are additive, i.e. one supports another and together they support the organizational efficiency [2].

Technologies, structures and culture are additive dimensions of bigger company infrastructure that also supports organzational performance. The infrastructure and process dimensions could be combined and linked together [2].

McKeen et al. studied the question which practices of knowledge management mostly supported the organizational performance. The four dimensions of knowledge management practices are: the ability to localize and share the knowledge, ability to experiment and create new knowledge, knowledge culture that promotes knowledge sharing, understanding of the strategic value of learning process. The culture proved to have the most impact on knowledge management practices. Firms that reward their employees for their knowledge and sharing of experience usually create an environmnet that supports knowledge management. The most valuable strategic competence is the ability to learn. The learning process applies the knowledge and upgrades it in time, which certainly associates learning with knowledge management. The organizational performance depends not only on current level of knowledge, but also on the ability to develop new knowledge for future. Top performing companies nowadays could loose in future provided their competitors are more capable of learning new things [10].

We may see companies implementing knowledge management programs without having specific tools for measuring its successful introduction. Gold et al. study validated that companies own certain antecedents for successful launch of knowledge management through the development of company competences [2].

Several alternative KPIs could be used to measure knowledge management performance. One possibility is to focus on productivity, investment levels, return on investment and the achievement of goals. An alternative approach takes into consideration the achievement of strategic goals, the effective implementation or usage of corrective activities. The assessment of knowledge management could be based on knowledge process covering knowledge creation, storage, transfer and implementation – we can measure how individuals create, store, share, use and explore the knowledge [4].

The research findings suggest that non-financial KPIs such as reaction on consumer needs do not necessarily improve the financial performance, nevertheless they are still important for customer relationship. This means that traditional financial KPIs are necessary but not sufficient and additional indicators about customer satisfaction, reaction on market development and quality of internal processes are needed. Ping-Ju Wu et al. propose to measure organizational performance in respect to competitors through: (1) financial indicators, (2) customer satisfaction, (3) internal processes. The financial KPIs include return on investment, return on assests, return on equity and marketed volume. The consumer perspective includes consumer satisfaction, image perception and product leadership. All of these attributes are key to achieve consumer loyalty which facilitates long-term retention and this way the success of the company. Internal processes include effectiveness of operations, productivity and reaction on changing environment [12].

The relationship between antecedents or influencing factors and knowledge managment performance was studied in many researches isolated. Lee et al. introduced an integrated model which analyzed the relationship of knowledge processes, factors that influence knowledge management (structures, culture, IT) and final performance. The antecendents are the first component of the model. These are the factors that influence knowledge management defined as mechanisms that consciously develop knowledge. The next component are the knowledge management processes, i.e. the phases such as knowledge creation, transfer, storage and use. The relationship among all three components could be defined via model input-process-output, which suggest that inputs will affect the outputs through some process. We may assume that the antecendents of knowledge management will reflect in the organizational performance through knowledge processes. In order to define the relationships among the components, the mediating component is needed – the role of facilitator, that comprises the abilities of the company, specific processes, innovatios. All these are groupped by the authors under the name of organizational creativity. The knowledge creation is an important antecedent for overall organizational creativity. Organizational creativity has a positive impact on non-financial performance of the company. Although there is a strong relationaship between organizational creativity and non-financial performance of the company, the direct effect on financial performance was not supported [7].

Chang et al. studied the effectiveness of Thai digital companies. Digital products include pictures, texts, movies, digital games, e-learning etc. The studied inputs in digital industry were: number of employees, investment into research and development irrespective of its object (technology, materials, product innovations), administrattive costs for advertising (as alternative indicator to investment into customer relationship managment). The output indicators include net revenues (standing for financial performance) and a monetary value of intelectual capital. Intelectual capital is the sum of individual knowledge including experience, technology, relationship management skills etc. The operational effectivness of Thai digital companies in the sample reached 24% in 2005 which suggested the room for development. Non-effective companies did not use their resource in an optimal manner. The human resources together with advertising cost (representing the cost of customer relationship management) have the strongest impact on operational effectiveness of digital companies. Decrease of advertising cost and labor or increase of net revenues would improve the input/output ratio – digital companies should pay more attention to resource adjustment in order to minimize non-efficiences. Digging to the individual level, the authors discovered differences – some companies performed better in financial KPIs, some had better intelectual capital. In any case the managers in digital companies should be more strategic, forward looking and not only judge the quality of intelectual capital, but allocate it appropriately in order to avoid overinvesting into some areas. The right adjustment of intelectual capital in respect to operational performance will optimize the company effectiveness [5].

Lee et al. formed knowledge management performance index. Knowledge process starts with knowledge creation, both tacit and explicit, and is supported by the interaction of employees from different functions and with different experience. The second phase is the collection of knowledge, which should be done systematicaly. The next phase of knowledge circulation process is dissemination of knowledge within the firm, which supports the qualified decisions and improves the level of expertise of the employees. The utilization of knowledge is the fourth phase. The ultimate phase of the knowledge circulation process is knowledge internalization that happens when an individual gains the knowledge, process it and uses it while creating a base for new one. The effectivness of the knowledge circulation process depends on the relationship between employees, atmosphere between subsidiaries impacted by the headquarters decisions, internal processes, strategic relationships with third parties, trust with partners, strategic management and leadership skills of managers, corporate vision etc. [7].

The improving efficiency of knowledge process translates into improving knowledge performance index. The development of knowledge management performance index is similiar to the introduction of new aplication – the benefits are low during the first phases, because time is needed for the employees to get familiar with new working processes, the benefits become significant later and in long-term the marginal gains are diminishing following the closeness of the optimum point. Knowledge management performance index is measuring the quality of the knowledge organization and refers to overall company performance. The companies with good knowledge organization have higher performance index and firms with high performance index have better results – stock value, investment into research and development, profitability. The knowledge circulation phases significantly impact knowledge management performance index that is a reflection of knowledge organization quality. Good knowledge organization significantly improves company performance, therefore the designers of knowledge systems should come up with solutions that optimize individual phases of knowledge circulation so that the performance is maximized [7].

Lee et al. also validated positive relationship between knowledge management practices and company performance. The support for knowledge creation, transfer and protection, continuous learning, understanding of company as a complex system, innovative culture, focus on individuals and investment into research and development have positive influence of company performance [7].

According to Darroch the outcomes of knowledge management could be competitive advantage, better financial performance, innovations, anticipation of problems, better ability to learn or extraordinary knowledge utilization. The competences help company survive on the market; firms with effective knowledge practices better use their knowledge and achieve better results in innovatios or financials. Firms with effective knowledge management are more innovative and performing better. Firms with bigger knowledge base are better in transfering knowledge, reacting faster, better use their resources and can maintain their competitive advantage. The ability to innovate can be strengthened by higher investment into research and development or hiring employees with academic and scientific background in order to drive product or technology innovations. Knowledge practices are flourishing when all employees use their skills. Surprisingly Darroch´s study did not support hypothesis that innovations improve the performance of the company, however Darroch split innovations into several tiers (radical, new to company, improvement of existing products). Darroch herself is concluding that companies should not stop improve their innovation skills, as innovations can also help to sustain the current level of competitivness [1].

Knowledge management practices are according to McKeen et al. related to company performance, qualitative and quantitive results, though the strongest impact refers to intermediate performance indicators. Knowledge management leads to various non-financial indicators such as quality, innovations, productivity and other indicators of effectivness, which can in real life improve simultaneously. When measuring the performance through financial indicators, the correlation gets weak – general changes in organization and in knowledge management do not necessarily drive financial performance; knowledge management has an influence on company competences that facilitate financial performance. There is no direct correlation between knowledge management practices and financial performance [10].

McKeen et al. analyzed knowledge management practices in relation to position of the company within competitive environmnet assuming that knowledge standing for strategic company resource has an impact on competitivness of firm. Knowledge management practice has positive influence on product leadership, that is based on innovations of product and services, custormer relationship with extraordinary mutual understanding and exellent operations. These three strategic competences are reflected in company leadership position and improve financial performance [10].

Firms with excellent operations focus on individual skills of employees, invest into employee development and share best practices. Firms with product leadership also create strategic plans based on new knowledge, benchmark their level of knowledge with competition, experiment with product and service, have department dedicated to knowledge to maximize knowledge value. Firms with attractive relations with trade partners engage in all mentioned areas of knowledge management [10].

The advise of scholars in respect to number of implemented knowledge strategies is mixed: some recommend to introduce one individual knowledge strategy, the others recommend to implement several strategies at the same time. Choi et al. studied the combinations of knowledge strategies and their impact on company performance. Implementation of sole explicit strategy increases the likelihood of better company performance. Focus on strategy prefering tacit knowledge does not increase the chance of improved performance. Combination of explicit strategy and strategy oriented on tacit knowledge decreases the likelihood of achieving better performance. The findings promote explicit oriented strategy and especially warn about the risk of staying in the middle – if the company does not choose either tacit or explicit strategy, the likelihood of improved performance will go down substantially [6].

From the perspective of the resources both external and internal oriented strategies increase the likelihood of improved performance. Companies that implement both strategies increase their chance for better results even more. There is a complementary relationship between external and internal strategies, i.e. in order to get to better results it is not necessary to use both since each of them supports the perfomance. Considering the strategy resource and focus at the same time, it was prooved that internal tacit strategies positively impact performance. Explicit external strategies on contrary show lower probability of better outcomes. However explicit external strategies moderate the impact of internal tacit strategies and this way companies can increase the probability of better results. Again, between strategy focus and resource there is a complementary relationship [6].

5 Summary and conclusion

In current era of IT, knowledge could be used to explain different level of competitiveness among firms. Reviewed studies validate positive impact of knowledge management on company performance – if not directly on profitability, knowledge management practices reflect in the improvement of various non-financial KPIs: competitiveness, custormer relationship, productivity etc. We can recommend to the manageres who plan to introduce knowledge management in their companies to start with an analysis of company competences and afterwards to set the objectives. The implementing managers should take into the consideration both possibilities of the company and requirements for the desired level of knowledge management program. This alignment of requests for knowledge management with company possibilities is needed to eliminate potential negative outcomes and maximize the benefits coming from the program [2].

At the same time we point at the general importance of knowledge for the organizations. The knowledge that is unique and has a great value may be the source of the success of the company.

Therefore the companies should support employees to generate and use new knowledge by creating culture that promotes exchange of the ideas, free communication and reward employees for their achievements in knowledge field. Individuals with their skills seem to be at the beginning of creating new values.

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Mining Big Data in WEKA

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Abstract: Recent versions of WEKA 3.8 also provide access to new packages for distributed data mining. The first new package is called distributed WEKA Base. It provides base "map" and "reduce" tasks that are not tied to any specific distributed platform. A second, called distributed WEKA Hadoop, provides Hadoop-specific wrappers and jobs for these base tasks. A third, called distributed WEKA Spark, provides Spark-specific wrappers.

Keywords: Data Mining, Big Data, WEKA.

1 Introduction to Data Mining and Big Data

Now is an age of Data Mining (DM). Popularity of data mining can be proven by the fact that the result of searching the expression "data mining" in the Google (November 2016) - was more than 60 million pages.

1.1 Data Mining

Data Mining is multidisciplinary in nature (statistics, informatics, machine learning, artificial intelligence, enterprise information systems). "Data mining is the discovery of interesting, unexpected or valuable structures in large datasets..." [11]. An interesting definition of data mining is: "Data mining is a process of discovering various models, summaries and derived values from a given collection of data" [14]. Currently DM not be focused only on the database as we know them. Ordinary applications are DM in text files or on the web. Real DM applications based on multimedia content (hadoop) they are already among us.

1.2 Big Data

The term "Big Data" is currently even more popular as the term "data mining". Result of searching the expression "Big Data" in the Google (November 2016) - was more than 300 million pages. Big data is a long time among us, but only now they are in the spotlight the lay and professional public. They they are most frequent characterized with the aid of 3 - 5 "**V**":

- **„Volume"** – amount of data is n*TB;
- **„Velocity"** – high speed of arrival of data and speed data processing;
- **„Variety"** – different types of data (the web content text, sound, video, digits, semi-structured databases and other ...).

These additional characteristics are sometimes appended:

- **„Veracity"** – informative value;
- **„Value"** – the value of information and knowledge.

We can be regarded as big data those entity which can be characterized by at **least 3 "V"** (Volume, Velocity and Variety).

1.3 Mining Big Data

We understand “Data Mining” as the an analogy as the "extracting valuable nuggets of large quantities of clay." Then we can understand the term “Mining Big Data” as a "extracting valuable nuggets of massive amounts of clay, stone and mud."

2 Software for Big Data

Commercial software systems for data mining and Big Data are mostly very expensive. Thankfully the market offers a lot of open source tools (software systems), which make the data mining more affordable for a lot businesses.

Big data, data that can’t maintain relationships. The problems with processing big data are varied, and no one tool can handle it all. Portal InfoWorld compiled 12 of the best open source tools for Big Data [13], processed in Tab. 1.

Tab. 1 The best open source big data tools by Bossie Awards 2016

No	Software system	Logo	Description	Special characteristics
1	Apache Spark™		In-memory distributed processing framework, which use batched processing of RDDs to a concept of a DataFrame without bounds [4].	Structured Streaming.
2	Apache Beam		To not rewrite code every time our processing engine changes. Extended features and performance of Google’s DataFlow [1].	Doesn’t support developer features like REPL.
3	TensorFlow™		Character recognition, image recognition, natural language processing, or some other kind of complicated machine learning application [20].	Run both distributed code and optimized parallel code on GPUs and CPUs.
4	Apache Solr™		Brings trusted and mature search engine technology to the enterprise. Able to deal with the scale of handling high query volumes across billions of documents [5].	Reliability.
5	Elasticsearch		Distributed search engine that focuses on modern concepts like REST APIs and JSON documents [8].	Able to detection and domain-specific business analytics.
6	SlamData		SlamData has a SQL-based engine that talks natively to MongoDB. Not sucking all the data into PostgreSQL and calling it a BI connector [9].	Basic analytics on MongoDB data store.

No	Software system	Logo	Description	Special characteristics
7	Apache Impala		It is Cloudera's engine for SQL on Hadoop. A row-based, distributed, massively parallel processing system [12].	If you need SQL over some files that you have on HDFS.
8	Apache Kylin™		It is designed to provide SQL interface and multi-dimensional analysis (OLAP) on Hadoop supporting extremely large datasets [3].	Lets you query massive data set at sub-second latency in 3 steps.
9	Apache Kafka™		Is the standard for distributed publish and subscribe. It is used for building real-time data pipelines and streaming apps [2].	Easy to install and configure
10	StreamSets™		Easily develop and reliably operate any-to-any data flows that connect a variety of sources to your Big Data platforms [19].	Robust and growing list of connectors.
11	Titan		Scalable graph database optimized for storing and querying graphs containing hundreds of billions of vertices and edges distributed across a multi-machine cluster [21].	Support graph traversals in real time.
12	Apache Zeppelin		Apache Zeppelin interpreter concept allows any language/data-processing-backend to be plugged into Zeppelin [25].	Supports Apache Spark, Python, JDBC, Markdown and Shell.

These software systems often implement methods other open source systems at its core. These software systems often implement methods of other free tools at their core such as R, KNIME, WEKA, Python and others.

The current trend is the integration of specialized software applications of DM in BIS[1]. An example for all can be *Pentaho Corporation* and the acquisition of highly specialized software application WEKA. In 2006 *Pentaho Corporation* acquired an exclusive license to use WEKA for BI[2] [16]. It forms a sub-module for data mining and predictive analytics system for management decisions *Pentaho BI Suite*.

[1] BIS - Business Information Systems.
[2] Business Intelligence.

3 Mining Big Data with WEKA

The **W**aikato **E**nvironment for **K**nowledge **A**nalysis (**WEKA**) project dates from the 1992 in University of Waikato, Hamilton, New Zealand [10]. WEKA is landmark system in data mining and machine learning, it is widely used tool for data mining research [16] and supports process models of data mining such as CRISP-DM [18]. This system had been released as open source software system. WEKA giving users free access to the source code and it has enabled a thriving community to develop and facilitated the creation of many projects that incorporate or extend WEKA [10].

3.1 Data Mining with WEKA

Basic functionality of WEKA:

- *Data preprocessing* – processing of format ARFF[3] and support of various other formats, filters);
- *Classification* - more than 100 classification methods, interface for classifiers implemented in Groovy and Jython;
- *Clustering* - unsupervised learning is supported by several clustering schemes;
- *Attribute selection* - the set of attributes used is essential for classification performance;
- *Data visualization* (tree viewer, Bayes network viewer with automatic layout, and a dendrogram, viewer for hierarchical clustering, 2D, 3D).

Furthermore Weka also includes *Association* and *Forecasting in time series.*

3.2 Graphical User Interfaces (GUI)

Design of graphical user interface began in 1999. In 2005 appeared the interactive versions of WEKA GUI - the Explorer, Experimenter, and Knowledge Flow interface (Fig. 1).

Fig. 1 The GUI Chooser

Displaying of attributes in the WEKA Explorer user interface:

[3] ARFF - **A**ttribute **R**elation **F**ile **F**ormat.

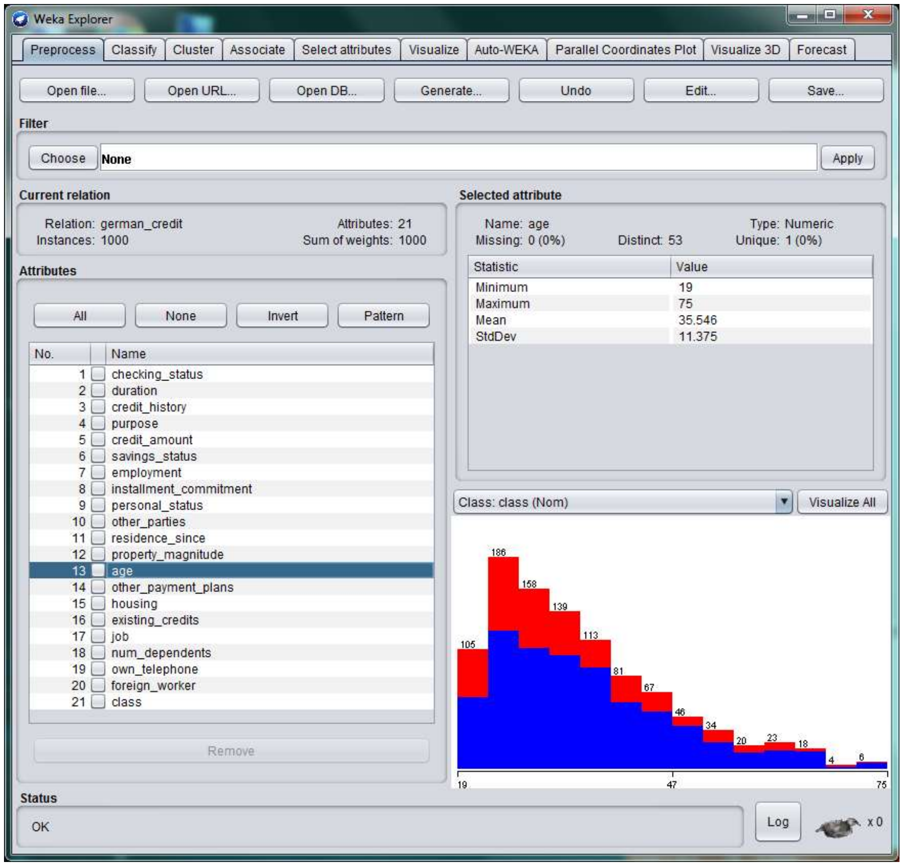

Fig. 2 The WEKA Explorer user interface, selected atribut "*age*"

Example of a decision tree – classifier with *J48:*

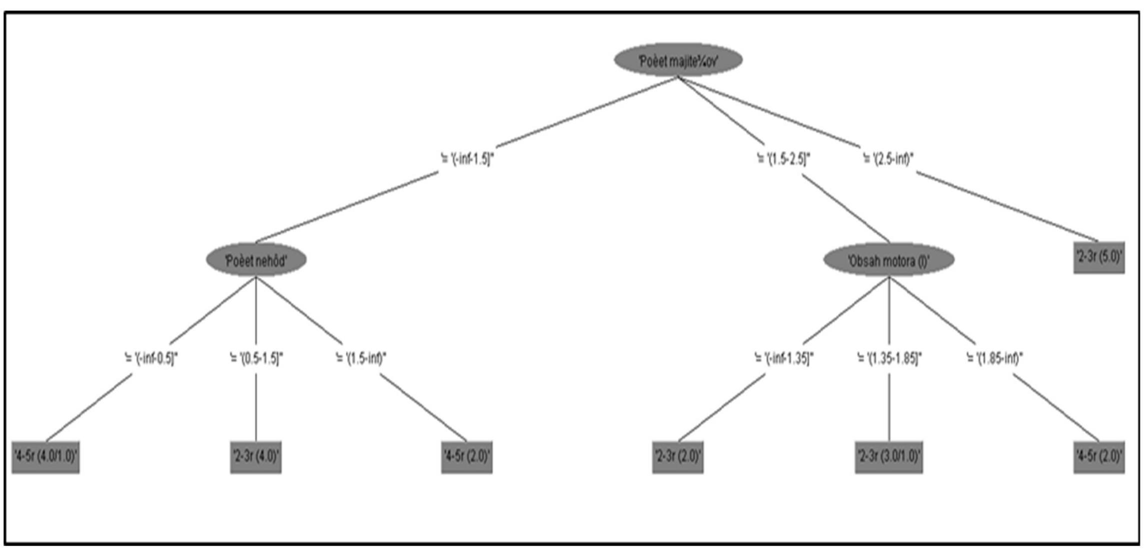

Fig. 3 Decision tree (J48)

The example mining of associations with *Apriori* associator:

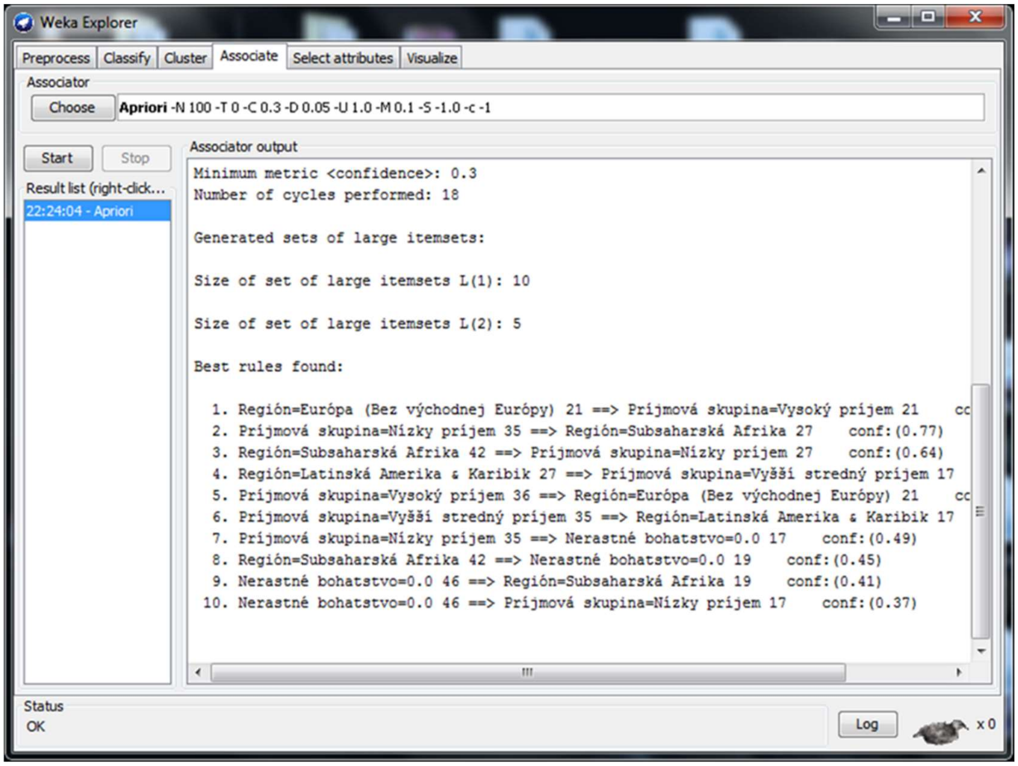

Fig. 4 Associator output (Apriori)

Example of prognosis by means of neural network (*Multilayer Perceptron*):

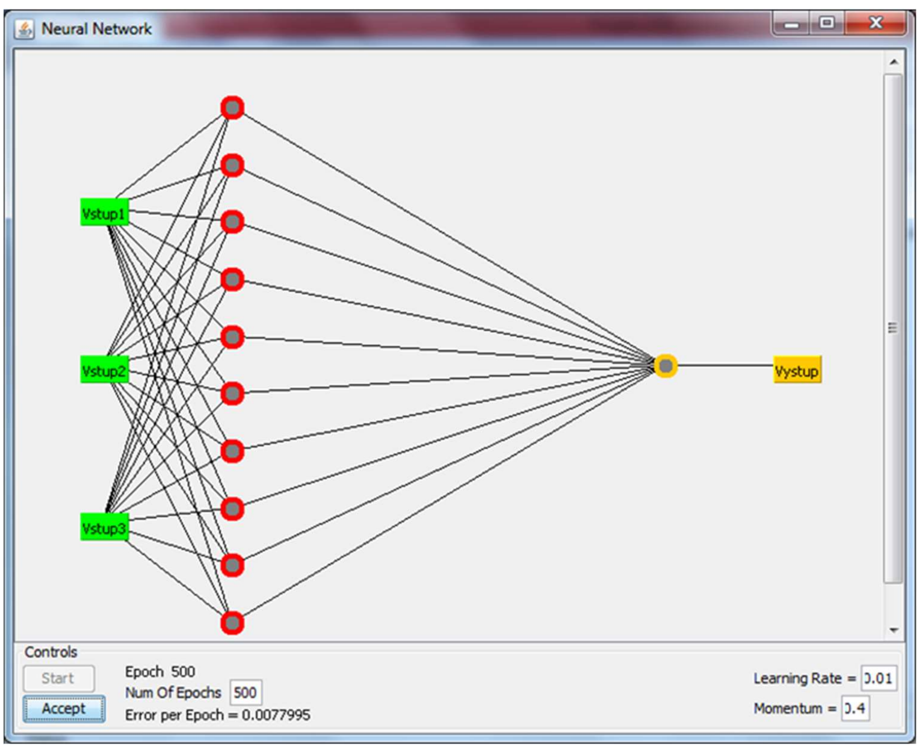

Fig. 5 Neural network vizualization (topology 3-10-1)

Most tasks that can be tackled with the *Explorer* can also be handled by the *Knowledge Flow*. In addition to batch-based training, its data flow model enables incremental updates with processing nodes that can load and preprocess individual instances before feeding them into appropriate incremental learning algorithms. It also provides nodes for visualization and evaluation [7] (Fig. 6).

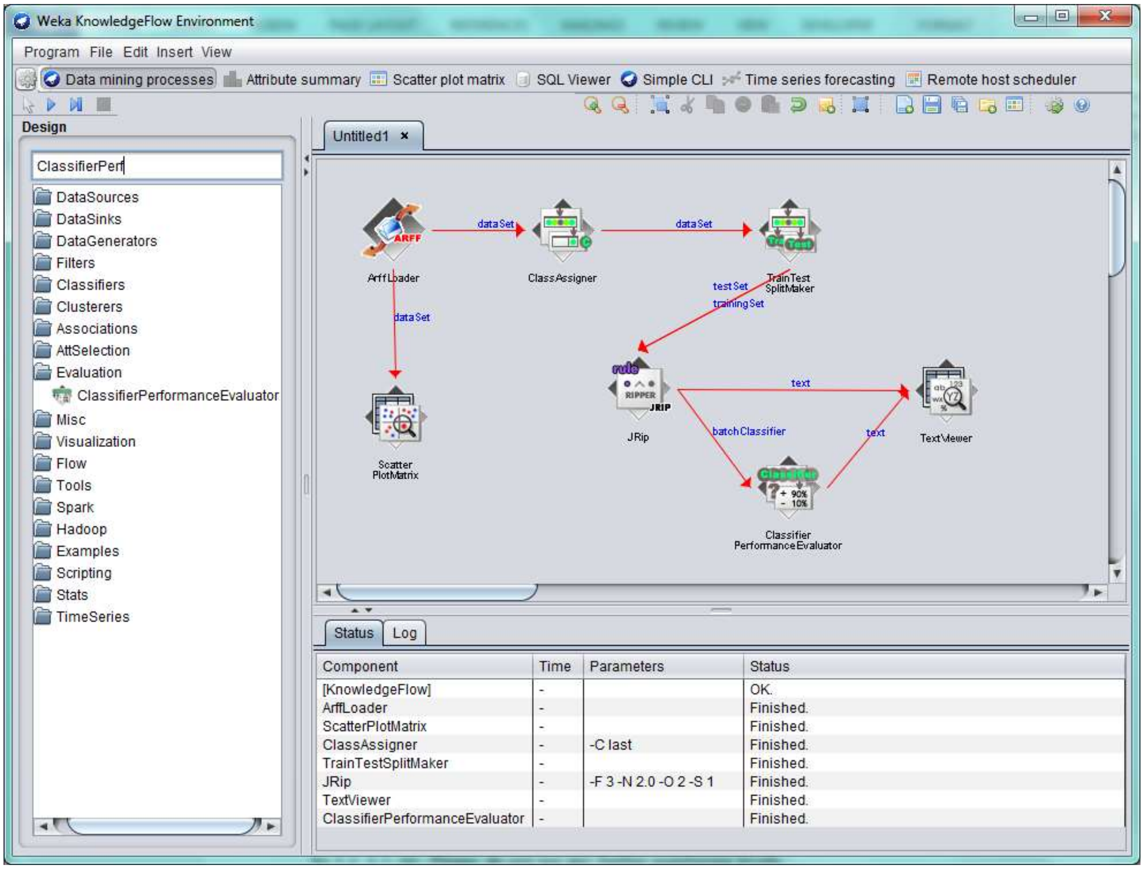

Fig. 6 The WEKA Knowledge Flow user interface

Once a set-up of interconnected processing nodes has been configured, it can be saved for later re-use.

3.3 Mining Big Data with WEKA

From version 3.7.2 WEKA has the concept of a package as a bundle of additional functionality, separate from that supplied in the main weka.jar file. This simplifies the core system and allows users to install just what they need or are interested in. WEKA includes a facility for the management of packages and a mechanism to load them dynamically at runtime. There is GUI package manager also (Fig. 7).

This "Package Manager" adds support for running WEKA in Hadoop and in Spark. With the support of these packages system can can predict in real time in a very challenging real-world applications with almost all models [22].

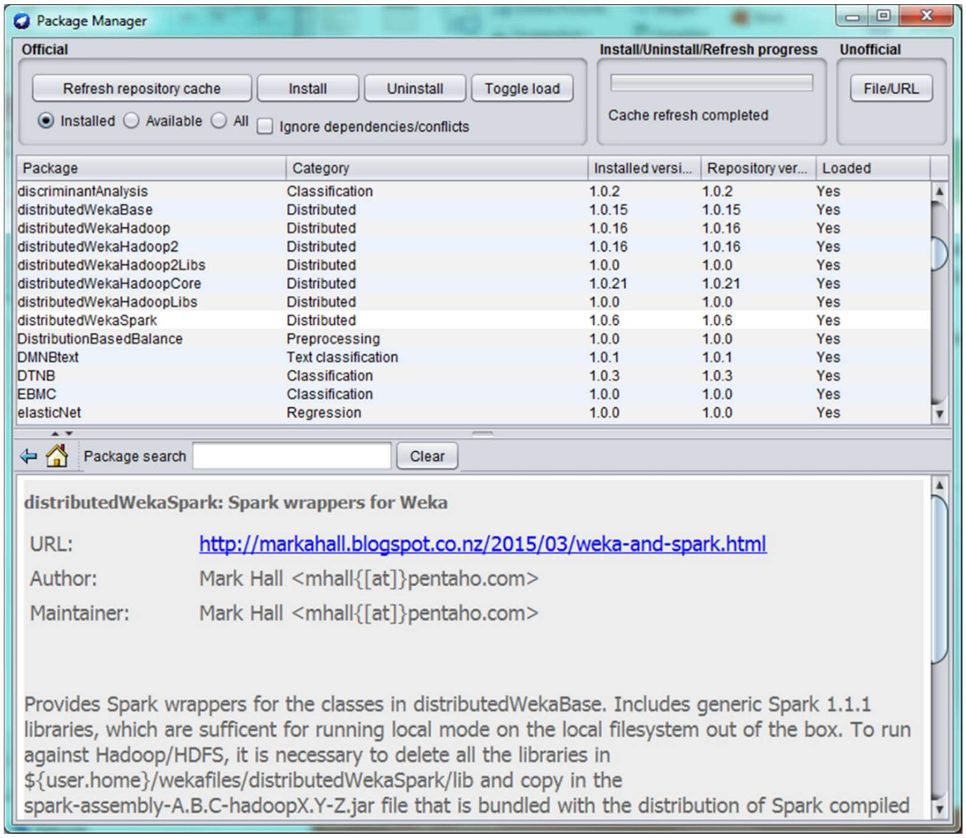

Fig. 7 Package Manager

3.3.1 MOA

In version 3.8 is package for **MOA** (**M**assive **O**nline **A**nalysis) data streams. Nowadays, data is generated at an increasing rate from sensor applications, measurements in network monitoring, log records, manufacturing processes and others.

All this data generated can be considered as streaming data since it is obtained from an interval of time. In the data stream model, data arrive at high speed, and an algorithm must process them under very strict constraints of space and time. MOA is an open-source framework for dealing with massive, potentially infinite, evolving data streams, it permits evaluation of data stream learning algorithms on large streams, in the order of tens of millions of examples [6].

The implemented classifier methods currently include: *Naive Bayes, Decision Stump, Hoeffiding Tree, Hoeffiding Option Tree, Bagging, Boosting*, and other (Fig. 8). MOA contains also an experimental framework for clustering data streams.

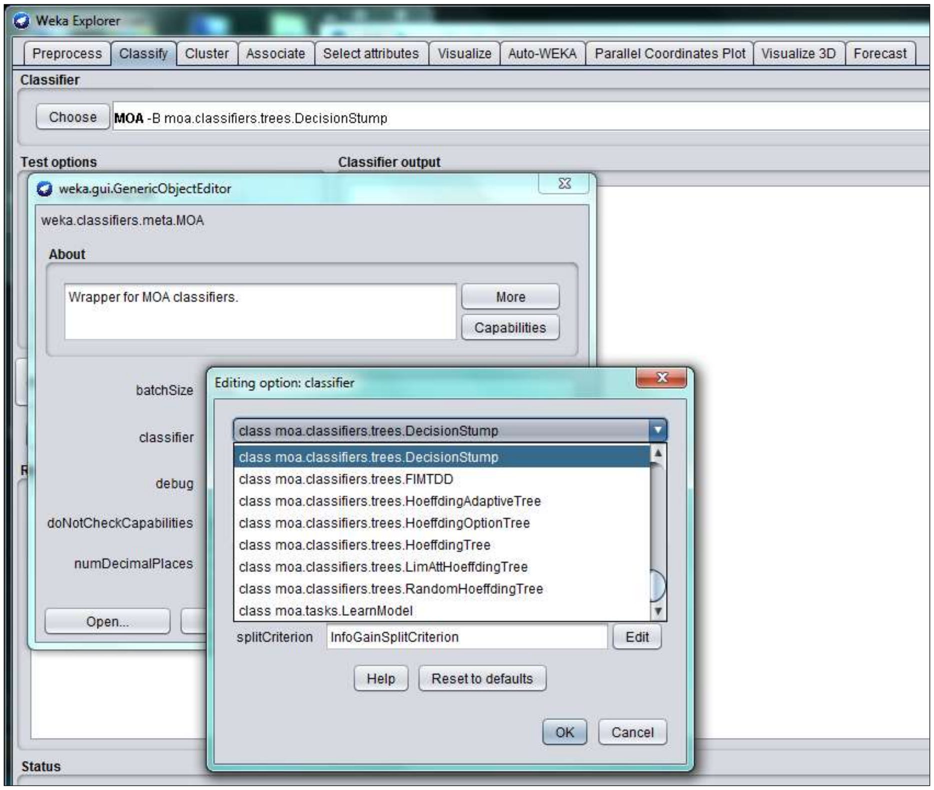

Fig. 8 MOA classifiers

Though the current focus in MOA is on clustering and classification, the autors plan to extend the framework to include regression, and frequent pattern learning [6].

3.3.2 Distributed WEKA

Distributed WEKA is a plugin (since version 3.7) that allows WEKA algorithms to run on a cluster of machines. This would use this when dataset is too large to load into main RAM, or use an algorithm that would take too long to run on a single machine. Distributed WEKA works with distributed processing frameworks that use map-reduce. It is more suited to large, offline, batch-based processing scenarios. Data is divided up over the nodes in the processing cluster (the machines in a processing cluster) and is conquered. Each piece is conquered independently of the other pieces [23]. The distributed WEKA plugin is made up of two packages: *distributedWekaBase*, that provides general map-reduce style tasks for machine learning that are not tied to any particular map-reduce framework implementation. A second package is *distributedWekaSpark*. This is a wrapper for the base tasks that works on the *Spark* platform (Fig. 7).

In addition to these basic packages, there is also a packages for work with Hadoop, depending on which version or flavor of *Hadoop* that you have installed [23]. The design goals of distributed Weka is to provide a similar experience to using standalone desktop Weka. It enables to use any classification or regression learner in Weka and also has support for clustering.

4 Conclusions

A common opinion is that the WEKA machine learning software cannot be applied to large datasets and Big Data. Main problem lies in training models from large datasets, not prediction for large datasets. Weka is being used to make predictions in real time in very demanding real-world applications. It is correct that it may be impossible to train models from large datasets using the WEKA *Explorer* GUI (even when the Java heap size has already been increased), because the Explorer always loads the entire dataset into the computer's main memory [23]. When dealing with large datasets, it is best to use a command-line interface (CLI) or the *Simple CLI* included in WEKA, use *Knowledge Flow* GUI, or write code directly in Java or a Java-based scripting language such as Groovy or Jython [23]. For new version WEKA 3.8, there is a library that provides access to the MOA data stream software containing state-of-the-art algorithms for large datasets or data streams. WEKA 3.8 also provides access to new packages for distributed data mining. The models that are output from distributed WEKA are normal WEKA models. That means they can be saved to your file system, loaded into desktop WEKA at a later stage, and used for making predictions, just like any other Weka model [23]. At the end, it must be stressed that the most important factor in the DM human resources.

It is not enough just to obtain information, but is equally important to choose the most important information, correctly interpret the information obtained and then make the necessary and effective action.

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The Use of Technology in HR and Payroll

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Abstract: Nowadays, the technology plays an important role in many business areas, the HR and payroll not excluded. Even though these two fields are highly dependent on the country specifics and local legislation, there are many aspects in which this People department can speed up the processes, lower the chance of mistakes and save costs using the technology.

This article describes the possibilities of innovations that the businesses can implement in their People department. In the first stage, the general possibilities are described, in the second stage, their advantages are presented. As a conclusion, three ways of how to implement the IT solutions are offered.

Keywords: technology, HR, payroll, knowledge management.

1 Introduction

In general, technology can simplify the recruitment and selection process, streamline HR workflow, provide employees greater flexibility and accessibility and improve the communication in the business place. The technology is also used in self-educating of the employees so it is important for human resource development [1]. Many companies find a great use of the HR Management System (HRMS) applications that help the users to manage their explicit knowledge and free their time for the implicit knowledge. However, as indicated by Schalk, 2013 [2], these tools need to be in the full accordance with the business strategy.

2 HRMS

There are many types of HRMS systems that can be purchased and implemented, and each may offer different features and functions. In general, HR Management System (HRMS) applications normally include the following [3]:

- automated payroll module which automates the pay process by gathering the inputs, calculating the pay and various deductions, preparing reports, generating payslips, etc.
- time and attendance module which gathers the time records and feeds them into the system,
- HR management module which monitors many HR aspects in the area of recruitment, placement, trainings, evaluation and development,
- benefits administration module which keeps track of the employees benefits such as insurance, vacations, passes, and retirement,
- online recruiting which easies the recruitment and selection of the employees,
- training module employee which helps to track the employee training and development,
- analytics module which enables to perform various calculations, comparisons and trend analyses,

- self-service module which allows employees to view their records (e.g. electronic payslips) and perform some of the HR transactions over the system (e.g. update of the address).

Thanks to these modules, the employer can speed up the recruitment process, monitor the training of the employees, track the working hours, calculate the salaries and wages, and analyze the statistical data. On the other hand, the employees have a direct online access to their data, and can either query their working hours or make minor updates to the system.

3 Advantages of the HRMS

It is obvious that a well-developed HR management system has numerous advantages. One of the most important benefits relates to the ability of the software to improve productivity of the HR employees. For example, numerous hours could be saved in the recruitment process by simplifying the efforts associated with collecting resumes and reviewing candidate information, or through payroll processing tasks. These tasks may require a lot of hours of manpower each week, but the time and effort required to complete them can be drastically reduced when some of the tasks are automated through an HRMS system.

Besides increasing the productivity of the employees, HR can greatly reduce its paper consumption as HR produces dozens of papers for every employee such as applications, resumes, insurance, employment and benefits forms, evaluation forms, etc. Decreasing the number of papers also means reducing the time the HR administrators spend filing and eliminating the storage costs. It is much easier to manage the information electronically and to create automated workflow processes to automatically route, track and manage employee information. However, in certain cases, it is required to store the signed forms in order to stay in compliance with governance (e.g. a Tax statement, a form that is used for using the child bonus and non-deductible amount) and therefore the HRMS cannot completely get rid of the paper.

In addition to the increased productivity and the reduction of a paper, the HRMS systems help to decrease the errors. Many HR tasks are highly regulated. Because of this, even a slight error on the part of a human resources employee may result in considerable legal issues and financial loss for the company. For example, when an employer does not count the total number of hours an employee works on the agreement per year (so called “Dohoda o vykonaní práce”), the total can easily exceed the 350 hours which is in contradiction with the Slovak legislation.

Kelly Jackson, the HR director confirms a substantial time saving and the reduction of error just by using a simple intranet-based tool for employees to make the annual benefit selections. “Going electronic with this process saved us more than 50 hours annually by eliminating the production, collection and tabulation of paper benefit enrollment forms from multiple offices. The electronic entry system also reduced errors by 92 percent, resulting in additional time saved.” [4]

4 Conclusions

There are many types of HRMS systems that can be purchased and implemented, and each may offer different features and functions. The alternative to this is to build the HR management system in-house but this is often too costly especially for the small or mid-sized companies.

Companies should carefully review various options in order to find the right system for their needs. Yet another option is to outsource their HR and payroll to the hands of business process outsourcing (BPO) companies. Working with the outsourcer can give the companies access to the new technology in the SaaS – software as a service – model. SaaS providers generally price applications using a subscription fee, most commonly a monthly fee or an annual fee so the initial setup cost for SaaS is lower than the equivalent enterprise software. Instead of dealing with these cumbersome issues on their own, the companies use the know-how and infrastructure that the provider has and can therefore concentrate on their core activity.

Neverthless, despite of thousands of SaaS HR software solutions – whether built in-house or acquired externally – simply implementing a new piece of software will not magically engage the employees who are the key performers but often with new and evolving technology, they often do only the bare minimum to accomplish what they need to get done and do not leverage new functionality [5]. For this reason, in the phase of the implementation, each individual solution and applications has to be within an employee experience ecosystem – the right combination of HR technology solutions, programs and services, woven together in a meaningful way.

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Student teamwork analysed through knowledge management models

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Abstract: In this paper we are going to deepen our knowledge on chosen knowledge transfer models and present two real life cases which we have experience on and study how the transfer was executed in practice.

The cases chosen to be analysed are both from university environment in Finland, one from Oulu University and the other from Oulu University of Applied Sciences. The first teamwork we are going to analyse is an event organizing task at Oulu University that consisted of organizing activities for upper secondary school students who are getting to know the Oulu University as a possible future study place. The second task is a course assignment teamwork that was done at the Green Thinking course at Oulu University of Applied Sciences. The aim of the task was to analyse the differences in the ways green thinking affects businesses in different countries and also to give examples of such companies in these countries.

We are going to analyse the cases with the help of Nonaka's SECI framework because it's widely recognized in the field of knowledge management as the base stone of knowledge transfer theories. Since it's been argued that SECI has some flaws related to the nature of knowledge we were hoping to find other model which would concentrate specifically on learning and development of knowledge. In the end we chose Collective Information Processing (CIP) model to support Green Thinking case to really see the inoperativeness of the teams.

Keywords: knowledge, teamwork, SECI, CIP model.

1 Introduction

The authors of this paper are the teacher and three students in the course "Introduction to Knowledge Management" in Oulu University of Applied Sciences. In this paper we are going to deepen our knowledge on chosen knowledge transfer models and present two real life cases which we have experience on and study how the transfer was executed in practise.

1.1 Cases

Our group has experiences of team working in two Finnish universities, Oulu University (OU) and Oulu University of Applied Sciences (OUAS), and we chose our cases from those institutions. One of the cases concentrates on an optional course at OU called "Practical Business Communication", which is part of the study program of Nordic Philology. This teamwork case we are going to analyse is an event organizing task at Oulu University that consisted of organizing activities for upper secondary school students who are getting to know the Oulu University as a possible future study place. The other case is about Green Thinking course at OUAS which is an obligatory course in the degree programmes of Business

Information Technology and International Business. The aim of this task was to analyse the differences in the ways green thinking affects businesses in different countries and also to give examples of such companies in these countries.

We chose these examples because we wanted the tasks to be from two different environments and we wanted to have an example of both a well-planned group work and a group work that had some issues.

1.2 Knowledge transfer models

We are going to analyse the cases with the help of Nonaka's SECI framework (Nonaka & Takeuchi 1995) [1] because it's widely recognized in the field of knowledge management as the base stone of knowledge transfer theories. Since it's been argued that SECI has some flaws related to the nature of knowledge we were hoping to find another model which would concentrate specifically on learning and development of knowledge. In the end we chose Collective Information Processing (CIP) model to support Green Thinking case to really see the inoperativeness of the teams. (Propp 1999, 226, 231 - 236) [2].

SECI framework

SECI framework introduced first in 1995 by Nonaka and Takeuchi is still, 20 years later one of the best known and definite corner stones of knowledge conversion. SECI model is based on two knowledge concepts in which Nonaka immersed himself with, Tacit and Explicit knowledge. (Frost, 2016) [3].

Tacit knowledge is defined as knowledge that is difficult to transfer from one person to another. It's challenging to write down or visualize. It's often based on individual's experiences, feelings or associations with others. Explicit knowledge on the other hand is possible to articulate and document. It can be generated by logical deduction and stored objectively. (Mikkonen, 2016) [4].

The SECI framework proposes four ways to convert between tacit and explicit knowledge. Nonaka named these four ways of knowledge converting; socialization, externalization, combination and internalization. (Frost, 2016) [3]

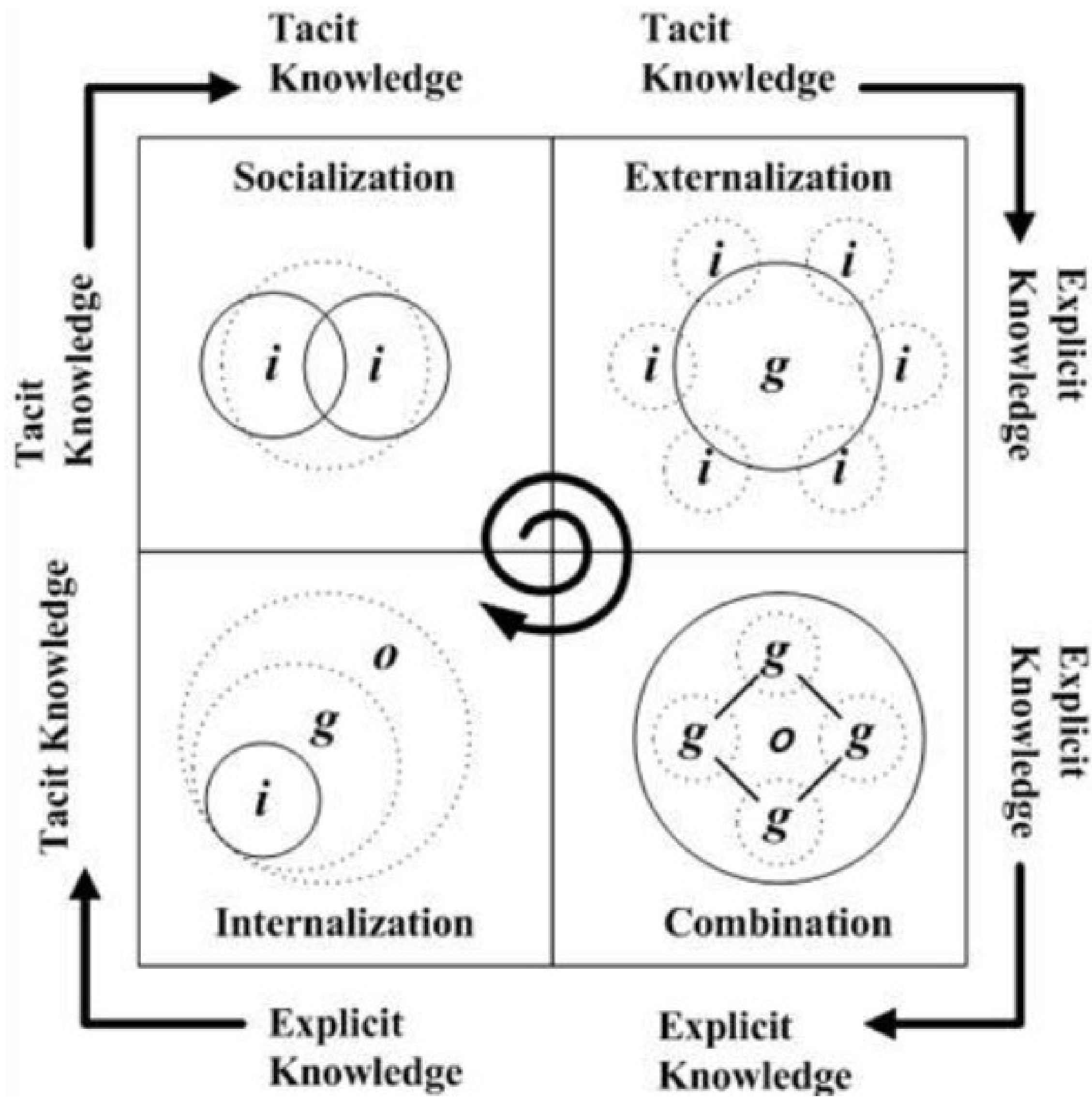

Fig. 1 The SECI Process (Tammets, 2016) [5]

Figure 1. displays the process of knowledge transfer as introduced by Nonaka and Konno. (Nonaka and Konno 2000) [6]. First in socialization phase tacit knowledge is passed along through practises, observation, imitation and guidance. Meetings and brainstorming support this action of tacit to tacit transfer.

In externalization phase the tacit knowledge is transitioned forward as explicit knowledge. This is the phase where knowledge gets articulated forward or published. It becomes basis of new knowledge since it can be shared with others and by them.

Explicit knowledge is combined, organized and integrated in combination phase. Databases and network-based communication can support this part of transfer process.

In the last dimension of the SECI model, individual receives the knowledge and starts to apply it. This is when explicit knowledge is transferred to tacit knowledge again, in Nonaka's model this phase is called internalization. New knowledge has now become an asset and a part of individual's knowledge.

Collective Information Processing (CIP) model

The collective information processing model is the concept of having the result of a group work be the conclusion of collective thinking and working instead of individual clumping together their separate work results. Its emphasises the communication between the individual of the group and the positive effect this communication has on the results of the work.

Collective Information Processing model has four stages: Individual knowledge base, group knowledge base, communicated information base and final collective information base. To have successful results with the CIP model, all the stages should be gone through successfully within the group. Often the main problem of a group work is the lack of communication and the lack of willingness to share information between the different members of a group. Reasons for this lack of sharing could be for example an existing competitive setting between the members of the group, the feeling of inequality between different parts of the group or the size of the group being too large for the communication between the members of the group to be successful. (Propp 1999, 226, 231 - 236) [2].

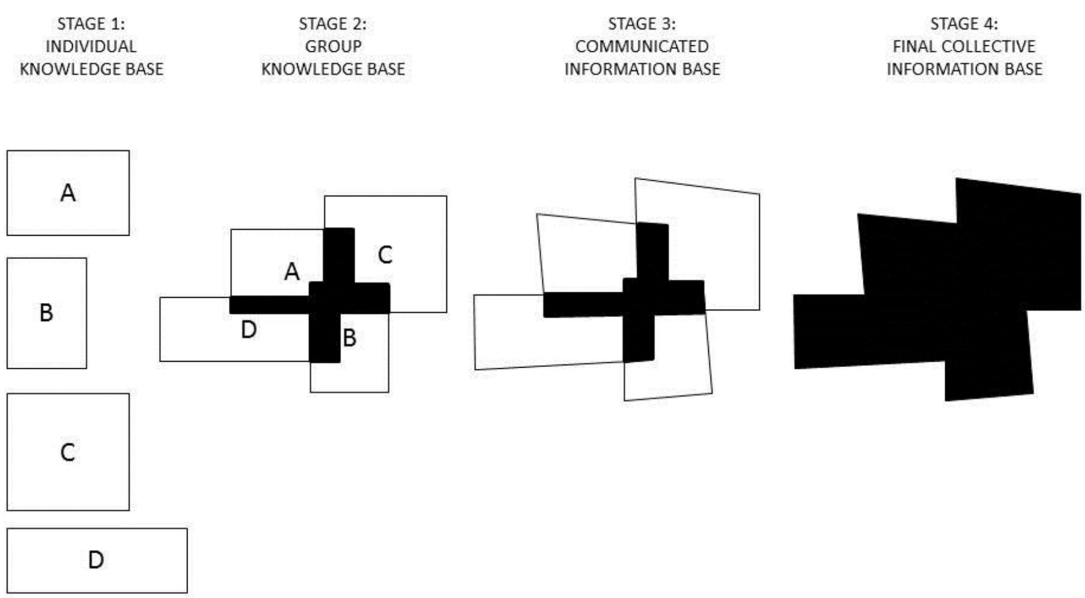

Fig. 2 Distillation model of collective information processing (Propp 1999, 233) [2]

The 1st stage is individual knowledge base. Everyone gathers experiences throughout her/his life that is individualistic, as well as personal perception possesses known only to her/him. The amount and quality of knowledge possessed by each group member determine the maximum size of knowledge pool. The 2nd stage called the group knowledge base forms the common knowledge base for a group from the overlaid knowledge shared by group members. The 3rd stage is the communicated information base where each team member can express her/his own opinions and share her/his knowledge and experiences while proving her/his points. As a result of communication, group knowledge as well as individual knowledge might be modified and updated. The 4th stage, called the final collective information base, is the logical output from the previous stages. Based on the logical output, the group decision is rendered. (Propp 1999, 231 - 236) [2] [9].

The main advantage of group work is that a group can gather more information than each individual separately, can store and retrieve information more effectively, and can validate the information more thoroughly for decision making. Also, group knowledge is a combination of information and experience from each member, and the group can find more interesting and unusual viewpoints. (ibid. 225, 228-230.) But it is not always the case in reality, as collective information processing (CIP) is influenced by non-communicative factors, for example, the presuppositions of how parallel individual concepts in the group are, the amount and quality of unique knowledge possessed by each member, the size of the group, individual status, relationships in group, characteristics of task, time constraint, and communication medium (Propp 1999, 236-244) [2] [9]. Also, the CIP model reveals that a group considers collective opinions rather than individual ones, thus sometimes individual thoughts get ignored if they are not proved to be worthwhile for the group (ibid. 230-231). In this report, the CIP model will be used to analyze the teamwork dynamics in the Green Thinking project.

2 Results

In this chapter we will be introducing the results of our analysis of the teamwork projects and implementing them into the existing knowledge management theories.

2.1 Green Thinking teamwork in the framework of the CIP model

In a university environment there are many occasions when you are bound to work with a team that you're not familiar with. On many occasions these teams result in many innovative ideas and multiple interesting points of view, but the mix of people who don't know each other or each other’s ways of working may also result in many communication and knowledge transfer issues.

An example of a team work suffering from knowledge managing issues due to CIP related issues are the tasks in the Green Thinking project. The goal of these green thinking tasks was to bring together people from different background and cultures so that they could bring to the table as many different green thinking ideas as possible. The aim of the task was to investigate the different green thinking and eco-friendly solutions from different companies from several countries and evaluate the effectiveness of these solutions. The solutions were presented in both written and presentation form.

One of the major issues with the green thinking teamwork was the lack of communication. Due to the fact that each of the group members seemed to only work towards their own goal in the task, instead of wanting to achieve something as a team, the amount of communication was very minimal. The only time when the team came even close to having a working communication situation was when the self-elected group leader of the task group was giving orders to other group members and questioning them about their work.

Another one of the issues in the task arouse from the different positions of the members of the group. Due to the fact that one of the team members had chosen herself as the leader of the task, hindered the communication within the team and made the rest of the members less comfortable to express their own ideas for the task. Due to this issue, most of the decisions concerning for example the schedule and different tasks that were assigned to people, were decided by the "leader" character in the team instead of them being shared decisions.

Serious issues occurred also when some team member didn't do their tasks and dropped out from the project in the middle. This caused a lot of extra work and planning for other members because they had to finish the project without one member. On this teamwork the team size was around five people which is not that much and when someone is not doing their tasks as agreed, others have to do their work and the results of the group work may not be as desired.

Usually teamwork has a deadline and when issues like this occur, scheduled time to finish the work might not be enough and the team must think about new ways to achieve the desired end result or just focus on getting the best results as possible. When the team is going through this kind of issue, communication plays an important role and in this case communication was quite poor and the time was limited. This issue brings out the importance of planning and if planning is made correctly, this kind of issue shouldn't affect into end result very dramatically.

In this case also the support between team members was very poor and everyone just tried to survive on their own when they should have tried to survive as a team. When there is no connection between the members of the team, workings as a group can be very challenging.

2.2 Organizing the university visitation day for secondary school graduates

The learning outcomes for the Practical Business Communication course at OU were listed as following: Fluency in oral and written situation in organizational communication practices. (Weboodi.oulu.fi, 2016) [7]

In practice this course was organized in a bit different way in each year. The tasks students did included writing business letters, press messages and doing PR work for the faculty of Nordic Philology.

In this particular year that we have experience on the mission was to organize the university visitation day for secondary school graduates and plan the event and presentation for the subject of Nordic Philology. The course is part of optional subject studies and targeted to 2nd and 3rd year university students.

Starting point

The grounds for the project were good. Group sizes in Nordic Philology courses were never too big and on the course at that time were approximately 20 participants. It was also possible to spend some money for this event thanks to the tight co-operation with cultural organizations Svenska Nu and Pohjola Norden. In the first meeting we agreed mutually on our schedule and every participant could express their will to work on a specific task. Responsibility groups were the following: one group to organize the official presentation for Nordic Philology in one of the lecture halls in the faculty introduction event. Another group was in charge of logistics since we had a whole classroom reserved for our activities and for rap artist JesseP who was one of our attractions. One group had the responsibility to arrange all the accessories for visiting students. For example pens, USB-sticks etc. Then we had one group to come up with all the activities and prizes. (Svenska.yle.fi) [8]. In the following we'll concentrate mainly on the performance of the activity group due to the personal experience from working in that team.

Fig. 3. Oona Huoponen and Maija Niva talking with the high school students [8]

Communication and the activity in the team

One of the most important success factors was that this was a free-choice study. We suggest that since everyone had the opportunity to drop out of the class when the course contents were discussed kept the group motivated. Of course, as always some seem to be somehow more motivated than others. Other success factor was definitely the small size of the teams and the whole subject of Nordic Philology in general. Even though there were 2nd and 3rd year students, everyone knew one another and there was a mutual goal and "we" - spirit the whole time – as in the Nordic philology studies in general. The good spirit was improved even by letting the students form the teams and ask for the tasks.

In our activity group the communication happened mainly via social media and on Wednesday morning lectures. Few times on the last week the team gathered at the university to actually test out our activities and finalize our creations.

We began working by throwing in different ideas and prizes, brainstorming. One of our members took naturally the critical viewpoint and shut down our ideas while we tried to create more. And together as a team we quickly cut out the craziest ones. Including for example searching for a person dressed as a Viking from the university hall etc.

Our small team didn't have an assigned leader or more specific roles inside the team since we all knew each other at some level, we were all Finns and studying the same field. We could easily count on each other’s effort and work morale.

The actual challenges occurred in between team’s communication. We had a study platform called Optima to use for the communication, but since everyone had their own timetables and lectures, so actual meetings were almost impossible to organize. The problem with the online communication however was, that nobody really liked to use the platform. It was clumsy and uncomfortable to use, which led to the situation that communication between the small teams happened only on Wednesdays contact lectures early in the morning at 8:15 AM. Often this led to a situation where only one or two members of a team were present and partly due to bad communication, planning or strongly divided responsibilities inside the small groups, there were situations were those teams who weren't fully presented on the lectures could not give a fully understandable report to other groups of what was going on inside the team.

3 Conclusions

After having studied an extensive course about the different models of knowledge work and how these models can be applied to real world knowledge work, it was fairly easy to find real life examples to reflect these theories upon. Our decision to revise team working and knowledge sharing cases from two different university environments was successful, because it not only gave us a chance to investigate the working manners of two different organizations but also the differences between a successful and a flawed way to work as a team.

3.1 Pitfalls of the Green Thinking project

While investigating the flaws and pitfalls of the Green Thinking project in the informative frame of the CIP model, we discovered few main reasons for the communication mishaps within the working teams. One of the main reasons that the communication was flawed between different parts of the teams, was their lack of willingness to achieve the tasks result as a group. Whether it was the inequality between the group members or the complete lack of participation to the task, the members of the groups were having trouble in sharing and getting information from each other. One of the reasons for this was the fact that the members of the group weren't familiar with each other’s working manners and ways, and thus were unable to fit these manners into one working result. This clearly points out the importance of reserving enough time for the teambuilding and thus securing the CIP stage 3 (Communicated Information Base) to be achieved successfully.

Also the fact the different members of the group had different motivations and levels of working enthusiasm, resulted in some of the members feeling themselves compelled to boss other people around and to give commands to other people, who they felt weren't doing their part of the work. This resulted to even more feelings of inequality between the members of the group and hindered the communication between people even more. According to these results we came into a conclusion that not all of the stages of the CIP model were successful and the reason of failure of group work was unsuccessful communicated information base stage.

3.2 Success of the University visitation day in contrast with SECI framework

When we ponder this case in the framework of SECI the most problematic phase was clearly the externalization. We had clear instructions to use the study platform of Optima actively to discuss our ideas with other groups. As mentioned earlier Optima was frustrating to use and face to face meetings were unpleasantly timed to be very early in the morning. Fortunately, Optima had a feature which enabled auto sending all the messages to participant's email, which made sure that everyone was informed of the time schedule and possible changes.

The other phases of SECI were more successful. In the Socialization phase our whole team participated in brainstorming and threw in ideas. Inside the small team even the externalization phase worked fine since we actively shared notes of ideas which we had come up with on our own time. We had a ton of ideas when entering to combination phase where we carefully presented our ideas to few members of other groups, mainly our friends and asked for their opinion. Ideas were dropped based on logistic reasons, activities being too time consuming or challenging for the target group. For example, we went through few of the most popular upper secondary school course books to see what kind of topics where handled to form questions that were somehow familiar to the visitors. Internalization phase was mainly our actual execution of the University visitation day for the secondary school graduates. Before the actual zero hour we did execute few mock-up practices with our activities to see how they turned out.

In the end our group had planned two activities: a quiz on the presentation stand where by passers could pick up a question from a jar. There were four categories to choose from:

sports/free-time, literature, geography and entertaining.

All the questions where somehow related to Swedish language, culture or Sweden itself. On a correct answer they were rewarded by better candies. In fact, our candies were said to be the best at the University that year and we went out of those after the first day and we had to buy more. In the lecture hall, we had snacks for the visitors and as for the activity we had a memory/combination game where one supervisor took time and at the end of the visitation days the fastest competitor won a basket filled with delicacies.

For these two teamwork cases we have analyzed for this report we can conclude the importance of the team spirit and the motivation has on the success of a student project. There are many factors included but our findings, both the positive ones and the negative ones, are mainly related to the motivation of the students and the team spirit the team has able to create.

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To coach or not to coach: that is the question; or does coaching on KM platform increase performance?

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Abstract: Our paper outlies connection of knowledge management, performance management and coaching in practice of multinational company. Objective was to find out if development of principles and tools of knowledge management through coaching is leading to higher performance of employees. Other objective was to outline methodology and tool settings how to improve employee performance through active usage of knowledge management and couching. Research sample was consisted by employees of multinational company. Most relevant outcomes are: coaching is effecting subjective performance assesment from closest peers and superiors, employees accepted coaching as development opportunity, coached employees defined coaching as interview, coached employees perveived coaching as appropriate for work and life, uncoached employees thought coaching is appropriate for work situations only, uncoached employees thought they do not need coaching. We found out that coaching increases subjective perception of employee performance by their peers and superiors. We elaborate complex model of connection of coaching with concept of performance management which comes from four years' experience of implemented coaching culture in researched enterprise on the market of services. We deem appropriate especially: 1) connect explicitly coaching with performance and development employee objectives 2) provide employees with wide range of internal and external coaches 3) secure supervision and professional care of internal coach from management. For further research we recommend to realize number of activities: individual interviews with managers of coached employees focused on finding out of perception of behavior change of coached employees, individual deep dive interviews with coached employees with agenda: change of the approach after going through coaching, group interviews with uncoached employees focused on perception of behavior change by coached employees, precise measurement of coaching process and its outcomes.

Keywords: coaching, employees, performance, company, improvement.

1 Knowledge management

Knowledge management (KM) is the process of creating, sharing, using and managing the knowledge and information of an organization. "Knowledge becomes strategic matter of the business" (Kelemen, 2007) [1].

Dimensions of knowledge: Explicit knowledge represents knowledge that the individual holds consciously in mental focus, in a form that can easily be communicated to others, information or knowledge that is set out in tangible form.

Tacit knowledge represents internalized knowledge that an individual may not be consciously aware of, such as to accomplish particular tasks, information or knowledge that one would have extreme difficulty operationally setting out in tangible form.

“The classic example in the KM literature of true "tacit" knowledge is Nonaka and Takeuchi's example of the kinesthetic knowledge that was necessary to design and engineer a home bread maker, knowledge that could only be gained or transferred by having engineers work alongside bread makers and learn the motions and the "feel" necessary to knead bread dough” (Nonaka & Takeuchi, 1995) [2].

“Knowledge management is the process of capturing, distributing, and effectively using knowledge.” This definition has the virtue of being simple, stark, and to the point. A few years later, the Gartner Group created another second definition of KM, which is perhaps the most frequently cited one (Duhon, 1998): “Knowledge management is a discipline that promotes an integrated approach to identifying, capturing, evaluating, retrieving, and sharing all of an enterprise's information assets. These assets may include databases, documents, policies, procedures, and previously un-captured expertise and experience in individual workers.” Davenport (1994) [3].

Both definitions share a very organizational, a very corporate orientation. KM, historically at least, is primarily about managing the knowledge of and in organizations. The operational origin of KM, as the term is understood today, arose within the consulting community and from there the principles of KM were rather rapidly spread by the consulting organizations to other disciplines.

“Another way to view and define KM is to describe KM as the movement to replicate the information environment known to be conducive to successful R&D—rich, deep, and open communication and information access—and deploy it broadly across the firm. It is almost trite now to observe that we are in the post-industrial information age and that an increasingly large proportion of the working population consists of information workers” (Koenig, 1990, 1992) [4].

2 What does KM really consist of? What operationally constitutes KM?

So what is involved in KM? The most obvious point is the making of the organization's data and information available to the members of the organization through portals and with the use of content management systems. Content Management, sometimes known as Enterprise Content Management, is the most immediate and obvious part of KM.

In addition to the obvious, however, there are three undertakings that are quintessentially KM, and those are the bases for most of what is described as KM.

a) Lessons Learned Databases

Lessons Learned databases are databases that attempt to capture and to make accessible knowledge that has been operationally obtained and typically would not have been captured in a fixed medium (to use copyright terminology). In the KM context, the emphasis is typically upon capturing knowledge embedded in persons and making it explicit.

b) Expertise Location

If knowledge resides in people, then one of the best ways to learn what an expert knows is to talk with that expert. Locating the right expert with the knowledge you need, though, can be a problem. The basic function of an expertise locator system is straightforward: it is to identify and locate those persons within an organization who have expertise in a particular area. Such systems were commonly known as "Yellow Page" systems in the early days of KM. In recent years, the term expertise locator or expertise location has replaced yellow pages as being rather more precise.

There are now three areas which typically supply data for an expertise locator system, employee resumes, employee self identification of areas of expertise, typically by being requested to fill out a form online, or by algorithmic analysis of electronic communications from and to the employee. The latter approach is typically based on email traffic but can include other social networking electronic communications such as Twitter and Facebook. Commercial packages to match queries with expertise are available. Most of them have load-balancing schemes so as not to overload any particular expert. Typically such systems rank the degree of presumed expertise and will shift a query down the expertise ranking when the higher choices appear to be becoming overloaded. Such systems also often have a feature by which the requester can flag the request as a priority, and the system will then try to match higher priority requests with higher presumed (calculated) expertise rank.

c) Communities of Practice (CoPs)

“CoPs are groups of individuals with shared interests that come together in person or virtually to tell stories, to share and discuss problems and opportunities, discuss best practices, and talk over lessons learned Communities of practice emphasize the social nature of learning within or across organizations” (Wenger, 1998; Wenger & Snyder, 1999) [5].

3 Coaching

Use Coaching is a useful way of developing people's skills and abilities, and of boosting performance. It can also help deal with issues and challenges before they become major problems. A coaching session will typically take place as a conversation between the coach and the coachee (person being coached), and it focuses on helping the coachee discover answers for themselves. After all, people are much more likely to engage with solutions that they have come up with themselves, rather than those that are forced upon them!

In some organizations, coaching is still seen as a corrective tool, used only when things have gone wrong. But in many companies, coaching is considered to be a positive and proven approach for helping others explore their goals and ambitions, and then achieve them.

Coaches in the workplace are not counselors, psychotherapists, gurus, teachers, trainers, or consultants – although they may use some of the same skills and tools.

Most formal, professional coaching is carried out by qualified people who work with clients to improve their effectiveness and performance, and help them achieve their full potential. Coaches can be hired by coachees, or by their organizations. Coaching on this basis works best when everyone clearly understands the reason for hiring a coach, and when they jointly set the expectations for what they want to achieve through coaching. However, managers and leaders in the organization can be just as effective as externally hired coaches. Managers don't have to be trained formally as coaches. As long as they stay within the scope of their skill set, and maintain a structured approach, they can add value, and help develop their people's skills and abilities.

Coaching is a form of development in which a person called a coach supports a learner or client in achieving a specific personal or professional goal by providing training, advice and guidance.

"Baseline of coaching is insight of reality, spread of abilities and limitations" (Whitmore, 2009) [6], "Helping the coachee to look for its own solution and ways to achieve objectives" (Fisher-Epe, 2006) [7].

By objectives we can distinguish between:

a) Business coaching -Business coaching is a type of human resource development for business leaders. It provides positive support, feedback and advice on an individual or group basis to improve personal effectiveness in the business setting. Business coaching is also called executive coaching, corporate coaching or leadership coaching.
b) Life – Life coaching is the process of helping people identify and achieve personal goals. Although life coaches may have studied counseling psychology or related subjects, a life coach does not act as a therapist, counselor, or health care provider, and psychological intervention lies outside the scope of life coaching.
c) Health and wellness – Health coaching is becoming recognized as a new way to help individuals "manage" their illnesses and conditions, especially those of a chronic nature. The coach will use special techniques, personal experience, expertise and encouragement to assist the coachee in bringing his/her behavioral changes about, while aiming for lowered health risks and decreased healthcare costs.

4 Coaching is Founded on Confidentiality and Trust

Coaching can be successful only if coachees are able to discuss every aspect of an issue or challenge with their coach. The coach may need to listen to personal problems or private information that must be kept confidential. (Unless, of course, it involves criminal activity or activities harmful to the team, its clients or the organization; or affects the safety and welfare of other people).

The Solution to the Coachee's Issue Lies Within the Coachee

This may sound unusual, but it means that the background of an issue and the options available are generally known to the coachee. The coach's job is to ask the right questions to help coachees arrive at their own conclusions. As we've said before, this is a very powerful way of helping people to change.

5 Performance management

Performance management is the current buzzword and is the need in the current times of cut throat competition and the organizational battle for leadership. Performance management is a much broader and a complicated function, as it encompasses activities such as joint goal setting, continuous progress review and frequent communication, feedback and coaching for improved performance, implementation of employee development programmes and rewarding achievements.

The process of performance management starts with the joining of a new incumbent in a system and ends when an employee quits the organization.

"Performance Management is both a strategic and an integrated approach to delivering successful results in organizations by improving the performance and developing the capabilities of teams and individuals. The term performance management gained its popularity in early 1980's when total quality management programs received utmost importance for achievement of superior standards and quality performance. Tools such as job design, leadership development, training and reward system received an equal impetus along with the traditional performance appraisal process in the new comprehensive and a much wider framework" (Armstrong and Baron 1998) [8].

Performance management is an ongoing communication process which is carried between the supervisors and the employees through out the year. The process is very much cyclical and continuous in nature. A performance management system includes the following actions.

- Developing clear job descriptions and employee performance plans which includes the key result areas (KRA') and performance indicators.
- Selection of right set of people by implementing an appropriate selection process.
- Negotiating requirements and performance standards for measuring the outcome and overall productivity against the predefined benchmarks.
- Providing continuous coaching and feedback during the period of delivery of performance.
- Identifying the training and development needs by measuring the outcomes achieved against the set standards and implementing effective development programs for improvement.
- Holding quarterly performance development discussions and evaluating employee performance on the basis of performance plans.
- Designing effective compensation and reward systems for recognizing those employees who excel in their jobs by achieving the set standards in accordance with the performance plans or rather exceed the performance benchmarks.
- Providing promotional/career development support and guidance to the employees.
- Performing exit interviews for understanding the cause of employee discontentment and thereafter exit from an organization.

A performance management process sets the platform for rewarding excellence by aligning individual employee accomplishments with the organization's mission and objectives and making the employee and the organization understand the importance of a specific job in realizing outcomes. By establishing clear performance expectations which includes results, actions and behaviors, it helps the employees in understanding what exactly is expected out of their jobs and setting of standards help in eliminating those jobs which are of no use any longer. Through regular feedback and coaching, it provides an advantage of diagnosing the problems at an early stage and taking corrective actions.

The SMART model is a popular goal-setting tool. As an acrostic, it is easy to remember. Each letter in the word "SMART" represents a key element of a complete and actionable goal:

S – Specific: Is the goal explained with enough detail that it can be well understood by those involved in its completion and by any stakeholders?

M – Measurable: How will those involved in completing the goal know it has been accomplished and how will stakeholders determine its success?

A – Attainable: Is the goal attainable or feasible given the resources available?

R – Relevant: Does the goal align with, support, or advance the organization's vision, mission, values, principles, and strategies?

T – Time bound: Does the goal have a target date for completion?

Though useful because of its simplicity, relying solely on the SMART model for goal-setting may result in a goal lacking in critical details, or the goal may be too rigid, inhibiting creative ideas or flexibility to make adjustments to achieve a better outcome than originally intended.

To conclude, performance management can be regarded as a proactive system of managing employee performance for driving the individuals and the organizations towards desired performance and results. It's about striking a harmonious alignment between individual and organizational objectives for accomplishment of excellence in performance.

Connectivity of knowledge management, performance management and coaching

Coaching is based on Knowledge Management platform which is influencing performance managment.

5.1 Research characteristic and used methods

We have used the Case study with the enterprise on the market of services. In the enterprise coaching culture was implemented in 2012 and performance management implemented in 2014.

Used methods

We have used Literature, Questionnaire, Content analysis and Statistical analysis, performance analysis of coached and uncoached employees.

Operacionalization of variables

In coaching, we have counted the coaching hours, in performance we have counted reaching of sales plan, quality of the call, wider feedback, assesment of superiors, selfassesment.

6 Does coaching on KM platform increase performance?

Coaching in researched enterprise was implemented in 2012. Based on finnancial statements of the company in 2012 and 2013 outcomes were:

- Implementing of coaching into the company culture is cheaper than implemenenting of traditional forms of education
- Fluctuation after implementation of couching into company culture was declined.
- Implementation of life couching into company culture has no influence on the revenues of the company.

Partial results of research in 2012 and 2013 had shown that life coaching in the company has no impact on overall influence of company´s revenues. Results also shows that fluctuation after implementation of couching into company culture was declined and atmosphere in the company has been refreshed. Paralle surveys of ingagement showed, that employees receives very posittive attitude of cooperation and trusts their superiors. We need to also state that coaching in particular time was used by thrid of employees and this development tool was not linked with performance objectives.

Total in 2012 and 2013, 86 employees was coached and 70 of them participated on the survey. Employees has ingage the survey anonymuously and deliberately. In particular survey showed that coaching has no impact on revenues of the company. Development plan analysis of coached employees on KM platform did not proved the aim to increase sales performance, i.e. increase in revenue. Employees desire to be coached to improve communication rather than sales skills. Just 9 of 120 development plans was linked to performance increase.

7 Coach or Not To Coach

Coaching is just one tool that a manager must use to be successful. Used in the right situation at the right time, coaching can make the life of a manager immensely easier. Conversely, a manager will end up extremely frustrated if they try to coach employees who need something else from their manager, whose situation do not call for coaching, or who flat out don't want to be coached. Learning how to recognize when and when not to coach, is just as important as learning how to coach. Coaching is a dialogue that leads to Awareness and Action. When an employee has the skills and ability to complete the task at hand, but for some reason is struggling with the confidence, focus, motivation, drive, or bandwidth to be at their best, coaching can help. Employees typically struggle because one of three things is in their way:

1. Skills and Abilities - they currently lack the skill or ability to complete the task at hand; this relates to Aptitude.

2. Themselves - they currently lack the motivation, focus, chutzpah, confidence, or commitment to complete the task at hand; this relates to Attitude

3. Outside Factors - they currently are being affected by things that are largely outside their control, such as not having the Available Resources, changing market conditions, ineffective vendors and partners (internal and external), or poor relationships with various stakeholders and colleagues.

Coaching improves subjective perception of the coachees by their peers and superiors. Coaching declines fluctation. Coaching changes the attitude of coachees and coaching is cheaper than any other training.

8 Conclusion

Analyse of opinions of coached and uncoached employees about coaching stated that employees accept coaching as development method. This insight is in line with general definitions of coaching as development tool. "Nowadays coaching is considered as one of the most effective and most popular forms of human resources management". (Griffiths, Campbell, 2008) [9]. This result proves the right implementation into the development acitivities of the company and proper presentation to employees. We need to add that coaching has in researched enterprise tradition from 2012 which offers us proper time window for efficient presentation and communication to employees.Those who use coaching receipt the coaching rather as interview comparing those who do not use it. Despite main opinion about coaching as a development tool, quarter of employees perceives coaching as leadership, management or training.

Employees considered coaching as the right development method in 10%, most likely in communication and couching skills. Development of these skills is directly linked with perception of attitude, which considered as most effective through coaching. Analyse of development plans did not proved tendency to improve in sales skills, which directly effects revenue of the company.

Analyse of relation between coaching and performance has brought some of interesting outcomes. Comparisment of 2014 and 2015 did not proved differencies in number of coached hours of ordinary employee and customer care employee. Neither employees of Customer Care were most coached clients. Performance outcomes in revenue or in slaes of RGU´s did not changed rather annual assessment by their superiors has change.

Comparisment of coached and uncoached employees we have notised these subjective performance changes:

- Performance of coached employees in 2015 was perceived by coleaguees as significantly improved.
- Annual performance of managers in 2014 as quality of the performed calls in 2014 was assessed significantly more positive by coached employees than uncoached employees.

By comparing coached and uncoached employees we have not notised any changes by performance objective. Seems that change which considered by coaching has been recognised by piers. Percentage of the sales plans has not varied between coached and uncoached employees in 2014 and 2015.

Corelation analyse has shown positive relation between number of choached hours in 2014 and selfassessment in 2015, assesment of coleagues in 2015 and assessment of managers in 2014. Though it did not neither proved connection between numbers of coached hours and performance objectives.

We can surely stated that coaching connect with subjective assesssment of performance by colleaguess and superiors, but not with performance by objective. Therefore for further development plans of employees we do recommend model of connection between Coaching based on KM platform and Performance by Objectives.

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Motivation to the development of knowledge

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Abstract: By observing the collection of pieces of understanding and knowledge into a system, a question arises:

What motivates people for constant development and for interest for knowledge? In our paper we will unfold this theme and try to answer the earlier stated question. We are aware that it is impossible to come up with a definitive answer in the scope of this paper. Our goal is to unfold the possible indications of human motivation for knowledge and to list the tools of knowledge management that are currently used.

Keywords: motivation, theory, morality, assumptions

1 Introduction

Knowledge and intelligence has been following the human since. And humans have distinguished themselves and till do by how much knowledge they can absorb, use, perfect and give. In the current age the situation is not different although there is more information among us. There are more people, more stories, more knowledge.

It is interesting that people are not able to use all the information that is given to them. A question arises, about where all these new information come from. And furthermore: how come people search so stirringly for new information.

We do not have to forget a part of gathering information and that is the acquirement of competitive advantage. Information, knowledge and tools have always been and are since the key to have a winning edge over the others.

2 Knowledge

In this part of the work it seems worthy to define what knowledge is and how we gather them.

When thinking how to define this phenomenon, we did not do to depth analyses of the phenomena of knowledge , that is being worked on in the various literature. So we just mention:

We can translate or express Knowledge as information, knowing, belief. (Katuščáková, 2009)

We can express it as “ the ability to use tuition, experience, values and academicism as a scheme to evaluate data, information, and other experience for choosing an answer to the given situation.’’ (Fašanek, 2008, p.p. 15)

Katuščáková (2009) warns on the difference between information and knowledge with the opinion of authors Quigley a Debons (1999)” While information give an answer to questions like: who, where, when, what?, knowledge gives answers to deeper questions like: how and why?”

After defining the notion we continue with thinking about the fact how come there is so much knowledge around us that we have not explored and not gathered.

3 Motivation

3.1 Motivation to the development of knowledge - theory

To find the answer we have chosen the theory of J. Lock. It seems to us that it offers a complete view on the acquisition of knowledge and guides us on a comprehendible route of cause and effect.

Locke, as Godiš (2010) writes, in his book The treaty of human mind claims that knowledge is based on experience. Experience is created in our senses by the effect of things. An easy scheme represents its causality:

THING – EXPERIENCE – IDEA - NOTION

To add Locks theory we note the basic idea (thesis) of his work: “ Nothing is knowledgeable, that has not been in the senses before.” Our senses are all the time stimulated by stimuli, that we grasp, think about, compare. It is the basis of our knowledge.

By knowledge we focus on ideas not on the things themselves.

We think that this should be the driving motor of humans to gather knowledge and their enrichment. To give them further to the next generations and keeping them as heritage. (Godiš, 2010)

In order to learn the motivation of gathering knowledge we found in literature a lot of books dividing motivation on the base of internal or external motivation until dividing motivation to the smallest.

Depending on the vantage point theories continue to the course of motivation and gathering knowledge. Motivation is divided in the academic writings as motivation as such, motivation towards output for example with employees, students. The theories of employees motivation are not the outputs of the last decades.

We can mention some from the past, from the period, when thy mirrored the social situation.

In the end of the 19th century F. W. Taylor the leader of academic management has worked on the understanding of the output effectivity of workers. He came to a decision that the motivation is material gratification.

He was not the only concerned with this problematic. We remember another scientist, who was E. Mayo. For him social and psychological background were important. Good relationships at work for example.

We cannot leave out A. Maslow, whose theory is worked out into a pyramid. ON its top is the most advanced form of self-realization. (ISPIT, 2014)

D McGregor has worked out a theory dividing people into a generation of X and Y, that is often mentioned and considered as actual.

Each theory has brought a different answer to the theory of motivation. Maybe it is by the common advancement, advancement of academic knowledge, maybe by the example, or by the question of search. In all cases each theory has pushed the knowledge a step further and that is correct.

We decided, not to focus our work towards the division of motivation into structures. We want to focus on the human and his cause for enlargement of his knowledge. His longing for it, gathering it, keeping them and exchange.

In correlation with searching for meaning for gathering knowledge, which we did, a space opens up to glance the background of motivation. The cause that moves people. The purest cause in the worlds purest word description is morality.

Let's consider morality and the motivation to it for a while.

3.2 Motivation of morality

"To understand the character of moral attachment it is important to know from whom we learn morality." (Pavlovičová, 2001 p.p. 670) Since it is always about the morality of a certain group of people. For that it is exceptional. "Then the central notion of ethics are not rights, but virtue, not laws but common good." (Pavlovičová, 2001 p.p. 671) The author further says that accepting the morale of a certain group of people among whom a person lives brings the understanding of the so far used notions and common loyalty.

The same behavior model is present by the gathering of knowledge.

Pavlovičová (2001) further says the morality of motivation, that is the basis of respect for the moral codex of a group. Many authors understand the question of motivation as the weakest potential to understand morality. The ultimate questions comes forth and that is why to prefer moral principles to personal gain?

The morality of motivation, we consider, is important among all human processes. We consider it as a basis of the judgement for a course of human action.

Just to mention an interesting truth. The central point of motivation is according to George H. von Wright self-control. Self-control has the role as the core of motivation and during decision making is more important that virtue. (Pavlovičová, 2001)

We thing that self-control has more humility as virtue and is thus more important, as the author cited.

Let us stay at the theme of moral motivation. This part enables us to remember the basics of motivation that is in the human virtue. To look at morality from the philosophic point of view gives space to see motivation in every aspect of human behavior. As we stated above motivation is seen by doing student, employee and personal actions and the quality of these actions.

There are two felt differences to understand virtues. A virtue is felt like a characteristic of a person, that is filled by his positive characteristics. Even virtue has its ethics that is concerned with the rules of engagement. The question stays: How we should act? If entwined with the character of the mentioned person, the question is: What kind of people should we be? (Pavlovičová, 2001, p.p. 669)

By moral motivation there are significant conditions, that are required and those are:

a) practical requests,

b) critical requests,

c) requests on objectivity (Kadlic, 2013 p.p. 9).

3.3 Reasons for motivation

We agree with I. Košalka on the source of human motivation:" The majority of human have an unquenched interest in getting better in that , what they have the best proposition." (manažér, 3/2016, p.p. 11) Even by hindrances it is possible to determine how much effort we have to invest into them. People driven by talent and creative potential always find a way how to self-realize.

Gathering knowledge is fun. It is not about information, getting information, listening. Motivation in enhanced in creating contacts, friendships, enriching humans or getting enriched by humans – sharing experiences. It is about finding new possibilities, that can be for example enrolling in a new course, tuition, enriching a new theme that is interesting in the field of new vantage points. It is of trying, of finding new results, by which no one wants to make the basic mistakes. It is about the courage and support. The enterprise towards knowledge.

We can think about why is it worth to strive towards knowledge. If we leave out the above mentioned ones – the good feeling from work, internal motivation, that otherwise as on 100% it is not worth doing, why to be the best and not be the average? Because "people want to work for the best, buy from the best, have something in common with the best in all human situations." (Manažér, 3/2016, p.p. 15)

3.4 From motivation to manipulation

So far we have been coping with the motivation , that is inside the person. We showed some of its reasons. In the next part we shall focus on the motivation from the outside, on other people. On the transfer of motivation.

When transferring motivation on the other person, the motivation can have a shape of forced motivation, which we categorize as manipulation. Reháková (2016, p.p. 16) says: If it is the one or the other is distinguished by the feeling, that the human has after accomplishing the task, if he feels happy or feels misused." The judgement is on the concrete person. On the feeling he has at the end of the interaction. If it was motivation he feels happy, if it was manipulation he feels low. On the other side: by motivation a certain human side is picked and elevated and is used to get a result. By manipulation a characteristic is made up. The manipulated person does not have it, or it is not that good. He is suggested to do what we want. But otherwise he would choose differently. (Reháková, 2016)

The manipulator manipulates all the time, morality is absent by him, as well as virtue and open dialogue. (Škodová, 2009)

About the reasons of manipulation Toman (hnonline, 2013) says a thing or two. He mentions two, that are the strive of the manipulator to achieve a better, stronger position and the other to get money.

When viewing manipulation from the other side we will ask ourselves, what is her opposite. We can agree with the proposal: "The opposite of manipulation is the culture of open communication…" (eFocus 2/2008, p.p. 69). It is important to spot manipulation and to warn on it. For instance to quit the conversation and showing that we spotted the manipulation and deny it. It is an advantage to have certain rules in the company culture. For instance professionality, team spirit… among them not using manipulation. It is efficient, when each value is defined among colleagues and agreed upon together.

4 Conclusion

In our work we are constantly bound with a wide range of knowledge and we considered about the motivation for constant search of the environment to enlarge the database of knowledge. In short we have defined the phrases as knowledge, knowing, belief, that give us answers to questions as how and why.

We came to conclusions that answer motivation towards developing knowledge. We have chosen the opinion of J. Locke and agree with him. His theory says that our senses are always developed by motifs. On the base of their resolution experiences occur. Knowledge comes from experiences.

We mentioned other authors from the end of the 19th and 20th century F. W. Taylor, E. Mayo, A. Maslow, D McGregor. Their added value is to be seen in the answers to the questions of motivation and the theme we are looking for to answer.

Our work on motivation has led us to think about its source and that we think is morality. Morality holds in many aspects of human decision making. In one part we have considered the morality of motivation that has its rules. We will show as an example moral principles in groups, self-control, virtue.

The source of motivation in this thesis is the strive to develop in there we consider ourselves to be the best. In where it benefits. There is a feeling of happy exploration, development of friendships, and by gathering knowledge we also give some away.

We have looked at the other side of motivation, which is manipulation. The manipulated person feels low and useless by it. There are many techniques to avoid manipulation, for example to describe openly the situation. A culture of open communication is a good environment.

The goal of our work is to look for possibilities that indicate motivation of humans toward knowledge and to mention some used tools of knowledge management. We believe that we enrich the reader and inspire him for further research.

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Continuous improvement of the company as a result of knowledge access to Kaizen

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Abstract: Reproduction quality products must respect the production rate and possibly the lowest cost. Prices of production inputs – factors are related producers in various developed countries about the same. Options for reducing costs in the procurement of these factors are therefore limited. To improve the situation in costs the company can use basically two approaches to Business Process Reengineering (BPR) and Continuous Improvement (CI). Substantial Improvement (Reengineering) is a fundamental reconsideration and radical reconstruction process to achieve significant improvement in terms of performance measurement, efficiency, effectiveness (e.g. the cost, quality, service and speed). We do not look meticulously at what is there, but we will focus on what it should be. Gradual improvement (Continuous Improvement) in a company usually delivers small improvements, but a culture of continuous improvement can yield big results to improve the overall business. Continuous Improvement aims mainly to what the company is today and what action can lead to improvement. There is no single model and how to use each bind different types of improvement activities. In any enterprise system is tailored to specific conditions. Our goal is to present the applicable procedures of the implementation of the Kaizen method in the enterprise.

Keywords: Training Within Industry; Kaizen; Continuous Improvement; Rationalization proposals.

1 Introduction

Enterprises use different methods to reduce costs. One approach is Kaizen. Kaizen we have learned to perceive as a change for the better (good), thus improving generally. For this reason we say that it is a philosophy that focuses on continuous improvement in all areas of life. But Kaizen approach has benefited from massive training TWI (Training Within Industry). According Dinero, Charles R. Allen was a vocational instructor under the Massachusetts State Board of Education before World War I, and during World War I, when he was the head of the group that set up the shipbuilding training, he took these 4 instruction steps succinctly stated them as [1]:

1. Preparation
2. Presentation
3. Application

4. Inspection (or Test).

Allen developed training-training to shipbuilding already during the First World War. Training was called "J" program. Consists of 4 areas:

1. Job Instruction
2. Job Methods
3. Job Relations
4. Program Development.

After World War I, the United States emerged as the leading industrial power. During the first 50 years of the last century, American companies in such major industries as electronic, textiles, automobiles, and steel supplied most of the world's consumer and industrial products. If it wasn't produced by U.S. manufacturers, it either wasn't available or it wasn't as good.

2 Training Within Industry as a predecessor of Kaizen

Cautiously One of the reason for the success of U.S. manufacturing was the War Manpower Commission (WMC), formed by the U.S. government in 1942 to help industry train defence plant workers for World War II. The training program for industry according to Warren, Allen & Attner (2012) TWI has the theoretical base in the training program for industry, which was based on Charles Allen's 4-point method: Preparation, Presentation, Application, and Testing [8]. The Training Within Industry (TWI) service was created by the United States Department of War, running from 1940 to 1945 within the War Manpower Commission. As Dinero pointed out the purpose was to provide consulting services to war-related industries whose personnel were being conscripted into the US Army at the same time the War Department was issuing orders for additional materiel. It was apparent that the shortage of trained and skilled personnel at precisely the time they were needed most would impose a hardship on those industries, and that only improved methods of job training would address the shortfall [1]. By the end of World War II, over 1.6 million workers in over 16,500 plants had received a certification. The aim was to increase defence production for supporting of allied WWII military operations. The training within industry program covered the Five Needs of the Supervisor: Knowledge of the Work, Knowledge of Responsibility, and Skills in Instructing (Job Instruction, Skills in Improving Methods (Job Methods), and Skills in Leading (Job Relations) After World War II, the WMC was abolished in 1945.

Throughout the 1940s and into the 1950s, U.S. major competitors and trading partners – United Kingdom, Germany, France, Italy, Japan and most of its Asian neighbours – were engaged in recovering from the devastation of World Word II. With little or no competition, many manufacturers did not see the need to continue to improve. Most forgot the training within industry lessons. U.S. industries were dominant largely because they had no serious foreign competition and were untouched by both world wars.

But challenges came swiftly to most U.S. industries by the 1960s, and their impacts were magnified with the oil shortages caused by the major oil-producing nations, had discovered alternative products from several foreign nations that better met their needs.

Allen's four steps of instruction were published in various forms. According Dinero, M. J. Kane took the concept of Allen's four steps in 1940 and combined it with the concept of Key Points, fashioning the following TWI seven-step instruction [1]:

1. Show him to do it
2. Explain Key Points (how and why)
3. Let him watch you do it again
4. Let him do the simple parts of the job
5. Help him do the whole job
6. Let him do the whole job – but watch him
7. Put him on his own.

In November 1940, these steps, along with the “Key Point” concept, were incorporated in a bulletin, “How To Instruct a Man on a New Job”. This was the program TWI ultimately used to train people to be lens-grinders. As result of this work, the training of people for separate jobs involved in lens-grinding was reduced from approximately 5 years to a matter of [4–6] months.

According to Dinero, later –TWI developers refined the M. J. Kane seven steps to four and created a training card (reminder card) for the JI 4/Steps [1]. The 10-hour Sessions were:

Job Instruction (JI) is a course that taught trainers (supervisors and experienced workers) to train inexperienced workers faster. The instructors were taught to break down jobs into closely defined steps, show the procedures while explaining the key points and the reasons for the key points, then watch the student attempt under close coaching, and finally to gradually wean the student from the coaching. The course emphasized the credo, "If the worker hasn't learned, the instructor hasn't taught". At the request of enterprises outside of manufacturing, variations to the JI program were developed for hospitals, office and farms.

Job Methods (JM) – a course that taught workers to objectively evaluate the efficiency of their jobs and to methodically evaluate and suggest improvements. The course also worked with a job breakdown, but students were taught to analyse each step and determine if there were sufficient reasons to continue to do it in that way by asking a series of pointed questions. If they determined some step could be done better by eliminating, combining, rearranging, or simplifying, they were to develop and apply the new method by selling it to the "boss" and co-workers, obtaining approval based on safety, quality, quantity, and cost, standardizing the new method, and giving credit.

Job Relations (JR) – a course that taught supervisors to deal with workers effectively and fairly. It emphasized the lesson, "People Must Be Treated As Individuals". Program Development (PD) – is the meta-course that taught those with responsibility for the training function to assist the line organization in solving production problems through training. There was also a short-lived course that taught union personnel (UJR) to work effectively with management. It was logical that after the Second World War the same education / training were used also in Japan, where the bulk taught and almost domesticated. The literature therefore rightly meets with the view that Kaizen is considered a "child" TWI. At the same time we understand it as part of Kaizen. TWI is basically just statistical control and to some extent controls the quality, especially technical. Historical developments have confirmed that the use of the method in Japanese companies during World War 2. The rehabilitation of destroyed country, produced positive results. Kaizen was a response to the need to restore the national economy and the Japanese nation as a whole.

Currently we regarded as Kaizen one of the most successful management techniques and is referred to as a means of Japanese "economic miracle". Kaizen is Japanese for quite a normal way of thinking, which is learning from early childhood. Implementing Kaizen in the work area contributes to the continuing improvement in the various aspects of the business, whether they are business management, investment, supplier-customer relations, but also production itself, marketing.

The current view of the Kaizen is to aggregate marking techniques such as absolute quality control system rationalization proposals, the ring controls, zero defects of production etc. Understanding these methods alone (rapture of the total) and their actual use can never be effective. Kaizen is a collective term for different techniques that you take aim to improve any process. Kaizen is by Henry, a synonym for the continued improvement of anything, anytime [2].

It is not just about improvements in working life but also social and national. Masaaki Imai believes that will never happen there would not be room for improvement [5]. It is highly likely that the above mentioned statement will be eternal with regard to the constantly evolving field of science and technology. Japanese are accustomed to change and are opening them, it's part of their thinking. According to Kaizen day would not end without anywhere in the company did not, at least to some improvement. Margaret Rouse stresses, that the intention of improving processes is the active involvement of employees in problem-solving focus on reducing waste and ultimately reducing costs [7]. The overall levels of costs in the enterprise affect the financial position in two directions: economy and efficiency. Cost savings and efficiency in the use of production factors can lead to maximize the volume of production and business efficiency in maximizing profits. Kaizen is a daily activity whose purpose goes beyond simple productivity improvements. Unless Kaizen implemented correctly, it humanizes the work environment, reduce excessive hard work ("muri"). At the same time they teach people how to conduct experiments in their own work using the scientific method and how to learn to recognize and eliminate waste in business processes.

Kaizen efficiency assumes current work with three principles:

1. Thinking about the process and the results (not only of the results), so captured procedures leading to the results achieved;

2. Holistic thinking about the whole process and not just on the current view, in order to avoid creating gaps in other parts of the process;

3. Learning - not critical, not in search of the culprit (because blame is a waste), more analytical, allowing re-validate assumptions that prove the outcome of the current process.

The Kaizen process is concerned for taking part by people at all levels, from Executive Director to external collaborators. This process can be carried out single, consultation, small or large groups. In Toyota, this pioneered Kaizen as a rule, local improvements to a particular site or in a particular region and involves a small group of people who want to improve their own working environment and productivity. Group goes through the implementation of the Kaizen with the assistance of counsel. The successful implementation of Kaizen method assumes that each activity is seen as a process can be improved. Top management must be exemplary performance of duties; it is not enough just to take responsibility. According Deming production process is the basic issue of company. All efforts are focused on fulfilling customer expectations and for that it is necessary mutual cooperation within teams.

The philosophy is different from improvement programs, "commanded and controlled by" typical for the sixties of the twentieth century. Kaizen methodology includes making changes and monitoring results, then adjusting process. Pre-planned large-scale projects are replaced by smaller experiments, which can be adapted as soon as proposed.

3 How to remove surpluses, loss and irregularity

The entire process approach applicable procedures of the implementation of the Kaizen method in the enterprise based on Deming's PDCA cycle (Plan, Do, Check, Carried out). All activities that Kaizen approach used to remove waste must be integrated in the PDCA cycle. At the same time, all activities must be geared to continuous improvement. As reported Matisková the overall effectiveness of this approach is reflected in increased productivity, the elimination of waste, in improving the performance of employees and ultimately the creation of added value [6].

Kaizen philosophy is based according Manktelow, J., Jackson, K., Edwards, S., Eyre, E., Cook L., Khan B. on the use of many tools that lead to a reduction in waste. The basic tool of access in this case is called Kaizen. "Five S" (5S) ". 5Ss is a checklist of good management to achieve greater policy, efficiency and discipline in the workplace. It is derived from the Japanese words SEIRI, SEITON SEISO, SEIKETSU and SHITUKE translated as sort, compare, clean, standardize and systematize [4].

- SEIRI (Separation) – The goal is to separate the necessary things from the unnecessary.
- SEITON (systematization) – The purpose to put things, tools to where it is most frequently used.
- SEISO (Cleaning) – This is the maintenance of the site and its surroundings, which should still be maintained to effectively carry out the work.
- SEIKETSU (standardization) – Continuous improvement and standardization of work organization. (That work is done in a simpler and better)
- SHITUKE (Discipline) – Each team member must be involved in the work to maintain the greatest possible efficiency and effectiveness of processes.

The 5Ss refer to the five dimensions of of workplace optimization: Seiri (Sort), Seiton (Set in order), Seiso (Shine), Seiketsu (Standardize), and Shitsuke (Sustain).

The 5S Program defines the steps that are used to make all work spaces efficient and productive, help people share work stations, reduce time looking for needed tools and improve the work environment.

Sort: Sort out unneeded items

Straighten: Have a place for everything

Shine: Keep the area clean

Standardize: Create rules and standard operating procedures

Sustain: Maintain the system and continue to improve it.

Every planned improvement is necessary to control the questions "why?" to the above five levels to guarantee the benefits of the improvements. This creates a justification for introducing changes.

3.1 Muri Muda, Mura

Through (S5) we limit, reduce, respectively remove the "Three M - (3M) 'that mean: muda, mura and muri. The aim of this method is to eliminate deficiencies that Japanese managers called "3MU". It is the interpretation of three Japanese words that symbolize those activities that are necessary to get rid unconditionally if he wants to make in addressing the problem reached a sensible solution and greater efficiency. Its meaning is as follows ("3MU"):

- MURI – surpluses overload
- MUDA – losses waste
- MURA – uniformity deviations.

Wastage in the company can include overproduction, defective products downtime and waiting, excess inventory, unnecessary work, excessive movements in the manufacturing process, unnecessary transport and the like. Mutual synergy Kaizen tools and management process is accessible so called Kaizen house.

Gemba Kaizen or Kaizen house according KII expresses the basic philosophy of this approach, which at the peak of construction, the house contains processes to achieve efficiency and effectiveness in managing and building the methodologies and procedures for effectiveness and efficiency of managerial control. This house Kaizen fully expresses the whole strategy Kaizen approach [3].

3.2 Practical application of Kaizen in a particular company

The goal was to streamline maintenance processes in the company through the application of Kaizen.

Step 1

We analysed the causes of the inefficiency of the process, which were characterized by high maintenance costs.

Tab. 1 Define causes high maintenance costs

Problem	Cause	Corrective Action
Repair costs	High failure rate of the device	Changes the maintenance system
The cost of of spare parts	The high cost	New supplier for the spare parts
energy costs	The high energy consumption	Replacing by alternative resources, conservation
Maintenance costs	Lack of preventive maintenance, poor organization of work	Establishment of a system of preventive maintenance
Wage costs	High idle and inefficient use of time fund	Coordination of activities, performance-based pricing

Based on analyzes, we found variations which have resulted in the following facts:

1. Low utilization of the available working time maintenance staff.

2. A high proportion of the performance of corrective maintenance in the field of mechanical maintenance - Troubleshooting.
3. Lack of staff to perform preventive maintenance.
4. Failure to perform preventive maintenance plan.
5. Technical deficiencies in facilities when performing preventive maintenance.
6. Lack of coordination in the execution of maintenance work.
7. Inability to modify terms of preventive maintenance during the year in the system due to objective reasons.

These fundamental deficiencies led us to make sure we have designed a system of corrective actions and quantified targets which the introduction of Kaizen be achieved.

Step 2

We set targets we want to achieve, and we compared it with current values and values that we have achieved after the introduction of Kaizen activities.

Tab. 2 Targeted and achieved values for the application of Kaizen

Indicator	The current value 2015	Target value 2016	Improvement [%]	2017 value achieved	Improvement [%]
The cost of spare parts	2 350	1 500	36	1 560	34
Energy costs	1 120	500	55	700	38
Maintenance costs	1 560	1 320	15	1 450	7
Wage costs	1 532	980	36	1 002	35
Repairs costs	5 260	2 500	52	3 600	31

Given the targets we suggested other remedies:

1. Streamlining the registration process, the absence of maintenance work on regular monitoring of attendance.
2. Ensuring coordination maintenance of the post - Coordinator of maintenance.
3. Operational distribution maintenance staff to perform preventive maintenance.
4. Modifying the terms of preventive maintenance on the system due to objective reasons.
5. The adaptation of the working environment in the maintenance department, t. j. arrangement of activities, materials, work equipment.
6. The introduction of pay for performance-based in order to reduce downtime in the workplace.
7. Change in supplier of spare parts.

After making and design corrective measures in the company we have seen improvement after a year of operation maintenance processes.

Step 3

We compared the target values against values achieved with measures in Kaizen. A retrospective improvements followed and the values measured prior to the imposition of measures. Values before the introduction of Kaizen is the present value of the costs of the 2015 targets we set for the year of 2016, the process we followed until 2017, when they were all made corrective actions. Based on the graphical representation of the benefits we can say improvements from baseline. However, the imposition of the measures we have failed to reach the level targets for each category of costs in the maintenance process. The overall improvement was there, but when summing up the percentage improvements we have failed to meet 49% cost reduction for each category.

Although the targets have not been met, we recorded within the maintenance process the following improvements:

1. Specification of events on specific technical place.
2. Capacity planning for maintenance to technical space.
3. Monitoring the availability of materials in warehouses.
4. Monitoring capacity maintenance departments.
5. Accurate quantification maintenance costs.
6. precise monitoring of implementation of the annual plan preventive maintenance.
7. Monitoring the proportion of preventive and corrective maintenance.
8. Monitoring of the effective time fund the maintenance staff.
9. Their remuneration based on performance.

Overall economic assessment can be given in the form of cost reduction Kaizen. Results in terms of reducing the cost of maintenance process represented a value of €3,510, which represents a saving of financial resources for the enterprise.

4 Conclusions of the analysis and idea

The idea: Why Kaizen is an appropriate tool for identifying problems in the company?

Masaaki said that Kaizen is the key to Japan's economic success. Use Kaizen really brings improvements for businesses in particular, in improving quality, increasing productivity, reducing inventories, shortening the production line, shortening downtime, and production time [5]. If the Kaizen philosophy began more fully implemented in terms of manufacturing enterprises, it could bring about improvements in process control and lead to a reduction of the cost of these processes. Kaizen is a system that should prevent losses, which significantly reduces the added value and lead to perfect production, for example JIT (just-in-time). If we want to present the results of Kaizen in terms of business concepts, Kaizen orientation would be as follows:

Toyota

The best example of putting into practice of Kaizen is a Japanese company Toyota. Toyota has the most symetric and most powerful cost management. Toyota production system in which workers for decades systematically and uncompromisingly eliminate all unproductive activities, productivity is a model not only for the automotive industry.

The Toyota Kaizen started to use after World War II re-development of the company. Kaizen is manifested mainly in the Toyota system of learning, sharing of information, knowledge and experience through knowledge management, overcoming mindsets, respect and respect for people, teamwork, attention to detail, tightening things done and finding groundbreaking solutions. Toyota Production System (TPS) created on the basis of Kaizen at Toyota and its nature was in reducing costs and improving the quality of use of Circles of quality. It streamlines employee access, that part of the salary should be fixed and part unfolded on the amount of production. TPS has been developing for 70 years. It is a philosophy which is based on the applicable principles and functioning. From TPS it is based on the amount of the newer concepts, because there is no other way how an enterprise can develop.

During the development of Kaizen, the Toyota met with crisis and work was necessary to adapt the conditions of work more attractive to appeal to young people (and girls), thus modified and rationalized production and human resources development (HRD).

Toyota decided after the success of Kaizen in their companies support the implementation in Europe and America. Here, however, Kaizen met through a misunderstanding, because especially in American companies just raise demands on employees but did not adapt the conditions for development. later the conditzions changed and Kaizen became more and more attractive for Europe and America.

Continuous improvement Toyota for 25 years has increased productivity by 7 times while US automakers only 3.5 times. The time from the start of production to eliminate problems and achieve the standard, the planned power lines in the Toyota measured in days, in competing enterprises in the weeks and months. The productivity of designers and developers at Toyota is 4 times higher than that of American and European companies. In the US rankings for quality and reliability, Toyota consistently ranked in the top positions. If the US industry average in 120 problems per 100 cars sold and Toyota are the lowest - 101.

Pressure to reduce costs, TPS is a set of systematized ways these activities are beginning the design phase of the product, which shall be determined by reference costs and time. Then, in the workshop phase, the latter times and costs observed and constantly work on their improvement. They understood that the pre-production stages involved in product costs 5-10%, but their impact on cost is 70-80%. In this context, it seems quite illogical to seek cost reduction potential only in a production that costs are predetermined.

By Matisková practical skills that are essential to the success of Toyota are not only the individual elements of the production concept, but it's mostly the way you work with knowledge - workers in the development and manufacturing are constantly looking for problem solving, experimental, evaluate successful and unsuccessful solutions but above all learn, they expand the knowledge capital of the company by knowledge managers [6].

5 Conclusion

Any company that focuses its strategy on innovation can understand innovation with a diverse and diametrically different nature. Upgrade possible processes, products, working conditions, work organization systems, technologies and manufacturing processes, but all must lead to continuous improvement. Kaizen is the philosophy with respect to innovation-minded, but in some spheres evaluation diverges from the upgrade process. We confirmed that the identification and analysis of problems in business practice is appropriate and highly usable Kaizen. In companies that address the problems of low production or non-systemic control can be applied Kaizen and the Slovak conditions. Kaizen improves and enhances the work and adds value. Kaizen is a tool of modern management and the need to use it because it helps to identify shortcomings in the various stages of the business process.

Example of Kaizen application in practice in Slovakia and the Czech Republic is primarily an automotive plant Škoda Auto. In the Škoda Auto board members initiated so called Cascade workshops. Each workshop is 5-day series of workshops with a team of 10-15 people directly on the production line, which begins on Monday and ends by the analysis of waste on the Friday by presentation of established solutions and savings. The workshops were held for several months. The benefits from one workshop ranged from 4 to 6 million Czech Crowns.

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New aspects and tasks of Knowledge Management in the e-business era

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Abstract: Rapid development of IT is the significant characteristic of the 21st century. It has also an impact on business and enterprises. Many enterprises have the distributed character thanks to the internet, mobile technologies and other IT (grid, web services, cloud etc.). Sometimes it is too difficult to connect a traditional perception of the management with a turbulent and very fast changing IT environment. The management should be connected with IT very effectively and here is a space for new tasks and aspects of Knowledge Management. The paper sketches the hidden aspects of Knowledge management, which should be oriented on right coverage of the knowledge life cycle by IT within the enterprise. Knowledge management should be organic part of every IT project in business. It shows what, how and why to do in the IT projects, because the software solutions (as a product) are a part of business in the e-business era. The flexible IT architecture with a web services, microservices and various relative new technologies are involved directly in the supply chains, in the customer requirements and it is difficult to use it without good IT orientation. So the main task of the Knowledge managers is „to be bridge between software and people" and to find the most efficient ways to be successful on the market.

Keywords: Knowledge Management; E-business; Software engineering; Knowledge Engineering.

1 Introduction

First quarter of 21st century is the era, with many new characteristics. The fast development of technologies and especially information technologies (IT) is one of the most important features. IT has an impact on everyday life in many countries. Thanks to IT, the turbulent changes are visible also in many enterprises, in business, in public sector and in the whole society at all. The development of IT brings the possibility to make faster decisions, to store a plenty of data, to connect the remote nodes of distributed enterprises, to share information all over the world, but brings also many challenges how to manage data, information and knowledge within enterprise. The technologies are faster than the ability of people to use them effectively in the business. It seems, that too much information and too many technologies kill the creativity. It brings a lot of patterns, what and how to do it by using IT as "best practices". Many people, also the managers prefer ready-made IT solutions to be fast and first on the market. What is a pitty, often it runs without deeper analyzing the current situation and IT possibilities.

So here uprise some very important questions concerning two main common issues not only in the business, but also for every day life:

- First question is concerning the quantity and quality of information, which is important in current situations, concrete decisions, for process efficiency and satisfaction of people. It means, not to be lost in the ocean of information.
- Second question is how to deal with information technologies, which IT are useful and valuable for current actions and processes. It means, how to swim in the IT ocean.

IT bring radical changes in the business and allow to work on customer demand, with a number of variants "just in time" strategies. There were a plenty of scientific articles and various new IT solutions for business and management (and knowledge management too). The knowledge management was in the focus of interest between 2000-2010 years. Many managers and scientists discussed about the problem, where is the line between information and knowledge from the practical point of view. In the field of IT, the relatively old concepts from artificial intelligence were shifted to the virtual web space and opened the gate for e-business and virtual enterprises. Knowledge management (KM) is not an easy understandable term, because here is the possibility to see it from various points of view [1,2,4]. The perception of KM is often perceived as combination of business management and IT. Authors in [1] wrote about a classification of KM based on various KM schools. Here are three main approaches to KM, which follow particular purpose in the enterprise and they are complementary [1]

- technocratic
- economic
- behavioral

Although at first it seemed, that in current time, is the most important technocratic approach, it is not true in any case. Sometimes too many IT combinations in enterprise can lead to dislike for IT use or the main goal (effectivity and efficiency in enterprise) is lost somewhere in the huge heap of technologies.

Each of the approaches should be important in a well-balanced business. Sometimes it is more "art" than engineering or management. It is still the "art" how to join all strategies, technologies and people in the well-organized and effective enterprise.

2 From automatization to e-business

IT technologies changed also the business environment in the last 20 years, mainly business processes, and shift them from automation to e-business. Yogesh Malhotra [13,14] made comparison of two eras in business environment. The Tab.1 shows these comparison of "old" era of Business Automation and "new" era of e-Agility, which belongs to e-business. Here we can see, that the most important change should be in the role of IT. Automation era is the IT focused (more technocratic) and whole effort of automation is oriented on digitalization of whole business process. Not only in the production, but also in the management and services. The philosophy of e-Agility should bring the more flexibility in the business processes. The flexibility comes from the decentralization. Today many enterprises involved such IT as distributed systems, cloud solutions, grid solutions or web services and service oriented architecture, which allow creative and flexible approach in production and in management too. The Tab. 1 shows us also very important transfer from "technology importance" (the focus is on the best practices by using IT and externalization of knowledge) to "human importance" (emphasis on Visions, Beliefs and Actions, so emphasis on tacit knowledge).

Tab. 1 Focuses in the changing Business Environment by Malhotra

OLD Focus on Information-Processing (Automation)	NEW Focus on Business Model Innovation (e-Agility)
Focus on 'right questions' and 'best answers'	Multiple views of the problems and related solutions
Emphasis on Information systems and databases	Emphasis on Vision, Beliefs and Action.
Digitized memory, experience and expertise	Creative conflict, Dialog, 'Questioning the Status Quo'
Technology is central, People are less important	People are central, Technology is also important

As indicated above, the e-Agility belongs to the term e-business. Some authors suppose, that e-business is "poorly understood phenomenon" [4] and they are right, when we do not look on the technological aspects only. Good starting point for exploring the interrelation between e-business and Knowledge management is characterization of e-business [15] "E-business (electronic business) is the conduct of business processes on the Internet. These electronic business processes include buying and selling products, supplies and services; servicing customers; processing payments; managing production control; collaborating with business partners; sharing information; running automated employee services; recruiting; and more." E-business is not only business process reengineering by using crisp cuts, rapid changes in whole enterprise. E-business is not only about new information technologies involved in the traditional business performance. It brings the changes in business strategies, business models and also in management [9,10].

Malhotra [13] offered also the other comparison of automation and e-Agility by using some chosen indicators. He showed the main distinguish between radical changes of Business process reengineering (BPR) in the era of automation and new e-Agile era. If we consider the relationship between e-business and Knowledge management, we can see some similarities between KM attributes and e-Agility indicators. They are shown in the Table 2. It is the best point for finding the new aspects and tasks of KM in e-business era.

Tab. 2 Comparation of features BPR, e-Agility and KM by some indicators

Indicators	**BPR**	**e-Agility**	**KM**
Level of change	Radical	Radical/incremental	Incremental
Start from	Clean Slate	Existing model	Existing model
Frequency	One time	Ongoing	Ongoing /continuous
Time Required	Long	Short/long	Long

Participation	Top-down	All levels	All levels
Typical Scope	Cross-functional	Cross-network	Cross-network
Risk	High	High-critical	Low
Primary Enabler	IT	IT/human capital	IT/human capital
Type of change	Cultural/Structural	„Re-everything“	Cultural/structural/re-thinking

The result from Table 2 could be very confusing, because it seems, that the e-business and the Knowledge Management have the same concept. It is not true. E-business should be a tool of Knowledge Management, when we stress on the Information Technologies. On the other hand, the Knowledge Management has impact also on e-business and forces other changes in e-business.

To understand this relation is not easy. A clear technocratic approach finish in the automation and business process reengineering. To find a bridge between technocratic approach and economic approach is very complicated. Although the new challenge for KM is to be bridge between people in enterprise and software engineers, who design the IT for business.

3 KM technologies in the concept of e-business

„E-business can comprise a range of functions and services, ranging from the development of intranets and extranets to e-service, the provision of services and tasks over the Internet by application service providers.“ [15]. This explanation of e-business brings us more details about IT covering the business processes. The business process is a core for creating and designing software in e-business. When we look on business process, we can describe the process by using the state space and inputs, outputs in each state. To change this process into the IT speech, we can speak about data as inputs and outputs (and describe the environemnt of process and backward the data affects the process). It describes not only external environment (new stimuli from the surroundings, outside random effects, etc.), but also internal environment (inside random effects, attribution of production activities e.g. time, strategic or tactic requirements etc.) of process. So what is then the power, which make data changes in business process? We can say, that the knowledge are dynamic operators of business processes and they have impact on the business environment (change data, produces new data, new attributes of environment etc.)

From this IT point of view, we need to handle with Data Management and Knowledge Management by choosing and creating IT combination for E-business. „Data management is a general term that covers a broad range of data applications“ [16], but always manage data to valuable resources by doing three main activities: data design, data storage and data security. „Knowledge Management is the systematic management of an organization's knowledge assets for the purpose of creating value and meeting tactical & strategic requirements; it consists of the initiatives, processes, strategies, and systems that sustain and enhance the storage, assessment, sharing, refinement, and creation of knowledge.”on web [12]. E-business „lives“

in the web space in current time and this space has some specifics also in Data management and also in the Knowledge Management. Web space offers very strong technics for Data Management [15] as web metrics, web analysis, web statistics etc., which manipulate also with the digitalized data, so analysis and design of data is very fast and data storage is very easy. So often we can hear not only about E-business, but also about D-business (digital).

Concerning the digitalization of web space is a great challenge for IT professionals and Knowledge engineers find the right way how to manage knowledge in digital web space. Already in 2002 year raised up consortium dealing with term Web Intelligence [18] focused on the Intelligent Web-based Business. The consortium described and classified the IT used in web space to discover Intelligent Business [5]. As we see on Fig. 1, the Intelligent Web-based Business can be covered by electronic processes in every sphere of business. Here the authors viewed on E-business only as a part of Intelligent Web-based Business.

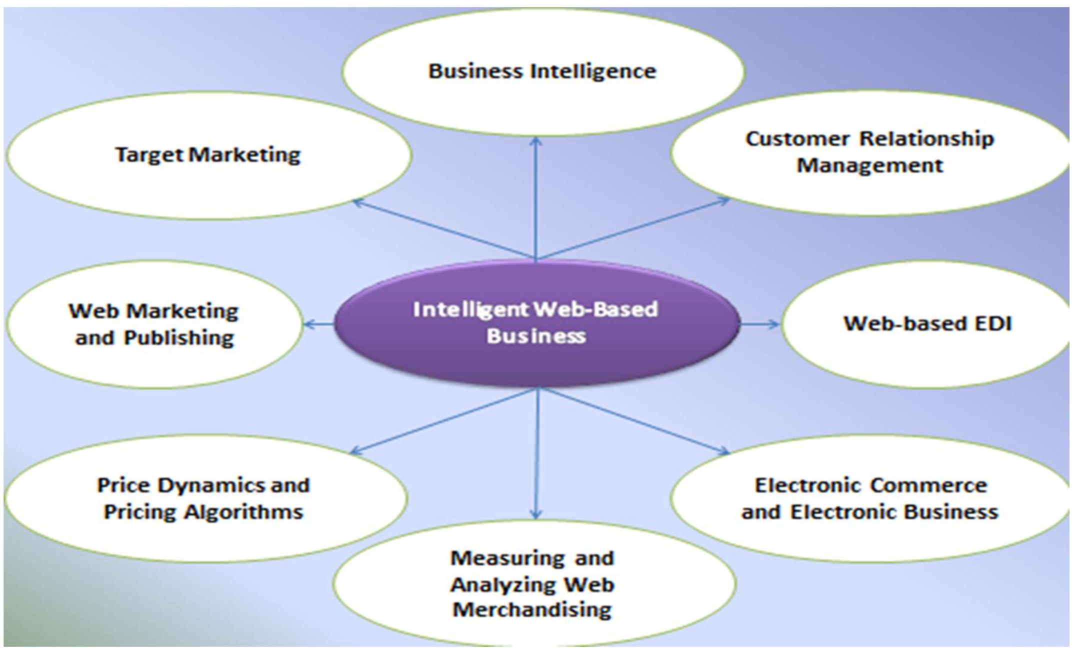

Fig. 1 Intelligent Web-based Business [5]

Today technologies shift the electronic business into the intellligent business, because the border between the knowledge technologies and web IT are wiped. Plenty of technologies are combination of KM technologies and web technologies. Here are some traditional groups of KM technologies [12]

- Groupware systems & KM 2.0
- The intranet and extranet
- Data warehousing,data mining, & OLAP
- Decision Support Systems
- Content management systems
- Document management systems
- Artificial intelligence tools
- Simulation tools

- Semantic networks,

which can be combined with web technologies such web mining, web farming, web information retrieval, web agents, inteligent ubiquitous computing etc. From this point, we can consider frequent characterization of Web Intelligence „Web intelligence is a combination of digital analytics, which examines how website visitors view and interact with a site's pages and features, and business intelligence, which allows a corporation's management to use data on customer purchasing patterns, demographics, and demand trends to make effective strategic decisions" [17]. All the changes in the e-business processes lead to the active web sites, when we can find some „wisdom elements" (personal or social agents, conceptual information extracting, ubiquitus computing etc.). This approach brings more flexibility by designing the KM systems in enterprises, but here is a risk that the system will not be set correctly. Specially, when the enterprises prefer the IT outsourcing (e.g.cloud solutions).

4 Interrelation between e-business and Knowledge Management

Many authors who have dealt with the Knowledge Management wrote their articles before five and more years. It seems that the interest in Knowledge Management in the E-business was stopped. The reason is very simply: the technologies "run" very fast, the development of new software solutions start to be "too agile" or "too rapid" and here are some new requirements on software and knowledge engineering. The projects of new software solutions are continuously included in the real just-in-time performance and in one moment we can have more open projects in one distributed enterprise. Projects are deployed very quickly, although they do not bring "big change at once". It is thanks to technologies like web services or microservices [11] and their flexible architectures. Martin Fowler describes, that the software development is not perceived as typical project "the aim is to deliver some piece of software which is then considered to be completed" [11], but more as a product. This approach involved also the developers into the business process and "development team takes full responsibility for the software in production" [11]. And finally he wrote also in [11] "The product mentality, ties in with the linkage to business capabilities. Rather than looking at the software as a set of functionality to be completed, there is an on-going relationship where the question is, how software can assist its users to enhance the business capability."

New development software philosophy shifts also the relation of technologies to business. Technologies are not only support system for business as before, but they are necessary part of business processes. With this new philosophy is necessary to shift also the role of Knowledge Management. Knowledge Management can in the distributed, fast changing business environment bring

- Determining the need for process transformation and understanding the context of process transformation
- Developing alternative process designs
- Work and performance assignment
- Create new knowledge sources about processes and software solution
- Shift the customers (customer as a competitive) to role of knowledge workers
- Shift the software developers to role of knowledge engineers (with deeper domain knowledge)
- Shift the internal processes to value net advantage

5 Conclusions

As was mentioned before, the technology evolution is faster then development in business and all other areas of enterprise. The business processes are often shifted from traditional enterprise information systems to systems based on the web technologies using cloud and grid technologies. The enterprises do not use their own servers and IT professionals, but prefer outsourcing solutions. IT firms are often to agile (they follow their own profit) and push enterprises to use their own solutions. Many times we can see bad IT solutions for enterprise (specially for SME). Here is a lack of people with interdisciplinary education, experience and skills in enterprises. IT professionals do not like study business and so their solutions are often based on their own opinion. The gap in communication between managers and the IT professionals is still a major problem. Fowler's description of changes in software engineering, where the IT projects should be involved directly in the business processes, shows that here is a place for knowledge managers with good skills and appropriate education in the IT area. Knowledge Management in the 21st century could not be cut from IT and from software engineering too. The main role of the knowledge managers should be in the future

- Know-what (to know how the business process is created, what it means in reality, not only as a process model; to know the impact of changes in the entreprise etc.)
- Know-how (to have a knowledge of IT tecnologies and projects in the enterprise; to be the member of the IT projects; to know what is necessary for organization to be adapt on e-business etc.)
- Know-why (to know why e-business is evolving as it is and what accounts for its impacts on competitive context, strategy, and operations).

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New Demands for Abilities and Skills of Knowledge Workers in the Financial Sector

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Abstract: Specialists in the financial sector have usually been regarded as knowledge workers. They use both explicit and tacit knowledge in their activities. Recently, the knowledge intensity of the financial sector increases and the share of work with lower knowledge requirements (e.g.clerical workers) is declining.. The purpose of the paper is to point out basic tendencies in the knowledge work especially in the banking sector (which is the dominant part of the financial sector in Slovakia). These changes are mainly due to digitalization of banking distribution channels and products, but also due to other - mutually interconnected - factors (global tendencies at international financial markets and intensified competition, new regulations, etc). Effective implementation of digitalization requires radical changes in the organization structure and culture of banks and the ways of doing business, higher flexibility and also new and interdisciplinary knowledge of financial specialists. They are supposed to flexibly acquire and use their (mainly tacit) knowledge of local conditions and respect specific requirements of the basic segments of local clients.

Keywords: Knowledge workers, knowledge intensity of work in the financial sector, digitalization and organization culture, interdisciplinarity of required knowledge, role financial advisors under current conditions.

1 Introduction

Knowledge workers have always been present in the financial sector, however, the type and quality of knowledge required and knowledge intensity have been changing with the development of the financial sector.

Trading at stock markets always required some knowledge –both explicit and also tacit knowledge and intuition. Creative problem solving was indispensable, although up-to-date concepts of creative problem solving and knowledge creating and sharing were not used.

The work of these specialists was mainly individual, knowledge sharing was limited by personal factors, but also a legislation (and this is true also today, e.g. insider trading).

Knowledge has been always important for bankers: their decisions, e.g. on granting a loan, had to be based on information about the clients, their solvency and creditworthiness, etc. Part of this knowledge was explicit and shared, but a lot of knowledge required for rational business decisions was of tacit character, based on personal experience and family tradition (not shared with others), Ordinary employees in banks performed more routine activities, with lower knowledge requirements, but independent problem solving was sometimes also important.

Although the concept „knowledge workers" is often used today, there is not a consensus in defining the concept.

The mentioned knowledge requirements were typical practically for all developed market economies and with the development of a financial system the knowledge quality and intensity were increasing, which is true especially for recent decades.

In the recent history of the Slovakia´s financial system there have been three points in time (waves) when knowledge requirements for work in the financial sector radically changed.

1. At the start of economic reforms, oriented on the transition to a market economy, a radically new knowledge and skills of the workforce in a financial system came to the fore (in comparison with the centrally planned economy). Know-how typical for modern central banking and commercial banking had to be applied. .For Slovakia, after the split of the Federation, the learning of up-to-date central banking know-how was very important.

2. At the turn of millenium, with the massive entry of foreign capital into Slovakia´s financial system, requirements on knowledge skills of banking management and work-force, significantly increased, Some new financial products and services were introduced and elements of a prudential commercial banking policy have been implemented.

The spread of knowledge was achieved by traditional forms of knowledge sharing, initiated by foreign parent companies .Those that were able to adjust, remained, but many workers (from the overpopulated banking sector in the 1990s) were fired. Over the years this new knowledge became routine.

3. Third, recent period of radical changes in knowledge requirements on financial sector employees and management, is typical for the last few years. These changes are caused by three main factors:

- recent development of IT technology and a trend of digitalization in the financial sector;
- intensive global competition between banks and also between banks and non-financial institutions;
- recent tendencies in the bank regulation at the international level that aim at preventing the outbreak of a next global financial crisis and protecting clients.

All three factors are mutually interconnected and shape the new environment for banks´ strategy.

The objective of the present paper is to analyze the impact of the three mentioned factors on the required skills and abilities of financial sector employees (knowledge workers in this sector) with special emphasize on banking, which is the dominant part of the financial sector in Slovakia.

However, before looking at these issues, let´s touch briefly the question *Who are knowledge workers we are going to speak about?*

For some authors knowledge workers are workers with higher education that use knowledge in their daily activities Moreover, data on the number of workers with higher education are statistically available and measurable.. However, this is a simplification and we cannot identify the two groups. Although many knowledge workers are university (and other higher education institutions) graduates, not all of these graduates actually perform work, where higher education is required. On the other hand, some highly creative individuals that can be regarded as knowledge workers, have got no university diploma. Such workers exist also in the financial sector.

Sometimes, knowledge workers are identified with IT specialist which can be understandable However, not only knowledge of the most recent IT technology is required, but also a deep knowledge of a particular industry, where IT tools are to be applied, in our case knowledge of up-to-date-banking and other financial know-how and clients requirements. That means an interdisciplinary knowledge is required for both IT experts in the financial sector and bankers in a more traditional way. Without this interdisciplinary knowledge and close cooperation between two mentioned groups of knowledge workers the competitiveness of the financial sector will not increase.

Another approach to define knowledge workers in business organizations is to identify them with managers (mainly at higher levels). Managers (irrespective of the industry where they work) use mainly knowledge (explicit and tact as well) in their activities and decisions. They are supposed to be able to make independent decisions and creatively solve problems. However, not all knowledge workers are managing a team, sometimes they have no subordinates. Majority of knowledge workers in typically creative fields are not managers,

In our paper we regard knowledge workers in the financial sector as specialists in the sector that use mainly knowledge (of interdisciplinary character) in their activities, are able to make independent decisions, are creatively communicating with the clients, meeting their requirements, knowledge acquired in this communication (tacit knowledge) are sharing with colleagues and management of the organization and in such a way they contribute to the knowledge potential of the whole institution. This knowledge is supposed to contribute to the efficiency and improved competitiveness of the company.

2 Digitalization in the banking sector and knowledge requirements connected with it

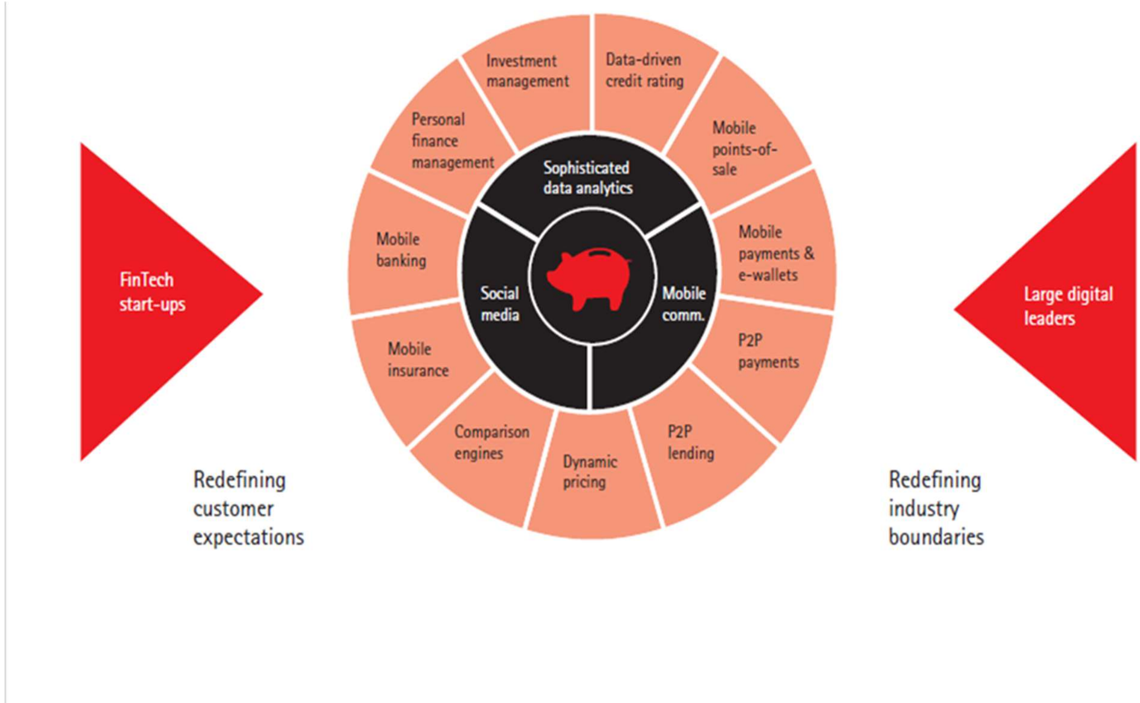
Digitalization is recently one of the basic trends in all financial institutions, but in our paper we´ll concentrate on the commercial banking sector generally (this trend is important for all countries) and specifically on the banking sector in Slovakia.

Banks are pushed to digitalization of their products, services and communication channels by competitive pressure (also from outside of the financial sector), fundamental changes in customer expectations and motivation to increase profitability, sustain market position and improve the competitiveness in general.

Different factors influencing the digitalization strategy of banks are illustrated at the Fig. l.

These factors include recent developments in the telecommunication sector and competition between banks and telecommunication companies, changes in the bank's products portfolio and the need for a more sophisticated data analysis, changes in customer requirements due to a new dynamics of their markets and globalization, etc.

Fig. 1 Digital disruption in banking



Source: Accenture Strategy p. 6

Taking into account all these factors, their potential benefits and risks (for the bank, for clients, etc.) and also local conditions of their importance, requires actually a lot of knowledge that financial specialist have to acquire, master and practically use. This is an interdisciplinary knowledge including knowledge on IT technology, corporate clients´ requirements, local (especially retail) clients specificities, global competition trends, regulation and legal conditions, etc. A lot of this knowledge is explicit and can be shared by traditional forms (channels). Top management is usually initiating socialization of the most important knowledge within the bank, but can´t discover everything that is important to know. Very often management is not aware of the fact that effective digitalization in banking requires also a radical change in the organization structure and organization culture and adjustment of interpersonal relations (A.T.Kearney, 2013, Kuhlman 2016)

Sometimes, the term „two-speed adjustment“ is used. This approach describes that banks are trying to make basic steps into digitalization as fast as possible (e.g. they create special department responsible for digitalization, rapidly include online based products and services). But on the other hand it is important also to apply online approaches to core banking activities, learn from step-by step approaches in using multichannel communication with customers, optimizing the branch network etc.

Individual knowledge workers can contribute to mentioned goals by developing appropriate software for digitalization, by getting experience (and forming tacit knowledge) from using the new online channels, helping customers to use the new forms of products and services and transforming general strategic guidelines into locally optimal solutions (using their knowledge of local conditions and clients).

Exploring ways to convert to a more digital business model is today typical for banks in all countries. However, steps taken so far depend on regional factors, e.g. regional banking capacities, IT infrastructure in the country and IT skills of the population, domestic customer demands, market dynamics, regulation, etc.

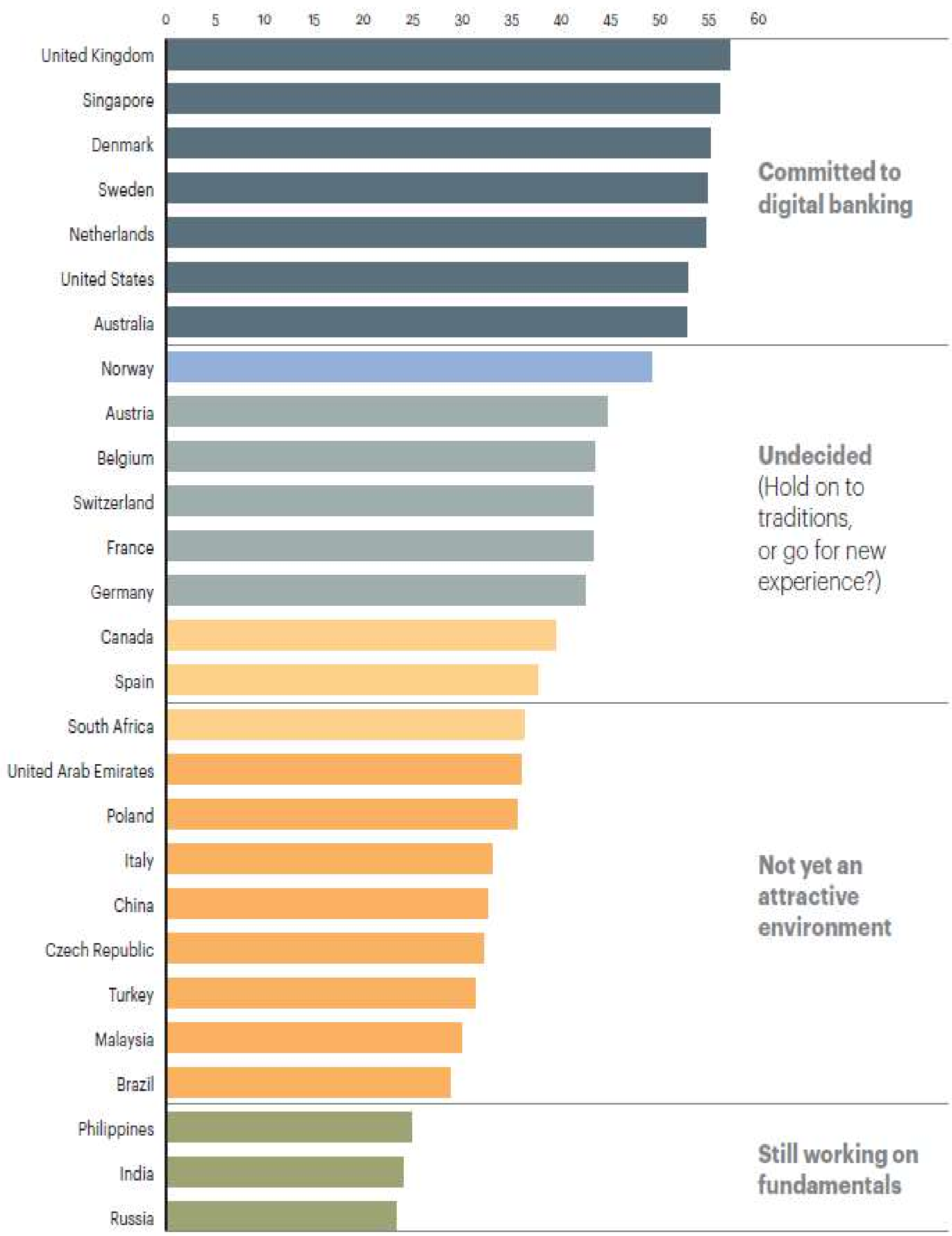
A. T. Kearney and Efma team conducted a research (A. T. Kearney, 2013) of the ways to digitalization and current achievements in the banking sectors of different countries. The team conducted in-depth interviews with leading retail banks in the world to better understand their approaches and motivation toward digitalization. On the basis of research results they constructed „the digital banking readiness index“ and the position of individual countries according to this index. This position is shown in Figure 2.

Slovakia was not explicitly included into the sample, but some occasional comment on the situation could be found in the report. On the basis of this and our experience we can assume that Slovakia belongs – together with the Czech Republic – into the third group, where banks, in principle, hold on to tradition, but are experiencing with digitalization. This is true in different degree for individual banks. These differences depend not so much on external environment (although different retail banks have different segments of clients with lower IT skills - older people or clients from countryside). As the banks in Slovakia are basically foreign controlled (the share of foreign owned banks in the total equity is more than 90%), the strategy, including the strategy to digitalization, is mainly determined by foreign parent companies.

Sometimes, products and services offered by banks – in the digitalization area – are up-to-date, but customers are lagging behind, especially customers in age groups 50+ (more explained in Sestakova, 2016). Sometimes clients prefer direct contacts before online communication and are not happy with too sophisticated products.

Irrespective of whether the way to a „digital bank of a future“ will be longer or shorter, human factor and knowledge of workers are always important and can be one of the decisive factors in the transition period. Interviewed banks in the research sample confess that they are lagging mainly in the organization culture and human factor to introduce the digitalization more effectively. This is true not only for top management level where decisions on strategy are taken, but actually for all levels – up to workers that are directly communicating with customers (at the lowest level of the hierarchy).

Fig. 2 Digital disruption in banking



Source: A. T. Kearney and Efma Global Retailing Banking Study

Taking into account communication with retail clients, *the role of financial advisors in bank´s branches* is very important. Advisors should help the clients to work with the new technology and simultaneously also contribute to improving the financial knowledge background of the retail clients which is still very low in Slovakia. This means that they have to perform also some educational function. With extremely low interest rates, traditional forms of savings are not attractive and rational customers are more interested in allocating their money in investment funds. Majority of these funds are actually managed by bank groups within their assets management operations. Financial advisors should advice the clients where to invest and what are the comparative advantages and disadvantages of different funds. This requires a deeper knowledge in investment banking and also of the recent developments at global and regional financial markets. The dynamics of changes at financial markets is very high and this knowledge should be permanently adjusted. To make their recommendations relevant to clients from different segments, advisors should understand the interests and financial position of the clients (something like the "family doctor" should know his patients) and also psychological skills and ethical behavior of advisors are very important. Of course, the abilities and practical approaches of many financial advisors do not meet these requirements so far, but this is an ideal to which the relation between banks and retail clients should move. For Slovakia, we can´t believe that these issues will be automatically solved just by online activities.

The similar requirements are true also for the communication between banks (mainly banks´ branches) and small enterprises. These enterprises are not able to find and interpret all the relevant information available on the web and direct advice is sometimes important.

On the other hand, cooperation with large corporate clients requires a deeper knowledge of some recent developments in IT technology (e.g.big data systems) and a closer cooperation with IT specialists from the corporation itself. Strategy oriented on corporate clients is usually determined at higher levels of bank´s management. In the cooperation between banks and corporate clients there is a trend to establish a true multichannel customer experience; digital channels; new digital products; remote advisory (or combined direct and remote advisory) and real-time event management.

Meeting the mentioned objectives and challenges requires interdisciplinary and cross-cultural skills of employees and some corporate clients are complaining that banks in Slovakia are lagging behind in this field. It is clear that the digitalization trend will be a long-distance journey. However, human factor, its knowledge, flexibility and cooperation abilities, will be an important factor in this trend.

3 The Impact of Global Competition

Use Recent developments at the world financial market and intensified competition between banks and also between banks and non-banking institutions are unquestionably the key factors influencing the strategy of banks under current conditions. This has been mentioned also in the previous parts of the paper. Extremely low interest margins compel banks to change the structure of their activities. Digitalization is just one form of cost savings in the long-run (but in the short run it can be very expensive) and attracting customers. Other forms of searching for survival strategy must be used as well. The definite solution is not clear and probably there will be differences between bank groups and strategies applied in different regions.

A specific feature of the banking sector in Slovakia is that it is actually controlled by foreign capital. Banks in Slovakia are parts of international banking groups and these groups or parent companies have always been regarding themselves as *global players.* The global reach of different banks ´groups and the degree to which they were successful in their global strategy can, of course, differ and the control can shift from one foreign owner to another. Such changes are usually connected with new demands on knowledge, skills and culture of local managers. This is true not only for top management but also for managers and specialists at lower levels. IT systems and communication channels are usually adjusted to owner´s requirements and employees are supposed to master not only new technology but also to flexibly use their existing tacit knowledge of local conditions to effectively implement global strategy in specific local conditions.

The new tendency in banks´ strategy under current conditions is *forming strategic alliances with companies from IT industry,* especially from telecommunications. It´s too early to evaluate performance of these alliances, but it is clear that some cross-cultural cooperation is important for their effective working. This again increases requirements on abilities and skills of financial specialists.

4 New Tendencies in the Financial Market Regulation

National and during the recent period also supranational regulation of the financial markets has always been an important factor influencing strategy and tactics of financial institutions and requiring the increased knowledge intensity of financial specialists. Today's financial markets offer an ever broader range of specialized financial products, which are often complex and difficult for investors to understand. Ensuring the transparency of such products is essential to improving investor protection in this area. (Hladký 2016).

New regulation in the European Union aims at protecting small investors and simultaneously at increasing stability of the financial sector and preventing the break-out of a new banking (and financial) crisis (Sooner – Taylor, 210). From the point of view of small investors protection the PRIIPs (packaged retail and insurance-based investment products) regulation is important which should start to apply in December 2016. This regulation introduces a standardized key information document for the group of financial products (Hladky, 2016). This document should make easier for investors to compare risks, costs and benefits of different financial .products prior to investing. Financial institutions and also financial advisors working in them will be obliged to provide the information which could be regarded as ethical even before the new legislation will be introduced, but during next years will be officially required. Even for experts with a relatively long experience at the financial markets it is difficult to orientate in the complex regulation network. Demands on their knowledge significantly increase. At the beginning it will be mainly explicit knowledge, but with the increasing practical experience the new tacit knowledge will be formed.

Another regulation that will increase knowledge requirements and contribute to forming a more demanding environment for financial institutions is the so called MiFID II. (Markets in Financial Instruments Directive II). The main objective of the MiFID II package is to strengthen the existing legal framework and introduce a single European rulebook for investment services and investment activities, as well as for ancillary investment services (Oller, 2016). It broadens the scope of regulation and can be regarded as a response to technological advances in the financial investment business. Although primarily designed for Europe, it is expected to have global implications. It will intensify knowledge requirements for workers actually in all financial institutions and also in the non-financial companies (in their risk-hedging policy, the way how equity and bonds are traded, etc.). As it is difficult to forecast indirect impact of the mentioned regulation, the implicit knowledge and know-how will probably play an important role.

5 Tentative conclusions

Although the view that the work of specialists in the financial sector is becoming more knowledge intensive and new demands on this knowledge come to the fore, is almost generally accepted, there is no consensus on the reasons, forms and quality of the new knowledge required. Moreover, there is no generally accepted view who actually belongs to the group (and social status) of knowledge workers.

Present paper tries to contribute to explaining the mentioned questions. Views and comments expressed in the paper are actually more hypotheses than conclusions. They are based on occasional observation and experience and a standard statistical investigation is still lacking (not only in Slovakia, but in other countries as well). Just the problem of digitalization impact is more analyzed in the literature, but with insufficient attention to the role of human factor in the process and interdisciplinary character of the knowledge required.

A lot of unsolved problems remain for future research.

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Collaborative Consumption and Disruptive Market Exchange Modes

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Abstract: Collaborative consumption is a recently adopted term describing the phenomenon of peer-to-peer exchange transactions via online digital platforms. It is often encompassed within a larger societal context and referred to as a "collaborative economy", "peer-to-peer economy", "access economy" or "sharing economy". The emergence of a nowadays collaborative consumption has been enabled by the development of new technologies, in particular those based on Web 2.0, and a parallel massive penetration of personal digital devices (smartphones, tablets, notebooks, etc.) among population. From the marketing perspective the collaborative consumption represents a hybrid marketing model of peer-to-peer exchange taking place on the online market with a predominant use of online marketing techniques. The aim of this paper is to discuss the new trend of collaborative consumption in view of disruptive market exchange modes.

Keywords: collaborative consumption, sharing economy, peer-to-peer exchange, online market, digital technology, marketing.

1 Introduction

Collaborative consumption (CC) has been defined as a model of economic arrangements in which participants mutualize access to products or services, rather than having individual ownership of them (Botsman and Rogers, 2010). From a different point of view, John (2013, p. 4) describes it as an economic model in which consumers use online tools to collaborate on owning, renting, sharing, and trading goods and services. Finally, Belk (2014, p. 1597) defines CC as people coordinating acquisition and distribution of a resource for a fee or other compensation, while this resource can be either tangible (product, land, space) or intangible (skills, swapping, renting/lending, second-hand purchases and reselling).

According to Botsman and Rogers (2010) although the companies operating in the field of collaborative consumption range enormously in scale and purpose, they are redefining how goods and services are exchanged, valued, and created – in areas as diverse as finance and travel, agriculture and technology, and education and retail.

The collaborative consumption system is also often referred to as "sharing economy" (Hamari, Sjöklint and Ukkonen, 2015), "peer economy" (Sundararajan, 2014) or "access economy" (Eckhardt and Bardhi, 2015) describing a hybrid market model of peer-to-peer exchange. According to Ertz, Durif and Arcand (2016) there are several key macro factors enhancing the mutualization in consumption: (1) Technological: Development of ICT and the emergence of Web 2.0, (2) Economic: Austerity and crises, decline of stable and full-time employment as well as of purchasing power, (3) Political: Withering of the State and its increased adjustment to the market ethos, (4) Social: Consumption as a central project in consumers' lives.

The development of collaborative consumption has been facilitated by ICT advances and a consequent emergence of digital online platforms (eBay, Airbnb, Uber, etc.) enabling peer-to-peer exchange transactions. In parallel, a massive penetration of personal digital devices (smartphones, tablets, notebooks, etc.) among population provided a significant access to these platforms and created a substantial market base for functional online market transactions.

Yet, any change in a market model brings also shifts in marketing practices used within that model. Therefore it is expected that a new hybrid peer-to-peer online market model of collaborative consumption shall lead to a disruptive marketing exchange paradigm. The aim of this paper is to discuss the new trend of collaborative consumption and its implications for market exchange modes.

2 The role of technology within the development of collaborative consumption

The word "sharing" has been one of the most used words during the last decade. It is defined as "to divide and distribute in shares; to partake of, use, experience, occupy, or enjoy with others; to have in common" (Merriam-Webster Dictionary, n. d.). However, given the novelty of the term usage there are languages (including the Slovak language) in which a convenient equivalent has not been officially approved yet. Instead, informal translations have become already widely spread among people.[1] In other languages, the English original term has been domesticated. Nevertheless, John (2013, p. 3) considers the term "sharing" to be a "keyword for today's society". The author defines it as a "constitutive activity of Web 2.0 describing the mode of our participation in social network sites and digital communication more generally" (John, 2013, p. 3).

Sharing, on one hand is a type of communication characteristic of our participation in contemporary ICTs, and, on the other hand, it is also a type of economic activity (John, 2013, p. 3). The latter connotation relates to the discussed term "sharing economy" which consists of a supply, demand and exchange on a peer-to-peer market. However, Eckhardt and Bardhi (2015, p. 1-2) criticize such naming of the new peer-to-peer business model. Instead, they suggest the term "access economy". The authors explain that when consumers use sharing services they don't feel any of the reciprocal obligations that arise when sharing with one another. Therefore it is not about sharing but about an access (Eckhardt and Bardhi, 2015, p. 1-2). Anyhow, as it was already mentioned, both terms are currently used as synonyms to "collaborative consumption".

There is no doubt that the technology in general, and the internet in particular, play a central role in the emergence and development of collaborative consumption. Especially, the new generation of internet that appeared around the year 2000 and was named Web 2.0 (as a successor of Web 1.0) opened new possibilities to publish a web material created by users (text, pictures, videos, etc.). This material has been called a "user-generated content". The main differences between the functionality of Web 2.0 in comparison to Web 1.0 are listed in the table 1.

[1] In common parlance the term "sharing" is usually translated as "zdieľanie". However, this term has not been approved by the Slovak Institute of Linguistics.

Tab. 1 Differences between Web 1.0 and Web 2.0

	Web 1.0	**Web 2.0**
Content	The owner is mostly a content creator	Active participation of visitors in the content creation (user-generated content)
Interaction	To the necessary extent	Discussions, chats, social profiles, etc.
Updates	Corresponding to the possibilities of an owner.	The web becomes a living organisms, there may be many content creators
Community	Passive visitors without interactions	An individual is a part of a broader community
Personalization	There is no implicit personalization	The creation and use of social profiles of visitors

Source: translated from Frey, 2008, p. 29.

As can be seen from the table 1 major improvements of Web 2.0 against Web 1.0 were the possibility of visitors to publish their own content and the interactivity with other visitors. As a result, the role of visitors/users significantly shifted from passive receivers of content to active content creators. The first wave of user-generated contents occurred in the context of social media. Therefore they have been also labelled as "consumer generated media". In fact, the emergence of social media has been probably the most visible manifestation of the mentioned Web transition.

Accordingly, the first sharing activities consisted mainly of sharing personal matters like information about relationships, events, memories, pictures, etc. (Facebook), photos and videos (Instagram, YouTube), opinions (blogsphere), knowledge (Wikipedia – a collaborative online encyclopedia), files (Uložto) and others. Soon, the business sector followed the new trend and started to use social networks as additional promotional tools in marketing. In parallel, various professional networks (e.g. LinkedIn, ResearchGate) had been introduced. These moves anticipated the extension of social networking from the private sphere into the business and professional environment.

In the second wave people discovered the economic potential of publishing user-generated content online with a perspective of promising business transactions. Yet, for this purpose specific online platforms enabling market exchanges including a money transfer have been needed. According to Hamari, Sjöklint and Ukkonen (2015, p. 4) these platforms act merely as economical-technological coordination providers, which do not necessarily have control over the content distributed, exchanged and coordinated.

In consequence, CC is considered not only a social and economic phenomenon, but also a technological phenomenon. As claimed by Ertz, Durif and Arcand (2016, p. 3) the internet and technological developments represent the lion's share of the developments that gave rise to collaborative consumption. In this respect John (2013, p. 4, 6-13) highlights the "digitalism of collaborative consumption" and distinguishes between the technology enabling collaborative consumption (social networks and digital platforms used to create communities around collaborative consumption) and that driving collaborative consumption (reproduction of social behavior in online and offline situations).

Among the pioneers in CC area the platform eBay has to be mentioned as one of the first global players creating conditions for peer-to-peer online business. Nowadays CC platforms operates in divers sectors of the economy like accommodation (Airbnb), transportation (Uber, Zipcar), finances (crowdfunding), second-hand business (Letgo), etc. In the further text we will discuss marketing implications of the collaborative consumption model.

3 Market exchange modes and collaborative consumption

From the marketing perspective the collaborative consumption represents a hybrid market model of peer-to-peer exchange taking place on the online market via a digital platform with a predominant use of online marketing techniques. Sundararajan (2013) considers this "reengineering" of consumption to be a natural consequence of the ongoing consumerization of digital technologies. Moreover, Ertz, Durif and Arcand (2016, p. 2) believe that collaborative consumption has a potential of changing the orientation of the marketing discipline. Similarly, according to Belk (Belk, 2014) collaborative consumption constitutes a set of "disruptive" marketing exchange practices which has to be approach from a different perspective than a traditional marketing.

In this respect, Ertz, Durif and Arcand (2016, p. 2) advocate the adoption of a macroscopic view, more specifically, the adoption of an Aggregate Marketing System (AMS). The AMS encompasses more players – besides marketers – taking into account also the role of consumers and government (table 2). The rising role of consumers appears to be central within the new collaborative consumption market model.

Tab. 2 Exchange configuration

Aggregate Marketing System	Organizations	Customers	Government
Organizations	B2B e.g. chemical leasing scheme	B2C e.g. marketer-managed bike-sharing scheme	B2G e.g. marketer-managed official car fleet management
Customers	C2B e.g. trade-in programs	C2C e.g. classified ads / auctions websites	C2G e.g. government sponsored used car trade-in programs
Government	G2B e.g. high-tech equipment leasing	G2C e.g. public auction blocks	G2G e.g. forestry equipment leasing

Source: Ertz, Durif and Arcand, 2016, p. 8.

Table 2 depicts new exchange configurations in which well-known B2C, B2B exchanges are now complemented by the emerging C2C, but also other transactional modalities moving goods more efficiently on the market. While a certain number of such exchanges involve new goods (B2B, B2C, B2G, G2B, G2C or G2G), others are uniquely associated with used or "pre-owned goods" (C2B, C2C, C2G). CC exchange schemes can be found in each exchange configuration, making it a prevalent element of the AMS (Ertz, Durif and Arcand, 2016, p. 8).

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According to Sundararajan (2013) the “peer-economy” marketplaces are inventing an entirely new asset-light supply paradigm, which enables the disaggregation of physical assets in space and in time, creating digital platforms that make these disaggregated components amenable to pricing, matching, and exchange.

Hamari, Sjöklint and Ukkonen (2015) mapped over 250 collaborative consumption platforms and identified several types of exchange modes including sharing, new purchase, second-hand purchase, renting, donating, swapping, and lending or borrowing. Some platforms facilitated multiple types of activities. These were grouped into two main categories of services: *access over ownership* and *transfer of ownership*. However, it was possible that the platform facilitated both modes of exchange.

In addition, Sundararajan (2014, p. 2) identified three main players constituting the new collaborative consumption market model: (a) *the platforms* (person-to-person marketplaces which facilitate the exchange of goods and services between peers, (b) *the entrepreneurs* (individuals or small businesses that supply goods and services in these marketplaces, and (c) *the consumers* (individuals who demand – buy, rent, consume). Both the entrepreneurs and the consumers are often referred to as “peers”. In the exchange process the payment from the peer-consumer to the peer-entrepreneur is mediated by the platform, which often charges a commission to one or the other trading party.

With respect to consumers' motivation to participate in collaborative consumption, CC appears to be an appealing alternative especially for those concerned with ecological, societal and developmental impact of consumption (Hamari, Sjöklint and Ukkonen, 2015). However, in price-sensitive markets the appeal might be mostly economic since shared goods and service are usually much cheaper than traditional offerings. This was also confirmed by the study carried out by Hamari, Sjöklint and Ukkonen (2015), which revealed that people's principal drivers are sustainability, enjoyment of the acting, and economic gain. The sustainability aspects of CC are also highlighted by Cohen and Kietzmann (2014, p. 280) who point out the potential sustainability benefits associated with sharing economies (mostly shared mobility), in particular in the context of the increased urbanization.

Throughout the gradual penetration of collaborative consumption into consumers' everyday life we can also observe an impact on the behavior of traditional businesses, notably in the area of services. In particular, the emergence of a parallel use of several exchange modes within one company is evident. For instance, taxi drivers work for a traditional taxi service company, but they are also registered with Uber. Thus, in practice they accept clients via two exchange modes at the same time – B2C and C2C. Similarly, online intermediaries in tourism accommodation industry (e.g. Booking.com) enlarged their product portfolio by including apartments owned by individual consumers or small entrepreneurs. Instead of competing with CC platforms they have prevented the competition by offering similar service like e.g. Airbnb. As a result, they apply both B2B and C2B exchange modes at the supply side of supply chain.

Thus, the “hybridization” of marketing exchanges and the coexistence of several market exchange modes even within traditional businesses suggest the growing significance of collaborative consumption on a nowadays market.

4 Conclusions

Collaborative consumption is an emerging peer-to-peer market exchange model empowered by developments in ICT, increased engagement in web communities (social networks) and growing consumer concerns (ecological, societal and economic) in a nowadays world. It represents a new hybrid marketing model encompassing disruptive market exchange modes with a significantly rising role of consumers as a key factor.

Nevertheless, the new trend of collaborative consumption can be approached from several different perspectives, notably as a/an:

(1) Technological phenomenon (John, 2013; Hamari, Sjöklint and Ukkonen, 2015; Ertz, Durif and Arcand, 2016);

(2) Emerging consumer culture (Botsman and Rogers, 2010; Cohen and Kietzmann, 2014);

(3) New exchange market model (Belk, 2014; Sundararajan, 2014; Ertz, Durif and Arcand, 2016),

In this paper we focused predominantly on the technological perspective and exchange market modes points of view. We described the origins of CC and its roots in ICT developments. Further, we discussed the emergence of disruptive market exchange modes within CC which form a new peer-to-peer marketing model. However, what is the future of collaborative consumption market model?

Most of the studies published in this area predict significant economic and societal changes connected with the emergence of CC. For example Sundararajan (2014, p. 1) believes that "peer-to-peer business enabled by digital platforms will constitute a significant segment of the economy in the coming years". In addition, he expects "a positive impact on economic growth and welfare, by stimulation new consumption, by raising productivity, and by catalyzing individual innovation and entrepreneurship". Similarly, Botsman and Rogers (2010) consider CC to be a cultural and economic force that is transforming business, consumerism, and the way we live.

To conclude we assume that the new phenomenon of collaborative consumption represents a significant shift in market exchanges modes and will further lead to disruptive marketing practices on nowadays digital market. Taking into account coinciding opinions of different authors the Aggregate Marketing System (AMS) appears to be the right approach for the analysis of new market exchange modes of collaborative consumption.

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The relationship between R&D expenditures and productivity in studies on industry and/or firm level - review

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Abstract: In this article we summarized the newest approaches used in the literature about the relationship between R&D expenditures and productivity. Our attention is oriented on studies concentrating on this relationship on sectorial levels and/or firm level. We monitor the methods and models used by the authors to describe this relationship and compare the independent and dependent variables used in these models. In most of the studies the positive relationship between investment in R&D and increased productivity has been proven.

Keywords: research and development, productivity, production function, panel data.

1 Introduction

The reseaecrh and development on the business level is one of the key factors that leads to successful innovation of products and processes and new knowledge. Thanks to the work done in the departments oriented on research and development activities companies can bring to the market new products or introduce new processes that lead to higher productivity and higher revenues.

The investment in research and development is different from other forms of investment since in this field even high investment do not necesserily lead to high profits. The obstacles of this transformation are connected also with creativity at different stages of the process – in changing the investment into new ideas, in transforming the new ideas into new products or processes and also the creativity in bringing these new products and processes to the market and to the end consumers and in persuading them to buy the products. Only then can the initial investment into research and development transfer into higher productivity or higher profits.

2 R&D and productivity

In this article we make an overview of the models and methods that were published about the relationship between research and development and productivity in the last few years. We specially concentrate on articles and studies about the influence of R&D expenditures on productivity on the microeconomic level – the level of companies and industrial sectors. Some of the articles also compare this relationship in various sectors, some of them compare companies in the same sector.

We focus on methods the authors use in order to track down the influence of R&D om productivity and also on models that help them to describe the relationship. We looked for the used explanatory variables, proxies and dummies. The outcome should serve as a base for our continuing work on building a model, stating the variables for the model and proving the existence of a positive relationship between research and development investment and increase of labor productivity on firms and sectoral level.

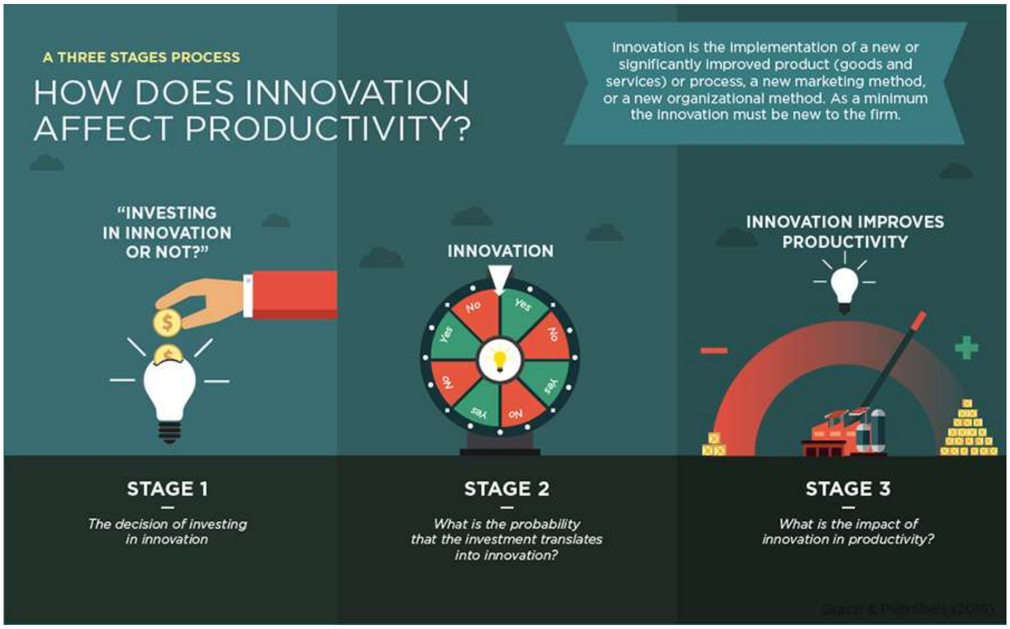

Fig. 1 http://www.firmsinlatinamerica.com/en/

3 Relationship between R&D and productivity on firms' and sectoral level

In our review we concentrated on more than 30 recent studies (2012-2016) from this field and two seminal works with an older date of publication. From these studies most of them concentrate on firms within the same industry, many of them compare same industries from different countries and few others do several models within one article – one within an industry, one between industries. The most interesting industry seems to be the manufacturing industry, followed by pharma industry and services. Some studies make a different division according to technological difficulty of various industries = and divide companies or sectors in high tech, medium tech and low tech industries (Ortega, Argiles, 2010; Blanco et all, 2016, Lu et al, 2010). In coupla of articles the authors compare various industries on the european or OECD level (Ortega, Argiles, 2010; Liik, Masso, 2014). One article was dedicated to agriculture (Alston, 2010).

Our attention was first oriented at the models used in chosen studies. It can be said that only few types of models were used even though in more variations. To the most used models belong Crepon Duguet Mairesse model (CDM), CDM model is names after its authors who were the first to include in a model on the firms' level the relationship between R&D, innovation and productivity. They divided the relationship in three stages and built a function for each of them. First stage encomprises the decision wheter to invest in innovation. This is followed by the second stage where the authors built an innovation function to connect the innovation expenditures with their outcome – innovated product or process Through the Cobb Douglas production function in the third stage is the innovation connected with labor productivity. (Crepon, Duguet, Mairesse, 1998).

The second most used method is Data Envelopment Analyies (DEA). DEA is quite a new way to evaluate the performance of so called Decision making Units. (Cooper, et al, 2011) Also panel data analysis is frequently employed. In one article Bustos model (Dilling-Hansen, Smith, 2014) –a model that divides firms into three groups according to their heterogeneity with regard to export and R&D investment (Bustos, 2011), was used and in one SFA model – similar to the panel data (Liik, Masso, 2014).

As the base the articles used various production functions, some of them divided in several stages. In most of the models we see Cobb-Douglas production function

$$Q(L,K) = AL^{\beta}K^{\alpha}, \tag{1}$$

Q – quantity of product

L – quantity of labor

K – quantity of capital

A – positive constant

α, β – coefficients

or augmented production function

$$ln(VA/E) = \alpha + \beta \ln\left(\frac{K}{E}\right) + \gamma \ln\left(\frac{C}{E}\right) + \lambda \ln(E) + \varepsilon, \tag{2}$$

VA – value added

E – employement

VA/E – value added over total employement

K/E – R&D stock per employee

C/E – physical capital expenditures per employee (Ortega, Argiles, 2010).

Next area of interest comprises the dependent variable – we concentrate on the proxies the models use for productivity. The labor productivity is the obviously prevailing dependent variable (Ortega-Argiles, 2010, 2014; Srithanpong, 2014; Heshmati, 2011; .Kumbhakar, 2012; De Fuentes, 2015, Belitz et al, 2011; Chevalier, 2012;…). Labor productivity is very import measure because it serves as a measure of economic growth in a country. It can be calculated in two ways – as the amount of goods and services produced by one hour of labor – labor productivity per hour worked – or as labor productivity per worker. In our models manly the logged value added per employee or per hour ratio was used.

In other models the total factor productivity was used. (Aw, 2010; Sharma, 2011; Sharma, 2014; Tello, 2015; Blanco et all, 2016; Kleis et al, 2014). The total factor productivity (TFP) measures the increase in total output of an economy, industry or firm that cannot be explained by the influences of factorsas capital and labor. It stands for the more efficiency and often is considered as the most important factor that for the economic growth. Singh (Singh, 2016) used both proxies for productivity – labor productivity as well as total factor productivity.

The range of independent variables is much bigger. The most interesting for us – the variable for research and development – stands in the models as own R&D stock or R&D stock per employee, R&D expenditures, total number of R&D researchers, knowledge capital per employee, investment or R&D intensity, previous patent application, the plants'own R&D, R&D investment, ICT expenditures.

Some studies go deeper and divide the R&D variable further – either differentiate the effects of local and foreign R&D (Zamborsky, Jacobs, 2016), or compare three innovation outputs – patent application, product and process innovation and sales of new products and their individual relationship with productivity (Barge-Gil, et al, 2015). In two articles instrumental variables were used – one was capital stock per employee and in the other one other firms' R&D and R&D in the parents'firm other plants (Kumbhakar, 2012; Bogliacino et al, 2012) .

Dummies help to build the models – dummy or indicator variable is used in statistical regression and takes the values of zero or one – for categorical variables. In the studies that we have observed prevails the export dummy – used in order to distinguish between companies that do export and do not (Manez, et al 2015). To the other dummies counts size, import, foreign ownership public financing, foreign firms dummy, industry dummies (technological intensity).

To complete the models and concentrate on the influence of explanatory variables, some control variables were added in the models. Most often seen is the total employement variable (Ortega, et al, 2011, Ortega, et al, 2012, Ortega, et al, 2010). . R&D spillovers, size, debt ratio, capital labor ratio and capital stock also belong to the control variables found in the models (Bednarek, 2014; Barge-Gil, Lopez, 2015; Feinberg, Majundar, 2001; Sharma, 2014).

Other important feuture of the studied models is how they copy with the endogeneity problem. Endogeneity arises in statistical models when a correlation between explanotory variable and error exists. It can be caused by an omitted variable or by simultaneity.In most of our observed models this problem is solved through usage of lagged values, mostly by one year or one period (Ortega et al, 2011; Bogliacino, 2012; Sharma, 2014; Zamborsky, 2016; Aw, 2010). The other observed solution to endogeneity problem was to use predicted values from the innovation function (Srithanpong, 2014; Heshmati, 2011; Alvarez et al, 2015).

Last monitored characteristic is conncted with the results of the studies. Most of the studies have proven the positive influence of R&D on the productivity on both firm and sectoral level. Only one study showed mixed results (Sharma, 2014). The others proved the positive impact according to their range of study – either on firm or on sectoral level or on both of them. Corporate R&D investment has a main role in achieving production growth, the intensity of innovation has a strong impact on firms productivity through innovation output.

More deeply, innovation has a stronger impact on productivity in manufacturing then in services and at the same time cooperation in the area of R&D is more important in the services than in manufacturing (Alvarez et al, 2015). The same staudy also showed that the size of a company is important by turning the investment in R&D into higher productivity. In the US the knowledge spillovers between individual states are important for higher productivity (Blanco et al, 2016),

The importance of corporate R&D investment has been also recognised as aa essential engine for productivity growth both at the macro and microeconomic level both in Europe and in USA, even though R&D expenditures have more impact on productivity in USA then in Europe (Ortega-Argiles, 2014; Castellani et al, 2016).The positive relationship between R&D and productivity across the European industrial and service sectors was proven also by the study from Ortega-Argiles (Ortega-Argiles et al, 2010). and plants'own R&D together with parents'firm R&D help to increase firms productivity.Similar results have brought the studies oriented also on multinational enterprises where the studies show that R&D investment by local firms is positively associated with the productivity of affiliates of foreign firms (Zamborsky, 2016; Doraszelski, 2013) and the firms' own R&D in connection with parents' firm R&D also help to increase the whole firm's productivity (Bogliacino, 2012; Lehto, 2011).

4 Discussion

This review article is aimed at finding the best possible or proven variables and dummies to create a model that should describe the relationship between research and development and productivity at the firm and sector level. The purpose of writing this article is to construct a reviewof recent literature and to monitor the recently used models,methods and data. With regard to this goal we continue our work in this field and focus on constructing a separate model for firm level and aseparate model for industry level.

We will examine given data from various international well established sources the relationship between productivity and R&D expenditures. The contribution would be in the area of new approaches and newest available data. Special attention will be given to the slovak data on the firms' level. With regard to this review we will include several ecplaanatory variables. To deal with endogeneity we wil lag the explanatory variables. The partial goal will be to find the appropriate lag in this relationship.

5 Conclusions

The goal of the article was to summarize the newest development in the area of inspecting the influence of investment in research and development on labor productivity or total factor productivity. This relationship has been observed on the firm and/or industry level in various separate countries or within a several-countries-comparison (USA-Europe, various OECD countries or various european countries). As such it serves the author as a preliminary article on the way of finding the best approach to this subject to construct a model to describe the relationship betweem research and development and productivity. From this point futher research will be oriented on this relationship with labor productivity as a proxy to productivity, research ande development investment and innovations as proxies to R&D.

To summarize we can say that in majority of the monitored studies the positive impact of expenditures on research and development on productivity was found and proved. Most of the researchers used labor productivity as a proxy for productivity, only few used total factor productivity instead. The range of explanatory variables was bigger, but besides the R&D proxy, export, sales, patents and geographical priximity were almost in all monitored studies. As for the R&D variable the R&D expenditures, R&D as a percentage of GDP, patents filled or accepted served as proxies. In majority of the studies the Cobb Douglas function in different variations serves as the tool to state the relationship.The range of the monitored studies helped us to find the patterns used I this field and also to find a way to move the research further.

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Knowledge Management as an Education Tool

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Abstract: The connection between Knowledge Management and education sounds natural because education is a knowledge-gaining process. At the same time, Knowledge Management addresses training and development of working adults whilst Education primarily speaks about pupils and students. The questions appear: *Can Knowledge Management contribute to more traditional forms of teaching and learning? If so, how?*

In our contribution, we open these questions. They will be discussed in our seminar hoping that they will ignite similar questions in minds of other educators and researchers and enrich their educational styles.

Keywords: Knowledge transfer; tacit knowledge disclosure, Knowledge Management applications.

1 Introduction

The organizers of the International Workshop on Knowledge Management are enthusiastic about interactive scientific activities. That's why they opened space for two pre-conference seminars. This paper is an introduction to one of them named *Knowledge Management as an Education Tool*. Its main aim is to analyze whether Knowledge Management concepts and procedures and to disclose their potential for more traditional education.

The connection between Knowledge Management and education sounds natural and possibly a bit uninteresting because education is a knowledge-gaining process. Wikipedia states that „*Education is the process of facilitating learning, or the acquisition of knowledge, skills, values, beliefs, and habits*." [1]. If one replaces the word "education" by "knowledge management", obtains another accurate statement.

Still, the concepts are similar but not identical. Learning this, one may ask him/herself why Wikipedia almost exclusively speaks about formal education running from preschools to universities. Probably, it does not touch lifelong learning as it is rarely organized by the above traditional institutions. It is predominantly accomplished by various specialized bodies like consulting firms or training departments of companies and uses specific approaches as coaching, mentoring, and staff development. For them, Knowledge Management represents their umbrella presuming that it addresses training and professional development of working adults [2]. In addition, Knowledge Management also maps the total knowledge of employees within companies, uses the findings for better organization of work and training and retraining necessary for more effective and efficient production. In this sense, Knowledge Management also targets the cooperation within the group and enhances its presumptions.

As a result, we witness two concepts for two different stages of life: "classroom education" for its first part and "knowledge-management strategies" for its second one. Questions appear: *Can Knowledge Management contribute to other - more traditional – forms of teaching and learning (i.e. "education" in its "Wikipedia" sense)? If so, how?*

The above formulation is done by the fact that Knowledge Management is much younger. Education is its "older brother" with thousands years of experience and its contribution to Knowledge Management is rather obvious. In our seminar, we therefore open the tasks: *Can the "younger brother" influence the older one? If so, when and how?* They will be discussed hoping that they will ignite related questions in minds of other educators and researchers and – hopefully – will represent a mirror to their educational practice and/or stimulate their future teaching strategies.

In Chapter 2, we will underline the importance of tacit knowledge. It is often neglected by our educational system which is concentrated on incorporating and demonstrating the presence of accurate facts within the given fields i.e. on explicit knowledge. Our aim is to point educators' attention to the appreciation of tacit knowledge and considering as an equivalent to the tacit one.

To explain ways of reaching this goal, the SECI model will be interpreted as a method of knowledge acquisition in Chapter 3. The model suggests to develop new knowledge in a systematic, spiral way by expanding the present one. Only after they coagulate, the recently arrived piece becomes an integral part of its recipient's intellectual weaponry. In Chapter 4, we discuss how to facilitate this process.

To some readers, our text may look "unfinished". Their feeling is correct. In Conclusions we explain the reasons. Basically, our paper is meant as an introduction to a long-term discussion. This paper contains just rudimentary ideas that need a further development. Not only during our seminar in collaboration with our audience but also by additional researchers in the future.

2 Tacit knowledge, its role and importance

In accordance to Knowledge Management, knowledge is present in two forms [3]: *explicit* (well-structured and unambiguously expressed) and *tacit* (vague, informal, and based on experience or beliefs).

Explicit knowledge covers familiar facts that can be stored on paper, recorded using media or other appropriate means. Mathematical and chemical formulas, optimization and validation methods, recipes and operational instructions – all are examples of explicit knowledge. Often, people acknowledge their full collection as our total knowledge. It is incorrect conclusion. Elements of explicit knowledge can be transformed into computer programs – abstract machines capable of getting data from their environment, remembering and processing them and producing results. The most advanced forms mimic human reasoning. At the same time, even the most advanced computer programs are incapable to mimic the level of complexity the human brain. This demonstrates limits of explicit knowledge and shows that "there must be something more".

These "additional elements" constitute tacit knowledge. It is stored in our brains only and we can register it when it is applied. It for example allows us to recognize whether a certain piece of explicit knowledge can be applied. Consider for example two similar problems:

- *Weight of a horse equals 450 kg. What is weight of 10 horses?*
- *Speed of a running horse equals 20 km/hour. What is speed of 10 horses?*
- *Color of a horse is white. What is color of 10 horses?*

From an explicit point of view, all problems follow the same scheme:

- *The value of a horse's attribute equals X. What is the value of the same attribute for 10 horses?*

A purely mechanical approach to its solution would result into the multiplication, i.e. to 10 X. At the same time, our life experience suggest applying it only in the to the horses' weight but not the other attributes. There is a difference between the two – one can state the horses' speed but not the color. So, each of three problems belong to a distinct category and must be resolved using a different approach.

Notice that:

- Hardly anyone taught us the difference between those two problems. We learned it through our experience.
- We can generalize the same rule to any number of horses – their weight can be multiplied but their speed not.
- Moreover, the same rule applies to any other animals. Their weight can be multiplied but their motion speed cannot – regardless whether the beings swim, fly or run.

Another example is the interpretation of statistical data. One can easily see it on the results of elections. Different political parties read the same data in different ways – the most of them will interpret them as their victory and hardly any will admit its failure. Similarly, people interpret other data depending on their experience, familiarity with the controlled environment, emotions, political views, etc. Even if some guidelines on interpreting statistical data can be proposed, there is no universal method. The result depends substantially on the interpreter.

Occasionally, the person might not even be aware of possessing a piece of tacit knowledge. Then, his/her conclusion may seem random and its outcome being a good luck. The legends of Isaac Newton and his falling apple and of Archimedes "Eureka" sound like these researchers had made random discoveries of their laws of Physics. At the same time, these discoveries (and many others by other scientists) would not happen if their authors would not collect huge amounts of explicit knowledge and research experience prior to them and were not deeply interested in the subject.

Tacit knowledge is therefore born as a result of training, too. Nevertheless, the training only builds its prerequisites for it but does not guarantee its future presence. Still, without the prerequisites the new knowledge will not originate.

To understand better the concepts, let us discuss the following questions. They are intentionally formulated in a general way to allow they different interpretation which hopefully will clarify the multifaceted character of both. For example, explicit knowledge have not only the form of facts (numbers, dates, values, memorized texts, etc.) but also of standard routines and procedures (a route from home to work, completion of shopping, car driving, …).

Give examples of exploitation of tacit knowledge in processing explicit knowledge. Explain the particular components.

Multiple-choice test problems seem to be a typical example of testing explicit knowledge. Can you identify some tacit-knowledge components in them, too? (Consider both their creation and completion.)

What components of our cognitive activity can be specified as tacit knowledge?

Can computer programs (e.g. in the field of Artificial Intelligence) build and develop their own tacit knowledge? Why yes or why not?

How to facilitate and develop tacit knowledge?

3 Explicit and Tacit Knowledge Intertwined

As one can conclude, explicit and tacit knowledge are inseparable:

- Isolated pieces of explicit knowledge have no real value. If their owner is not familiar with ways of their application, the pieces sit in his/her brain as a curiosity without any practical use.
- Isolated pieces of tacit knowledge can hardly exist. Each piece is a key to using certain element(s) of explicit knowledge. Thus, its existence without a chance for its application during a problem solving is senseless. Notice that such a possibility is primarily hypothetical. When its owner gets it, he/she is often unable to predict whether he/she will ever use it or not. Its acquisition is tied to a problem relating to a particular situation, its explicit data and the aim to be achieved – and we can only believe that we will meet with a similar problem in the future. At the same time, the students are more motivated by these pieces of tacit knowledge which promise higher utility to them.

High-quality education must therefore look for a balance between tacit and explicit knowledge. First, there is no reason to teach such pieces of explicit knowledge that are not presented within their tacit context. Naturally, we are not capable of predicting all contexts in which them can appear in the future but we have to concentrate on those most frequent i.e. to those the learner will meet with a high probability. In the rest of cases we have to hope in the knowledge transfer.

The SECI model [2] describes how explicit and tacit knowledge develop.

	TACIT KNOWLEDGE	EXPLICIT KNOWLEDGE
TACIT KNOWLEDGE	**Socialization**	**Externalization**
EXPLICIT KNOWLEDGE	**Internalization**	**Combination**

Fig. 1 The SECI Model

Socialization is the most traditional form of learning and is present in any human community. Owners of tacit knowledge interact with their partners – bearers of (possibly different) tacit knowledge. Socialization can be performed by interpersonal communication and be (and often is) quite informal. Its aim is to transfer knowledge by exchange of opinions, to analyze partners' values, positions and opinions in order to unify them based on a mutually agreeable platform, and similar. Another form of Socialization are intrapersonal insights – an individual questions and verifies his/her opinion on a topic in order to make it solid and consistent. In both cases, there is a risk of confusion and misunderstanding caused by various barriers as differences in language, culture, values, etc.

During *Externalization* people express their internal understanding of objects and methods in a commonly accepted way using various forms of formal notation or recording. Thus, their tacit knowledge (originally stored in their mind) gets an explicit form. Its representations (numbers, texts, graphs, formulas, etc.) create a basis for the wider distribution. The explicit knowledge is recorder using a standard format – only the recipients familiar with it can understand the message. (Mathematical formulas and music notation are examples of such notations.) At the same time, the message produced by Externalization, simplifies the "dialogue" between the author and consumer. A well-encoded piece of knowledge is much less ambiguous and its comprehension does not require the partners being present on the same geographic location in the same moment. Additionally, even machines can be its recipients e.g. when the idea is recorded in a programming language.

The pieces of knowledge expressed in their formal notation can be processed by their receivers. This process is known as *Combination* and may lead to new pieces of knowledge. For example, manipulations with mathematical formulas lead to new (possibly unknown) formulas. The laws of Aristotelian logic offers many typical rules of combination. For example: *If A implies B and B implies C, then A also implies C*. Computers and robots are also capable of executing similar combination rules when they are incorporated in their controlling programs. On the other hand, there are countless rules describing correct logical combinations. The right choice of the most appropriate rule requires tacit knowledge. For that reason, machine-performed combinations represent a minor part of real-life combination activities. People, especially field experts, still perform intellectual activities much more efficiently than computers. Their advantage is their ability to set up the goal of their activity in accordance to its purpose. For example, the same table of student test grades can be expressed (a) using the alphabetic order of surnames and (b) in the order of achieved grades. The first format is appropriate for learning of the grade of a particular student, the second one for identifying the best students. On the other hand, any computer will execute the sorting faster than a human. That's why people frequently adopt ICT (in this particular case, likely Excel) to accomplish their Combination-type tasks.

Newly acquired pieces of knowledge – results of Combination – must be adopted by their inventors. They have to interpret the outcomes and to comprehend them, especially whether or not they bring a new quality to their lives. The process is known as *Internalization.* Every new piece of knowledge becomes ready for its future application only when it has been converted into an integral part of our (individual or social) knowledge. Internalization is not always simple and straightforward, especially when the new piece of knowledge is counter-intuitive or contradicts to our former experience. Copernicus' heliocentric system is a popular example of a discovery which caused a social controversy. Its acceptance by society took dozens of years.

The knowledge-acquiring processes runs:

- *Inside each of the four quadrants:* During Socialization, we learn for example by communicating our thoughts and experiences with our partners. We try to reflect their style of thinking, study their mentality and effects of emotions on them, critically analyze their statements etc. During Externalization we learn to visualize our ideas and demonstrate them in a legible manner. We study which approaches work and which not; we remember the more effective ones in order to apply them later. During Combination we learn to control our moves to get fair results and search for more efficient combination methods. Especially, we concentrate on those applicable in our profession because they help us to increase quality and quantity of our outcomes. During Internalization we adjust the new piece of knowledge into our already existing knowledge system and start comprehending its role in it. We identify its advantages compared to the previously learned pieces of knowledge – and sometimes we even intentionally unlearn them.
- *In the clockwise order indicated by the initial letters S-E-C-I:* shows that learning runs in cycles. The ideas are born in our minds (S). Then we attempt to express them in a more concise way (E). This preliminary outcome is then elaborated using appropriate (combination) methods in order to get a desired outcome, to test its validity, practicability, acceptability and usefulness (C). Finally, we "shape" the new piece to a contour changing it into a part of our internal knowledge weaponry (I).

- *Eternally:* Every newly gained piece of knowledge is presented to the community and discussed. Its "socialization" begins and may lead to new ideas. As a result, the knowledge processing acquires the form S-E-C-I-S-E-C-I-S-…

The SECI model shows a life-cycle of knowledge with its multiple reincarnations. Due to its eternal development and improvement, our knowledge turns out to be deeper, wider and abundant with the time. The model also demonstrates the evolutionary character of our knowledge which constantly switches between explicit and tacit ones.

Discussion questions:

Presume you are an employee of a catering company. A customer comes and asks you for organizing a birthday party. Explain how Socialization, Externalization, Combination and Internalization run during this process.

Presume that you are writing a research paper. Explain how Socialization, Externalization, Combination and Internalization run during this process.

Find a practical application of the law: If A implies B and B implies C, then A also implies C.

Find a practical application of the law: If A holds and A implies B, then also B holds.

Give an example of a necessity of unlearning an older piece of knowledge after learning a new one.

4 Balancing Explicit and Tacit Knowledge in Education

We have demonstrated the importance of both forms of knowledge. Now a question appears: *How to incorporate them into education?*

First, traditional education certainly leads to both forms of knowledge – otherwise the learners would not learn anything useful for their professional and personal life. On the other hand, the Slovak schools and universities concentrate on pieces of explicit knowledge with memorizing as one of its principal methods of learning. Their meaning and applicability (i.e. tacit portion of knowledge) is enhanced much less. The learners then do not understand reasons for remember their gained pieces of knowledge because only their related pieces of tacit knowledge assign meanings to them. As cognitive neuroscience confirms [4], non-anchored pieces of knowledge become unstable and are quickly forgotten. Even if they are remembered, their owner has insufficient ideas of their usage. It making their presence obsolete. The unwanted effect of such situation is the learner's feeling of uselessness of his/her learning resulting into a growing negative attitude to education as a whole.

It implies the necessity to incorporate tacit-knowledge-oriented learning into our classrooms. So the question does not sound *whether* to do it but *how* to do it. There are options to be discussed:

- *Shrinking the amount of explicit knowledge*: The Internet is full of pieces of explicit knowledge which are available free of charge. Wikipedia [5] is not the only example; Google Scholar [6] and LinkedIn [7] are the others. There are numbers of less popular but highly relevant knowledge sources in the Internet, too. One of our learning objectives should be to help to our students to recognize them from the others, less reliable. In general, to find *a* source on the Internet is easy. However, *how to identify whether the source is relevant and trustworthy?* Unless the learners get a certain amount of tacit knowledge addressing this issue, they will face to a blind choice with a high risk of getting lost. As the time devoted to education is limited, the time used for explicit knowledge would be reduced. The saved time has to be dedicated to facilitation of tacit knowledge. The explicit knowledge does not have to be excluded – its pieces must always be accompanied by elements of tacit knowledge. The attention should be paid to those supporting creation of internal neural links. Then, we may hope that the learners will be capable of generalizing their partial cases to general rules.

- *Expanding the amount of individual knowledge*: Finding a relevant and trustworthy piece of knowledge does not suffice. The piece must be internalized and become a part of learner's tacit knowledge. The pedagogy must study *how to internalize pieces of knowledge and to make them part of our intellectual weaponry.*
- *Consolidation of the method*: If an appropriate method is disclosed, it should be externalized in order to allow its distribution and critical analysis. Such analysis would likely lead to its evolution i.e. to the application of Combination to its „first draft" aiming to its variations allowing specific individual approaches. *Can such an internalization method be transformed to a generally accepted methodology?*
- *Incorporating the method as a general tool*: When a methodology is found, it can be applied into education. The educators can be trained and used as its disseminators. Its wide incorporation into education will from one side serve as a verification methods of its relevance, from the other side it will also find its appropriate position into the epistemology. Thus, our final question is: *How to make such a process feasible?* Only then one can expect its general acceptance and dissemination.

5 Conclusions

Briefly speaking, the contribution of Knowledge Management can be done by reducing the extent of explicit knowledge and expanding time devoted to identification of relevant and valuable tacit knowledge. The four key questions have been identified:

- *To identify relevant and trustworthy information sources,*
- *To internalize pieces of knowledge without an external support (done for example by a teacher) and to make them part of our intellectual weaponry,*
- *To transform such an internalization method to a generally accepted methodology,*
- *To make such a process feasible.*

The complete solution goes far beyond the capacity of this seminar and – as the author is afraid – in its entirety does not exist. On the other hand, there is an indication done by the four initials in the previous section: S-E-C-I. We have to start with *informal discussions*. This seminar is planned to be one of them. Only then we can *propose some formalized approach* and elaborate it. It means that we have to play with them in order to *verify their effectiveness and usefulness*. Finally, the outcomes of the process must be implemented to *prove their applicability* as a general knowledge-enhancement method.

Thus, the aim of our seminar is not revolutionary but could move education a bit farther from its traditional and conservative style.

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Evaluation of Seminar 2 "Knowledge Management as an Education Tool"

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Abstract: This contribution presents the run of Seminar 2 and its following evaluation by a specific cohort of its participants – the students of a master program at Vysoká škola manažmentu. The results indicate that Knowledge Management awareness and its value for education is worth of further study.

Keywords: Knowledge Management, Education, Study program development.

1 Introduction

The seminar on *Knowledge Management as an Education Tool* was a part of IWKM pre-conference activities. As the Knowledge Management study program was dismissed by the Accreditation Commission due to formal reasons (one of its guarantors exceeded 70 years), one of its aims was to introduce the VŠM students to its basic concepts. At the same time, the seminar served as an introduction to Knowledge Management to participants not familiar with its theoretical basics. The seminar has a format of an interactive lecture – short talks of the authors were combined with their questions to the participants and their reactions.

The seminar introductory talk can be found in this proceedings [1], its slides prepared by both authors, too [2]. The first part addresses the models of knowledge and its acquisition, the second one introduces communities of practice as a method of acquisition outside school and university environment. The aim of the second part was to point the participants' attention to the fact that learning can have a form of knowledge sharing and is not limited to formal education.

A week after the seminar, a short questionnaire was distributed among the students. Its results are presented in Section 2. Due to a small number of returned sheets, their results have practically no statistical validity. Still, they represent an interesting information about the seminar influence on their appreciation of Knowledge Management and can serve as a form of qualitative research to be supported by a wider survey in the future. Our considerations about its orientation are presented in Conclusions.

2 Questionnaire and Its Results

2.1 Understanding the Concept of Tacit and Explicit Knowledge

The questionnaire contained ten questions corresponding to the sections of the seminar. In the first one, the participants' ability to distinguish explicit and tacit knowledge was tested by using fours questions. The respondents were asked to underline the correct version of their text. Below, the reader can see the questions with their correct marking.

- *Driving a car / Knowing the distance* between Bratislava and Prague is an example of using tacit knowledge.
- *Tying shoelaces / knowing the weight of an elephant* is en example of explicit knowledge.
- We can easily google *explicit / tacit* knowledge.
- *Tacit / explicit knowledge* can only be acquired through experience and practical application.

In all cases, 9 out of 10 answers were correct. It indicates that the difference between tacit and explicit knowledge does not represent a problem. To understand the relationship between school education, practical experience and their affect on a person's knowledge was not so clear. Only 7 out 10 answers correctly responded to the following question:

- What is especially valued in expert knowledge is their *explicit / tacit* knowledge.

Possibly, the respondents wrongly presumed that the only possible way of getting tacit knowledge is through practical activities. It was quite observable to their responses to the question

- At schools we gain *explicit / tacit / both types of* knowledge.

Only 4 responses correctly addressed both types of knowledge; 6 remaining answers pointed to explicit knowledge. Their wrong feeling could be explained by the fact that Slovak schools cancentrate on memorizing – which is a sort of education primarily targeting explicit knowledge. At the same time, the full comprehension would require a longer discussion that was probably not delivered during the limited time of the seminar. This contradicts to the correct conclusion that *Tacit knowledge can only be acquired through experience and practical application*. It seems that they do not view their school activity as a *right* experience and practical application but the issue deserves a longer study.

2.2 Communities of Practice

Four questions addressed communities of practice, their importance and ways of communication. The authors intention was to stress the importance of mutual knowledge sharing and the importance of involvement of each member of community. All respondents properly answered the question:

- A member of the community of practice *is supposed to / does not need to* contribute to the knowledge base of the community.

At the same time, they likely missed some of the key ideas behind it. The previous text requires active participation of the member of community on its knowledge sharing.

- Sharing a common interest *is / is not* enough to create a community of practice.
- Social media may create a false feeling of a community of practice due to the *ease of sharing a common interest / communication / common practice*.

In fact, the previous two questions are just variation of one. As both were correctly answered just 5 out of 10 respondents, one can conclude that their level of understanding is shallow.

At the same time, a certain optimism can be based on all correct answers to the question:

- A community of practice *may / may not* be created also in the classroom environment.

Again, one can presume that a longer time period spent during seminar plus creation of a sample community of practice by students themselves would probably lead to full understanding of the idea.

3 Conclusions

The outcomes of the questionnaire indicate that Knowledge Management concepts and practices can partially be understood on an intuitive level, but their full appreciation requires more than general information. They must be trained – not necessarily in special courses. Likely the most appropriate way is to apply its practices in various courses, so they become a natural part of the future managers' intellectual weaponry.

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Big Data – a New Challenge for Data Manipulation and Analysis

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Abstract: This paper introduces the field of big data as a new concept related to data manipulation and analysis and reviews its main problems and challenges.

Keywords: big data, distributed computation, data mining, machine learning.

1 Introduction

It can be seen that the extent of data collected by various applications and systems doubles every three years. But not only the amount of data changes, also the types of collected data rapidly changes. While in the past most data collected was in the tabular (relational) form, now-days we can encounter data in the form of time series, data streams, text, images or videos. The source of such data can be various sensors, surveillance systems, mobile phones, GPS devices, RFID readers, social networks, computer networks, web logs, scientific data etc. This fact is behind a new concept that suddenly emerged in the data base and data analysis community, the concept of Big Data.

2 What is Big Data

According to Gartner, Big Data is high volume, high velocity, and/or high variety information assets that require new forms of processing to enable enhanced decision making, insight discovery and process optimization [1]. Big Data can be characterized by 4 V's - Volume, Velocity, Variety and Veracity:

- Volume: the size of Big Data goes beyond standard data storage and manipulation techniques,
- Velocity: Big Data is often available in real time,
- Variety: Big Data contains not only structured data (e.g. in tabular or relational form) but also texts, images, audio or video,
- Veracity: the quality and reliability of Big Data can vary.

What is Big Data may change over time, but generally speaking, Big Data are data that cannot be handled using standard data base systems and standard data analysis tools. Cf. the Mckinsey's report [9], where Big Data is defined as "datasets whose size is beyond the ability of typical database software tools to capture, store, manage, and analyze." Big Data thus differs from very large databases (VLDB) where only the size of data was the problem.

3 Challenges for collecting, storing and manipulating Big Data

Traditional data management and analysis systems, mainly based on relational database management system (RDBMS), are inadequate in handling data that are characterized by 4 V's. RDBMS can efficiently handle structured data but offer little support for semi-structured or unstructured data. The scalability of RDBMS relies on expensive hardware and cannot be always guarantied.

The solution for the first problem can be NoSQL databases. NoSQL databases provide means for storing and retrieving data that cannot be expressed using tabular relations of relational databases. Beside this, these databases can be fast and highly scalable. The second problem can be handled (on the level of data storage) by the file systems or (on the level of data manipulation) by parallel computing, distributed computing, grid computing or cloud computing. Google designed and implemented Google File System (GFS) as a scalable distributed file system [6] for large distributed data intensive applications. GFS is designed to provide efficient, reliable access to data using large clusters of commodity hardware. The terms parallel computing, distributed computing, grid computing and cloud computing all refer to a processing where the computation is spread over more (or many) computing units. The computing units can be located within single computer ("classical" parallel computing), the units (computers in this case) can be interconnected within a network (distributed and grid computing) or can be put together on-demand via Internet (cloud computing).

Beside these particular approaches to Big Data, some complex solutions how to handle Big Data have been proposed as well. Let us introduce Apache Hadoop as such an example.

3.1 Apache Hadoop

Apache Hadoop is an open-source software framework that supports massive data storage and processing. Instead of relying on expensive, proprietary hardware to store and process data, Hadoop enables distributed processing of large amounts of data on large clusters of commodity servers. Hadoop has many advantages, and the following features make Hadoop particularly suitable for big data management and analysis. The core of Apache Hadoop consists of a storage part, known as Hadoop Distributed File System (HDFS), and a processing part called MapReduce. Hadoop splits files into large blocks and distributes them across nodes in a cluster. Hadoop can be deployed in a traditional onsite datacenter as well as in the cloud. Hadoop [11] thus integrates data storage, data processing, system management, and other modules to form a powerful system-level solution to handle Big Data.

4 Challenges for analyzing Big Data

The necessity to analyze huge amount of data that is collected on-line constitutes a paradigm shift for the field of data analysis (in particular for the areas of data mining and machine learning) since the idea of a standalone (desktop or workstation) analysis tool is abandoned in favor of process integrated, distributed and autonomous analysis systems. Instead of off-line learning in a batch setting, sequential learning, anytime learning, real-time learning, online learning etc. under real-time constraints from ubiquitous and distributed data is needed. Instead of learning from stationary distributions, concept drift is the rule rather than the exception. Instead of large stand-alone workstations, learning takes place inside small, unreliable devices. This paradigm shift is also expressed in new concepts for the whole knowledge discovery process, some examples are introduced bellow.

4.1 Ubiquitous Knowledge Discovery

Ubiquitous Knowledge Discovery can be defined as "Knowledge discovery process in mobile, distributed, dynamic environments, in presence of massive amounts of data". Knowledge discovery in ubiquitous environments is an emerging area of research at the intersection of the two major challenges of highly distributed and mobile systems and advanced knowledge discovery systems. Research areas as defined in the EU funded project KDUbiq (2005-2008 FP6 FET IST) are [5]:

- data mining in mobile systems, wireless communication networks, calm technologies,
- distributed architectures: distributed data mining, grid, P2P, autonomic computing,
- agents,
- learning components: statistical learning (incl. online learning), evolutionary computing,
- anytime algorithms data types: spatio-temporal, stream, multimedia,
- security and privacy: privacy preserving data mining, intrusion detection,
- HCI and cognitive modelling: user interfaces of ubiquitous discovery systems.

The idea of a standalone (desktop or workstation) analysis tool is abandoned in favor of process integrated, distributed and autonomous analysis systems of ubiquitous discovery systems.

4.2 Reality Mining

The term "reality mining" was coined by Nathan Eagle and Alex Pentland from Media Laboratory, Massachusetts Institute of Technology (MIT) about 10 years ago [4]. According to them, reality mining is the collection and analysis of machine-sensed environmental data pertaining to human social behavior, with the goal of identifying predictable patterns of behavior. Reality mining studies human interactions based on the usage of wireless devices such as mobile phones and GPS systems providing a more accurate picture of what people do, where they go, and with whom they communicate with rather than from more subjective sources such as a person's own account. Example applications of reality mining can be analysis of complex social systems, traffic monitoring and control, environmental monitoring or smart homes and ambient assisted living.

From the data mining point-of-view, reality mining deals with the most challenging data mining problems as defined in [12]. In particular, it tackles the issues of “scaling up for high dimensional data/high speed streams”, “mining sequence data and time series data”, and “data mining in a network setting”.

5 Conclusions

This paper tries to present an initial insight into the Big Data. Rather than an in-depth analysis of the field it just lists and briefly comments basic problems and basic notions of this interesting recently emerging area that is on the intersection of data storing and data analysis. Interested readers should refer to additional readings, some of them given in the list of literature.

Literature

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Big Data – a New Challenge for Data Manipulation and Analysis

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Seminar on Big Data, International Workshop on Knowledge Management,
VŠM, Bratislava, 20.10.2016

What is Big Data?

Big Data are data that cannot be handled using standard data base systems and standard data analysis tools.

Big Data sources: sensors, surveillance systems, mobile phones, GPS devices, RFID readers, social networks, computer networks, web logs, scientific data …

Big Data characteristics (3 V’s or 4 V’s)

- **Volume:** the size of Big Data goes beyond standard data storage and manipulation techniques
- **Velocity:** Big Data is often available in real time
- **Variety:** Big Data contains not only structured data (e.g. in tabular or relational form) but also texts, images, audio or video

- **Veracity:** the quality and reliability of Big Data can vary

The Big Data pipeline

- Data generation
- Data acquisition:
  - data collection,
  - data transmission,
  - data pre-processing (integration, celansing, rendundancy elimination)
- Data storage
- Data analysis

Challenges for collecting, storing and manipulating Big Data

New forms of data storage: file systems, NoSQL databases

New forms of computation: parallel computing, distributed computing, grid computing, cloud computing

batch processing X stream processing

Apache Hadoop

Software platform that supports data-intensive distributed applications

- Hadoop distributed file system
- Map/Reduce: divide and conquer approach to break-down intractable problem into tractable sub-problems

Challenges for analyzing Big Data

- New forms of data: heterogeneous data, unstructured data, stream data
- New properties of data: non-stationarity, concept drift
- New forms of learning: real-time learning, incremental learning, sequential learning
- New forms of computation: distributed computation, cloud computation

Areas related to Big Data Analysis

Analysis of Big Data grounded in Knowledge Discovery in Databases and Data Mining. However, new names appear used by different people:

- Ubiquitous Knowledge Discovery
- Reality Mining

Ubiquitous Knowledge Discovery

Knowledge discovery process in mobile, distributed, dynamic environments, in presence of massive amounts of data

A Blueprint for Ubiquitous Knowledge Discovery Systems

EU funded project KDUbiq (2005-2008 FP6 FET IST)

- data mining in mobile systems, wireless communication networks, calm technologies,
- distributed architectures: distributed data mining, grid, P2P, autonomic computing,
- agents,
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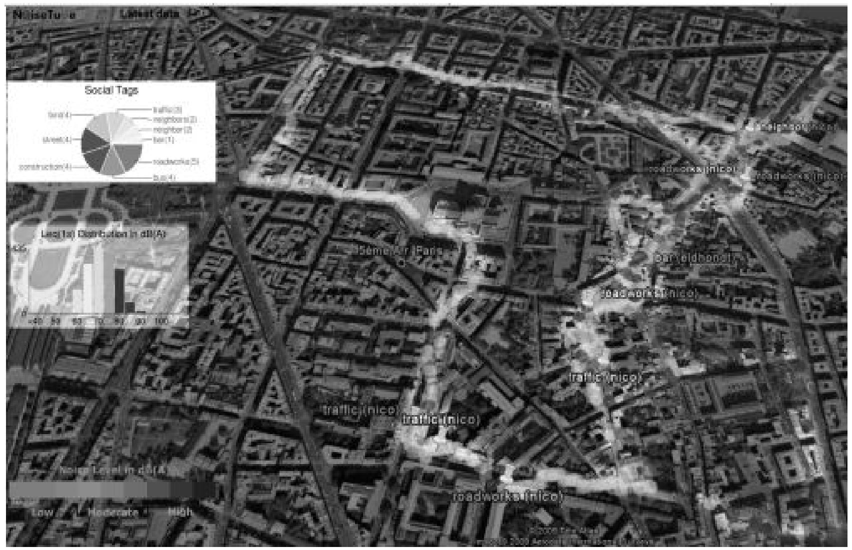
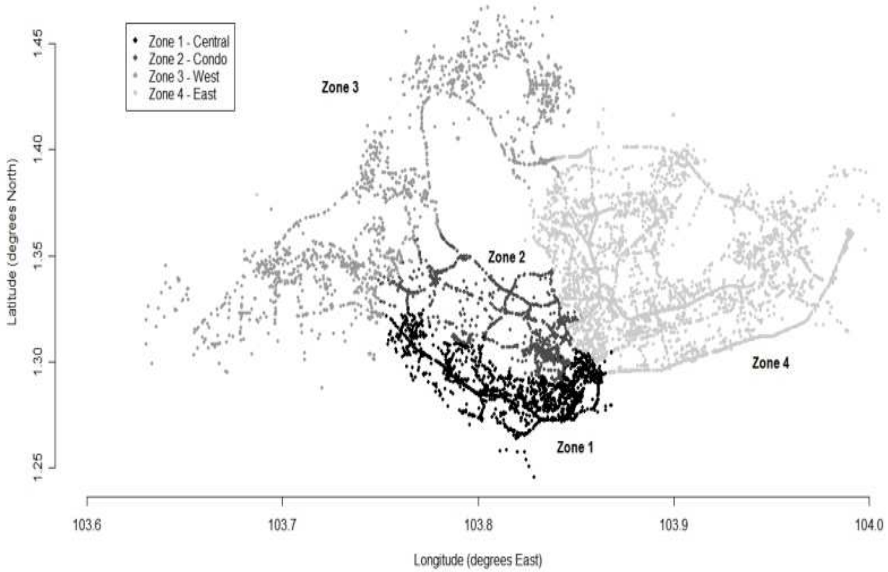
- anytime algorithms data types: spatio-temporal, stream, multimedia,
- security and privacy: privacy preserving data mining, intrusion detection,
- HCI and cognitive modelling: user interfaces of ubiquitous discovery systems.

Reality Mining

Collection and analysis of machine-sensed environmental data pertaining to human social behavior, with the goal of identifying predictable patterns of behavior. (Pentland 2004)



Collective noise map for part of Paris



Singapore - Taxi Observations by Location and Booking Frequency

Data Science

Set of fundamental principles that support and guide the principled extraction of information and knowledge from data.

Theoretical backgorund for data mining, big data analysis, data-driven decision making e.t.c

Thank You

BI and Big Data – praktické ukážky

Miroslav Koseček – Aadaptive.biz
http://aadaptive.biz/freelancer/

Seminár Big Data
International Workshop on Knowledge Management

Vysoká škola manažmentu v Trenčíne
City University of Seattle, Bratislava, 20. 10. 2016

AAdaptive.biz

BIG data

- Volume – objem (100+ TB)
- Variability
- Velocity – rýchlosť (s akou pribúdajú alebo ich treba čítať, či spracovať)

- Využitie – data mining
  - business analýzy
  - vedecké dáta (analýza genómu, LHC, analýza snímok...)

BIG data

- => masívne paralelné systémy
  - úložiská
    - HDFS
    - NoSQL
      - large column tables (Big Table, Cassandra)
      - key-value (Redis, Amazon Dynamo DB)
      - document store (MongoDB, Couch Base)
      - diagram (Neo4j)
  - spracovanie
    - map-reduce
      - Hadoop
      - Spark
      - Google App Engine

Platformy

- Hostované
  - prenájom virtuálnych strojov (Amazon AWS https://aws.amazon.com/ec2/pricing/on-demand/ , Google, mnoho ďalších)
  - Prenájom kontajnerov (Google...)
  - Cloudové služby (Google – Big Query, App Engine https://console.cloud.google.com/home/dashboard ; Microsoft Azzure, Firebase...)
  - výhody – jednoduchá správa, on – demand
  - nevýhody – nemáte to celkom pod kontrolou
- Vlastné
  - z dlhodobého hľadiska lacnejšie
  - treba to manažovať

Ukážky - MongoDB

```
> show dbs
local   0.000GB
> use test
switched to db test
> db
test
>
> db.createCollection ('fakturyPrijate');
{ "ok" : 1 }
> show collections
fakturyPrijate
>  db.createCollection('faktury')
{ "ok" : 1 }
> db.faktury.insert({Cislo_faktury : "1234"})
WriteResult({ "nInserted" : 1 })
> db.faktury.insert({Cislo_faktury : "1235", Suma : 23.80})
WriteResult({ "nInserted" : 1 })
> db.faktury.find()
{ "_id" : ObjectId("58026a33788d31e65179ab27"), "Cislo_faktury" : "1234", "Zakaznik" : "IBM s.r.o." }
{ "_id" : ObjectId("58026a78788d31e65179ab28"), "Cislo_faktury" : "1235", "Suma" : 23.8 }
> _
```

Ukážky

- NoSQL – dokumentová db MongoDB

FAKTURA: 234200095

Dodávateľ : INMEDIA, spol. s r.o.
Námestie SNP 11
960 01 Zvolen

IČO : 36019208
IČ DPH : SK2020066829
DIČ : 202006682
Obchodný register :
Obchodný register, OS B.Bystrica,
Oddiel : Sro, vložka číslo : 4345/S

Doklad č
Konštant
Dátum v
Dátum s
Forma ú
Dátum d

Peňažný ústav : UniCredit Bank Slovakia a.s.
Číslo účtu : 6619429000 /1111
Telefón : 045/5363008,5363024
Fax : 045/5326976

Odberateľ : Obecný úrad N
2568
Ul.Hlavná 1/1
013 02 Nededza

Miesto určenia :

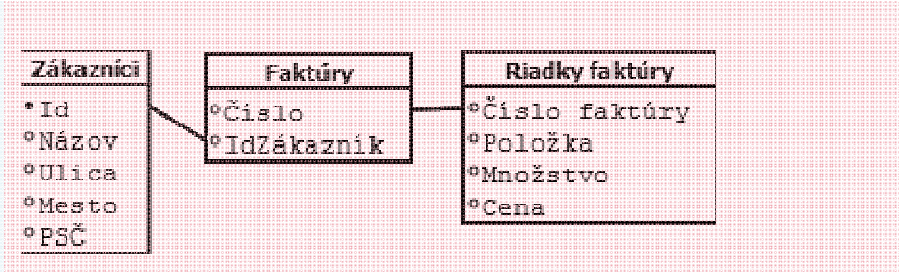
Druh dodávky : 0,25
Spôsob dopravy :
Č. objednávky : ozm
Vnútorný doklad : 340 200101 Hurtišová Monika
C. bez DPH :

DIČ: 2020677582 Tel.čísl
IČ DPH: IČ

Príjemca :

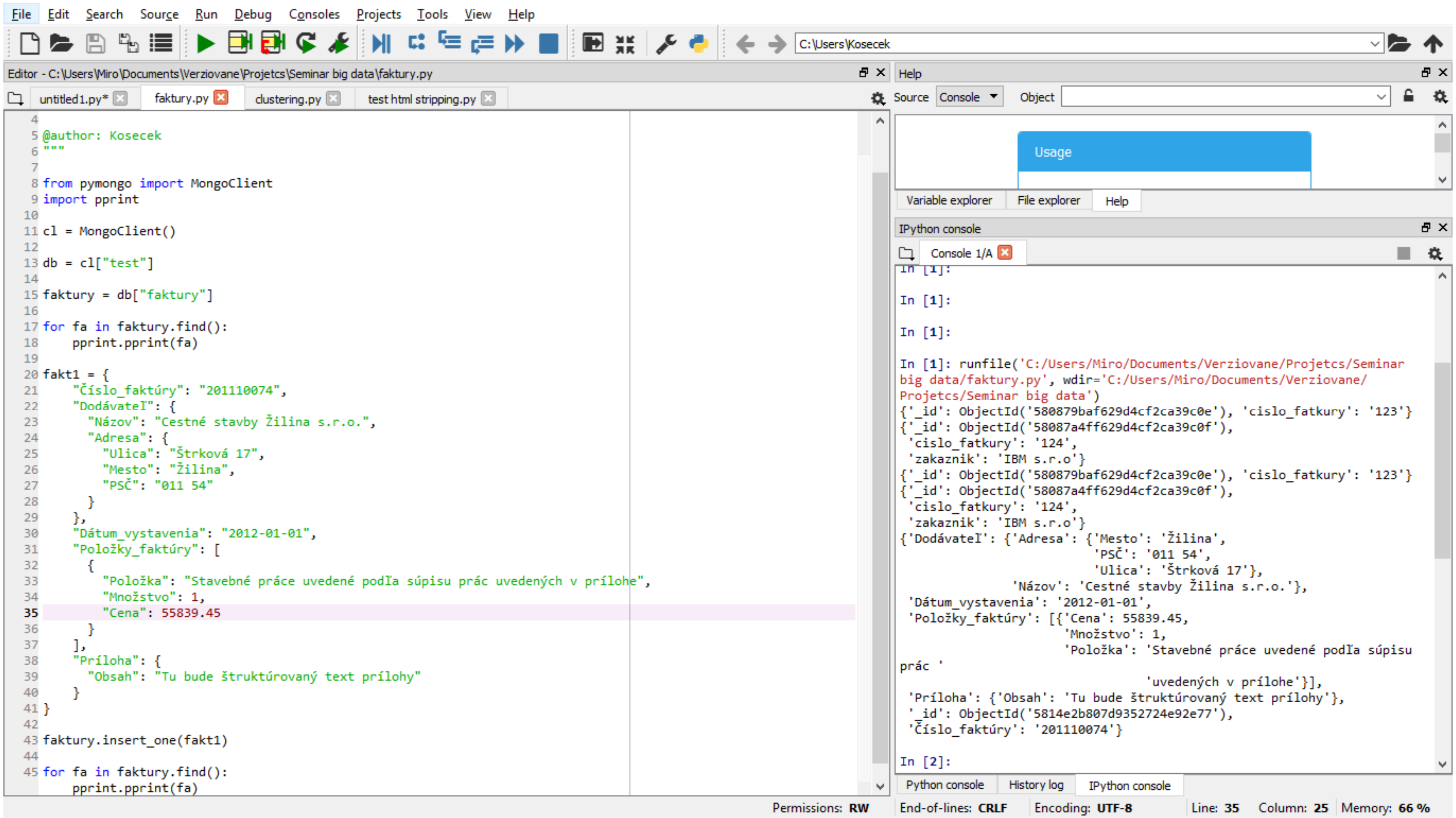
Balil : Hudec Miroslav
Obch. zástupca : 411 Unilever Pecko

Pč	Kód	NÁZOV POLOŽKY	Množ.	Mj	Balenie	Cena/MJ bez DPH
1	071109	Cest.Tarhoňa 5kgx2 Knorr	1,00	ks		20,820
2	25401	Čaj Saga Čierne ribezle 20x2g Knorr	6,00	ks	0,5 bal	0,750
3	25201	Čaj Saga Jablko 20x2g Knorr	6,00	ks	0,5 bal	0,750
4	256011	Čaj Saga Lesné plody 20x2g Knorr	6,00	ks	0,5 bal	0,750




```json
{
    "Číslo_faktúry": "201110074",
    "Dodávateľ": {
      "Názov": "Cestné stavby Žilina s.r.o.",
      "Adresa": {
        "Ulica": "Štrková 17",
        "Mesto": "Žilina",
        "PSČ": "011 54"
      }
    },
    "Dátum_vystavenia": "2012-01-01",
    "Položky_faktúry": [
      {
        "Položka": "Stavebné práce uvedené podľa súpisu prác
          uvedených v prílohe",
        "Množstvo": 1,
        "Cena": 55839.45
      }
    ],
    "Príloha": {
      "Obsah": "Tu bude štruktúrovaný text prílohy"
    }
}
```

MongoDB a Python



minit

Michal Rosik, GRADIENT ECM

International Workshop on Knowledge Management (11th IWKM)

"Big Data" Seminar, VŠM Bratislava, 20-21 October 2016

Speaking today

Michal Rosik

- Studied management at Comenius University, Slovakia
- Worked for Siemens as consultant and head of Microsoft Support Center
- 8 years in GRADIENT, last 4 years as product visionary for minit
- Passionate trail runner

Who we are and what we do?

... in few numbers

GRADIENT

… in few numbers

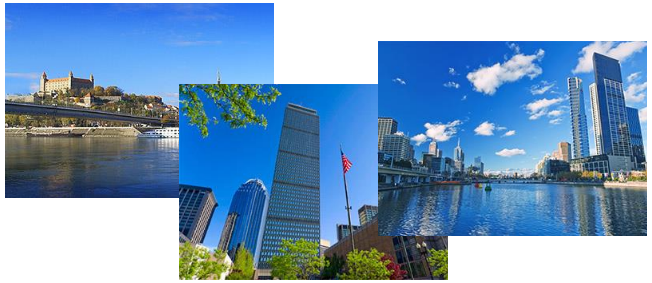
22 Years on market

3 Offices worldwide

2 Product lines

15 Awards received

Microsoft Partner
Gold Collaboration and Content
Gold Application Development
Silver Application Development
Silver Midmarket Solution Provider
Silver Data Platform
Silver Mobility



minit

GSCAN

Microsoft
Industry Awards
Finalist 2015
Slovak Republic

Why Process Mining?

Consult me

Personnel Interviews - the old school way

Standard way and corresponding issues

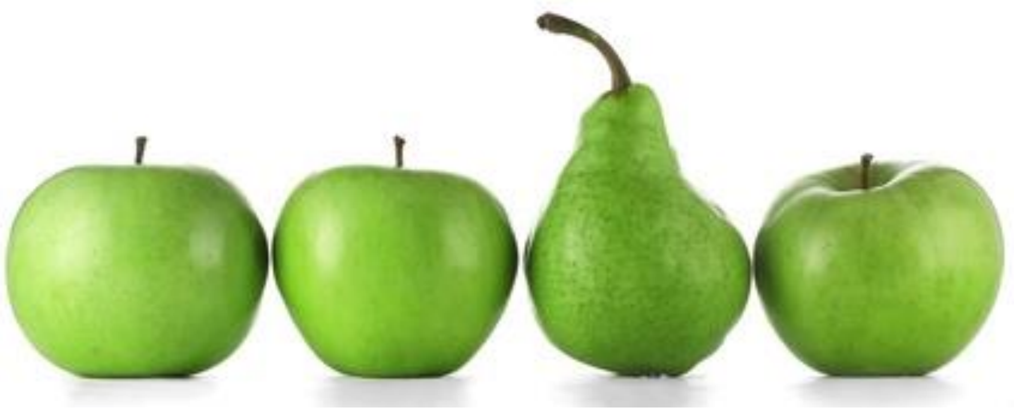
Standard way and corresponding issues

Subjective

Standard way and corresponding issues

Limited view

Standard way and corresponding issues



Exceptions

Standard way and corresponding issues

Visibility

Everything is logged

Although you did not know

In modern times logs are produced by

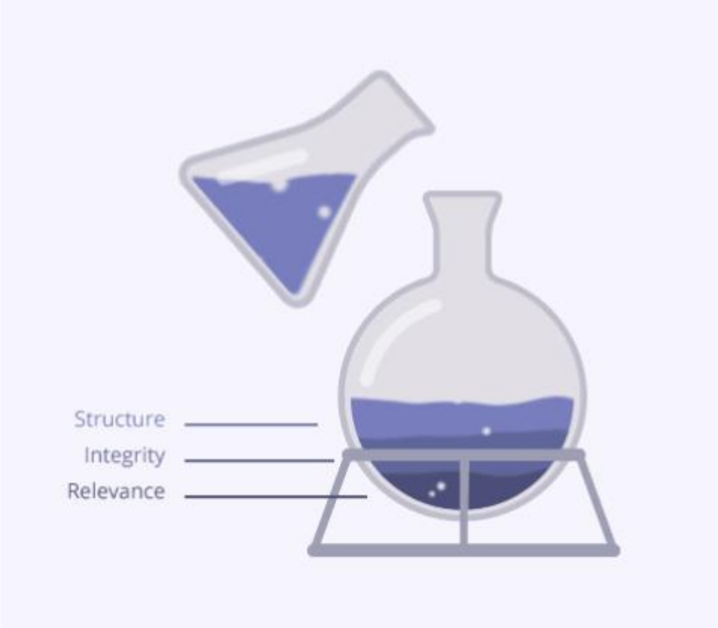
- Mobile Devices, Tablets, Smartphones
- LOB Information systems, ERPs, CRMs,
- BPM (workflow automation)
- Service/Call center systems,
- Surveillance/Attendance systems
- Email, IM
- Household Devices - Internet of Things

How does it all work?

Process Mining in a nutshell

Event Collection

Big Data whether via Mobile Devices, Smartphones, LOB Information Systems, ERP, CRM, Call Centres, and more can all be extracted to show what processes take place.



Log Creation

Events from data sources are mixed together but hold **data structure, data integrity, data relevance**.

A resulting log combines all relevant process events into a homogenous data file.

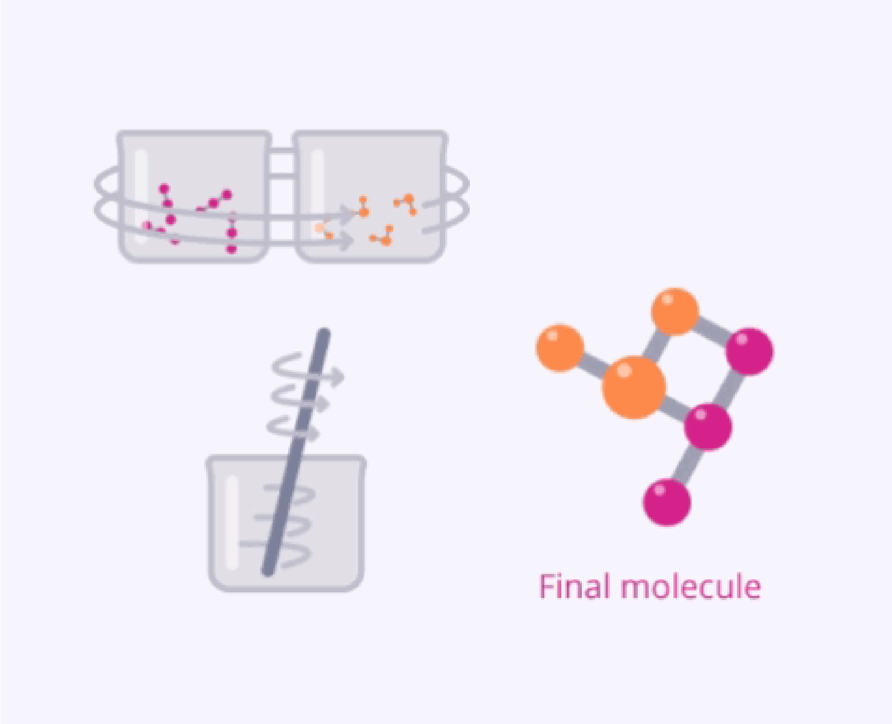
Terminology

	Case ID	ACTIVITY	TIMESTAMP	TIMESTAMP	RESOURCE	ATTRIBUTES	
	CaseID	Activity	StartTimestamp	EndTimestamp	Resource	ActivityFinalAction	CostCenterID
Instance 1	958680	Approving on specific level	12.11.2014 11:32:01	12.11.2014 11:32:10	Daphne Cash	Approved	21
	958680	Approving on specific level	12.11.2014 11:32:12	13.11.2014 16:31:49	Tad Day	Approved	21
	958680	Process order	13.11.2014 16:31:53	13.11.2014 19:53:32	Daphne Cash	OrderProcessed	21
	958680	Delivery confirmation	13.11.2014 19:53:38	10.12.2014 16:09:39	Jael Nichols	DeliveryCancelled	21
Instance 2	956461	Approving on specific level	23.10.2014 9:56:24	23.10.2014 9:58:38	Lara Obrien	Approved	35
	956461	Process order	23.10.2014 9:58:42	23.10.2014 10:04:12	Lara Obrien	OrderProcessed	35
	956461	Delivery confirmation	23.10.2014 10:04:21	28.10.2014 10:16:36	Lara Obrien	DeliveredCompletely	35
Instance 3	960076	Approving on specific level	24.11.2014 8:17:45	24.11.2014 9:20:46	Leila Sawyer	Approved	23
	960076	Approving on specific level	24.11.2014 9:20:49	24.11.2014 10:31:24	Noel Shields	Approved	23
	960076	Approving on specific level	24.11.2014 10:31:35	27.11.2014 14:40:24	Kane Wilder	Demand	23
	960076	Demand for information	27.11.2014 14:40:24	3.12.2014 13:55:54	Noel Shields	InformationSent	23
	960076	Approving on specific level	3.12.2014 13:55:57	8.12.2014 16:15:46	Kane Wilder	Approved	23
	960076	Process order	8.12.2014 16:15:54	8.12.2014 17:15:40	Zeus Hebert	OrderProcessed	23
	960076	Delivery confirmation	8.12.2014 17:15:42	8.12.2014 17:16:36	Zeus Hebert	DeliveredCompletely	23

Events

Process Distillation

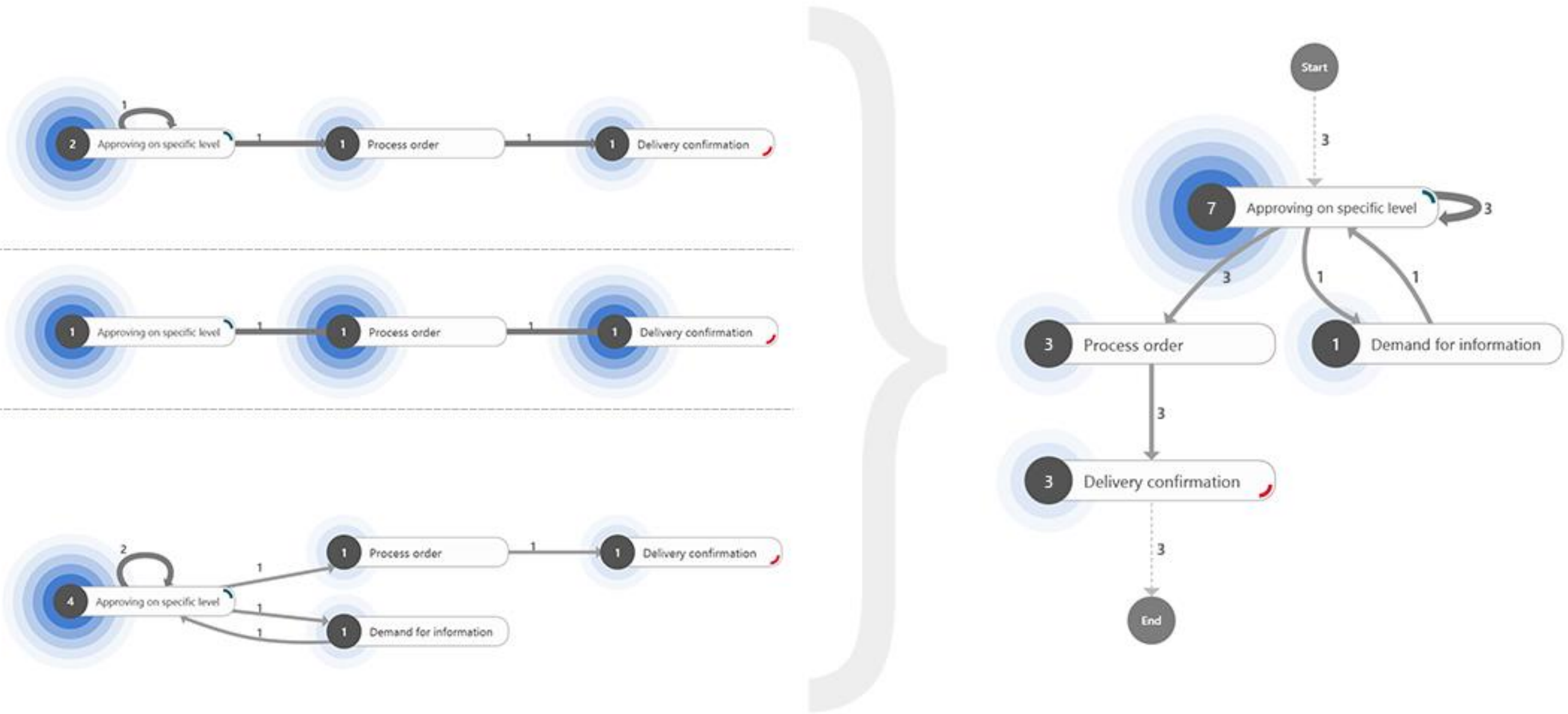
Process mining algorithms combine events, analyze their chronological order, correlations, frequency and performance, creating unique variations of your business process instances.



Synthesis

Manipulate, decompose and synthesize again and again until you get the right compound.

	Case ID	ACTIVITY
	CaseID	Activity
Instance 1	958680	Approving on specific level
Instance 1	958680	Approving on specific level
Instance 1	958680	Process order
Instance 1	958680	Delivery confirmation
Instance 2	956461	Approving on specific level
Instance 2	956461	Process order
Instance 2	956461	Delivery confirmation
Instance 3	960076	Approving on specific level
Instance 3	960076	Approving on specific level
Instance 3	960076	Approving on specific level
Instance 3	960076	Demand for information
Instance 3	960076	Approving on specific level
Instance 3	960076	Process order
Instance 3	960076	Delivery confirmation

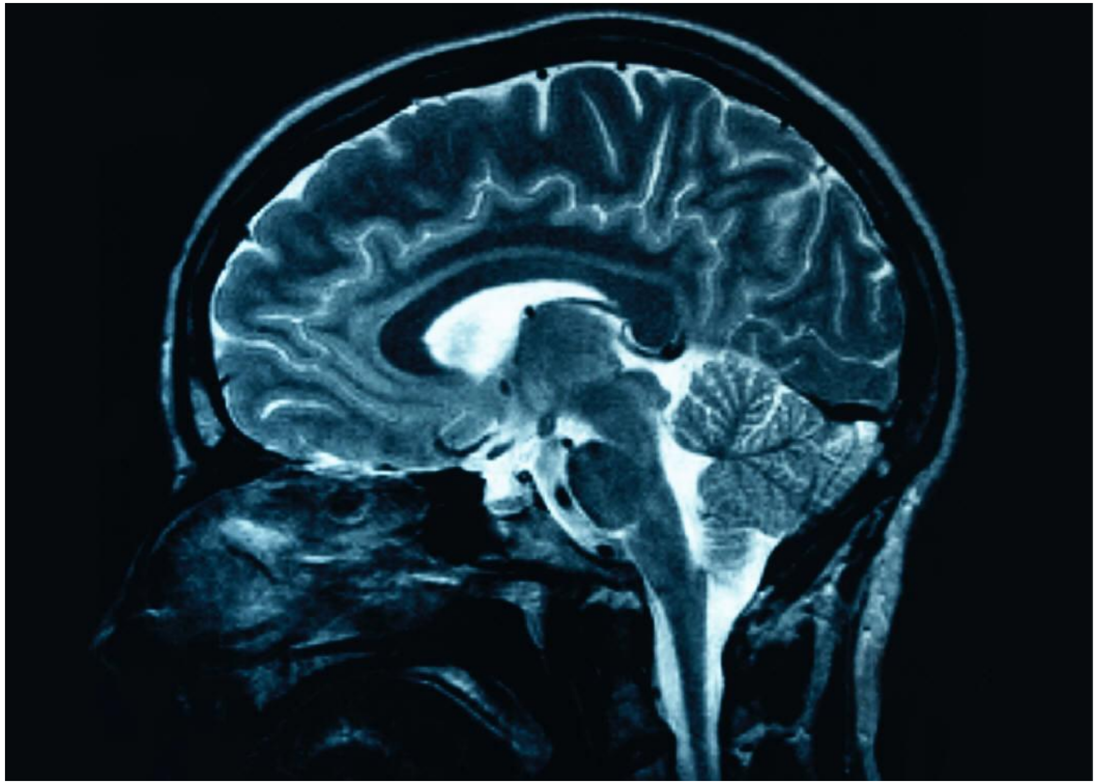


Process insight in a minute

… in minit

Process Discovery

- Analyze your IT and business logs and convert them into the **reality**
- **Process mapping** - show how the business processes in your company **really flow**
- Show the **AS-IS essence of the processes** down to the real Backbone



Process Diagnostics

- Immediately spot the **symptoms of inefficiency and problems**
- Identify the **bottlenecks**, **optimizations points** and **conflicts**
- Accelerate **process improvement** by using a measure-first approach
- Simplify, filter, magnify and **prescribe the right cure**

Process Compliance

- **Process Auditing** - regularly **check** the progress to identify non-compliant process execution or frauds
- Elimination of **exceptions, rework and waste** through monthly reconstruction of process execution
- Constantly **compare** reality to the discovered models

Personalized University

Is process discovery on event log data able to
help students achieve better results?

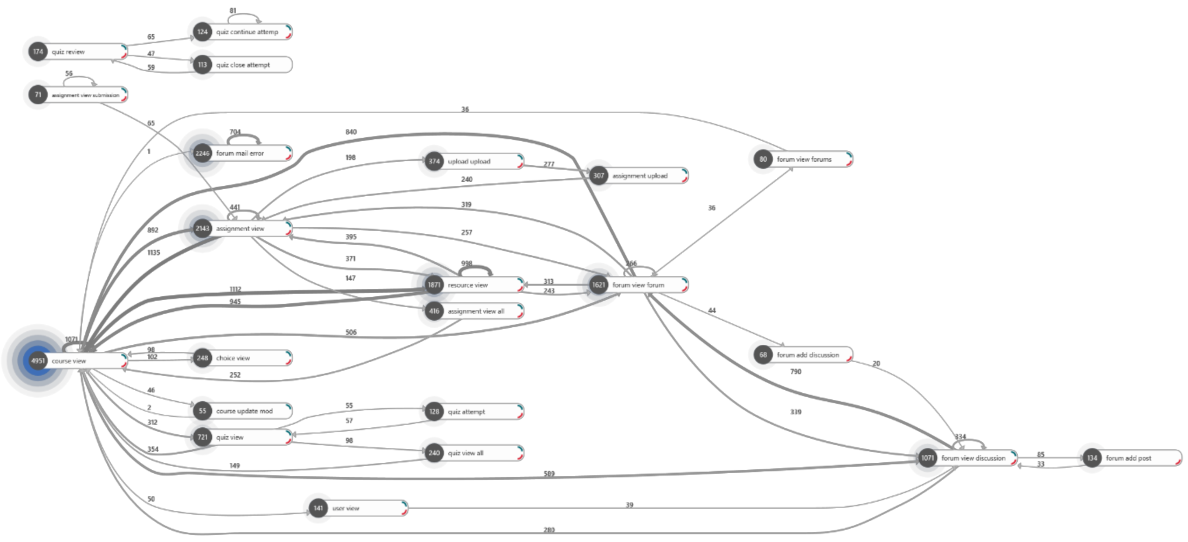
Phase 1 – Overview

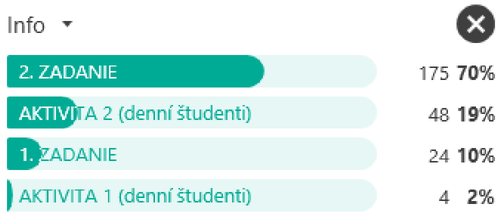
Low height flight over moodle data

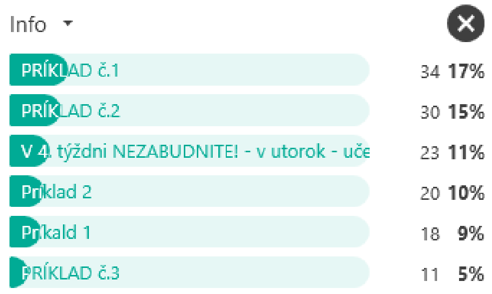
Overview

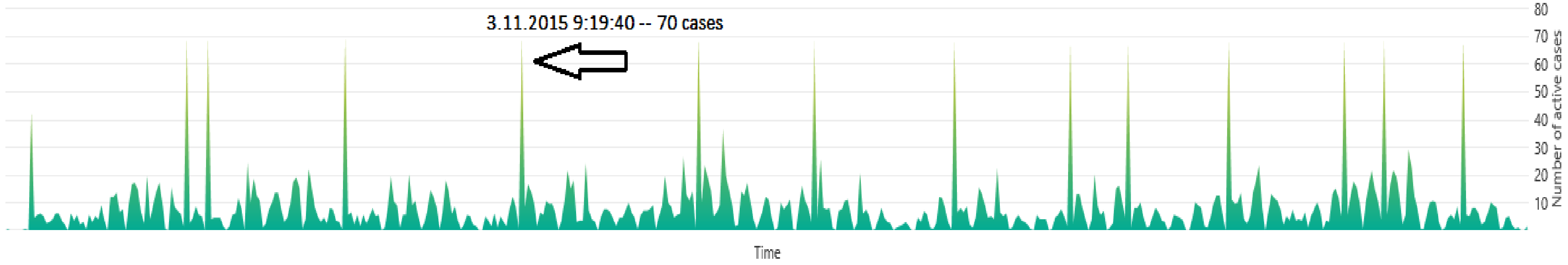
- Available data
  - Export from moodle
  - Selected subset
  - 29.9.2015 – 20.4.2016
  - ~41k events
  - 62 different activities
  - 142 resources
- Issues
  - What delimits a session?
  - Granularity of activities?
  - POV
    - 1 person / whole timeframe
    - Session based

Results

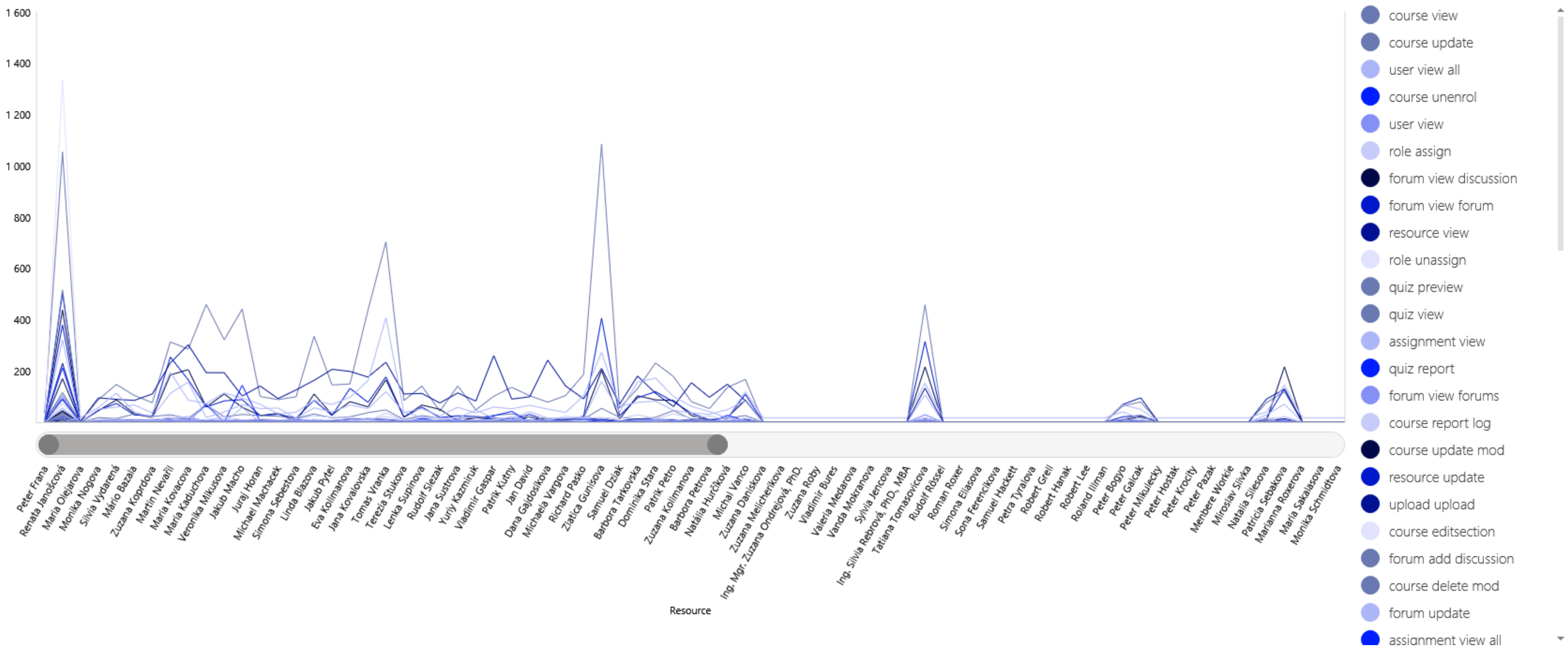



Info
2. ZADANIE 175 70%
AKTIVITA 2 (denní študenti) 48 19%
1. ZADANIE 24 10%
AKTIVITA 1 (denní študenti) 4 2%


Info
PRÍKLAD č.1 34 17%
PRÍKLAD č.2 30 15%
V 4. týždni NEZABUDNITE! - v utorok - uče 23 11%
Príklad 2 20 10%
Príkald 1 18 9%
PRÍKLAD č.3 11 5%


3.11.2015 9:19:40 -- 70 cases
80
70
60
50
40
30
20
10
Number of active cases
Time

Results


1 600
1 400
1 200
1 000
800
600
400
200
Peter Frana
Renata Janoščová
Maria Olejarova
Monika Nogova
Silvia Vydarená
Mário Bazala
Zuzana Koprdova
Martin Nevařil
Maria Kovacova
Maria Kaduchova
Veronika Mikusova
Jakub Macho
Juraj Horan
Michael Machacek
Simona Sebestova
Linda Blazova
Jakub Pytel
Eva Kollmanova
Jana Kovalovska
Tomas Vranka
Terezia Stukova
Lenka Supinova
Rudolf Slezak
Jana Sustrova
Yuriy Kazmiruk
Vladimir Gaspar
Patrik Kutny
Jan David
Dana Gajdosikova
Michaela Vargova
Richard Pasko
Zlatica Gunisova
Samuel Dziak
Barbora Tarkovska
Dominika Stara
Patrik Petro
Zuzana Kollmanova
Barbora Petrova
Natália Hurčíková
Michal Vanco
Zuzana Daniskova
Zuzana Melicherikova
Ing. Mgr. Zuzana Ondrejová, PhD.
Zuzana Roby
Vladimir Bures
Valeria Medarova
Vanda Mokranova
Sylvia Jencova
Ing. Silvia Rebrová, PhD., MBA
Tatiana Tomasovicova
Rudolf Rössel
Roman Roxer
Simona Eliasova
Sona Ferencikova
Samuel Hackett
Petra Tyralova
Robert Greif
Robert Hanak
Robert Lee
Roland Illman
Peter Bogyo
Peter Galcak
Peter Mikulecky
Peter Hostak
Peter Krocity
Peter Pazak
Menbere Workie
Miroslav Slivka
Natalia Silesova
Patricia Sebakova
Marianna Roxerova
Maria Sakalasova
Monika Schmidtova
Resource
course view
course update
user view all
course unenrol
user view
role assign
forum view discussion
forum view forum
resource view
role unassign
quiz preview
quiz view
assignment view
quiz report
forum view forums
course report log
course update mod
resource update
upload upload
course editsection
forum add discussion
course delete mod
forum update
assignment view all

Questions

- Can we focus on a specific study field?
- Are we able to enrich the data with final grades and thus distinguish students?
- Are we able to distinguish the process variants and habits of best performers?
- And what about comparisons to low performers?
- Would it be possible to learn from the best and guide newcomers to achieve better final grades?

Phase 2 – Deep Insight

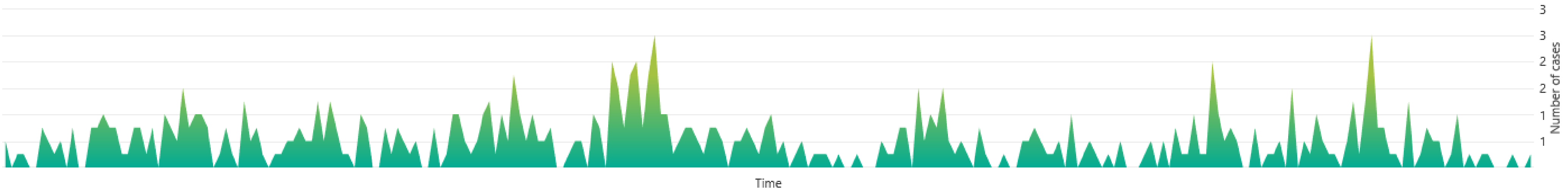
Drill-down into online study field based on focused questions

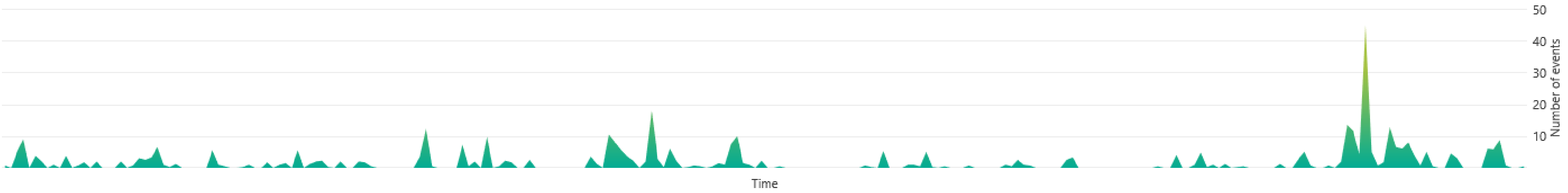
Pre-processing

- Data cleaning
- Dataset filtering
- Clustering based on final grade
  - Group 0
    - value 0
  - Group 1
    - value (1,2>
  - Group 2
    - value (2,3>
  - Group 3
    - value (3,4>
  - Group 4
    - value (4)

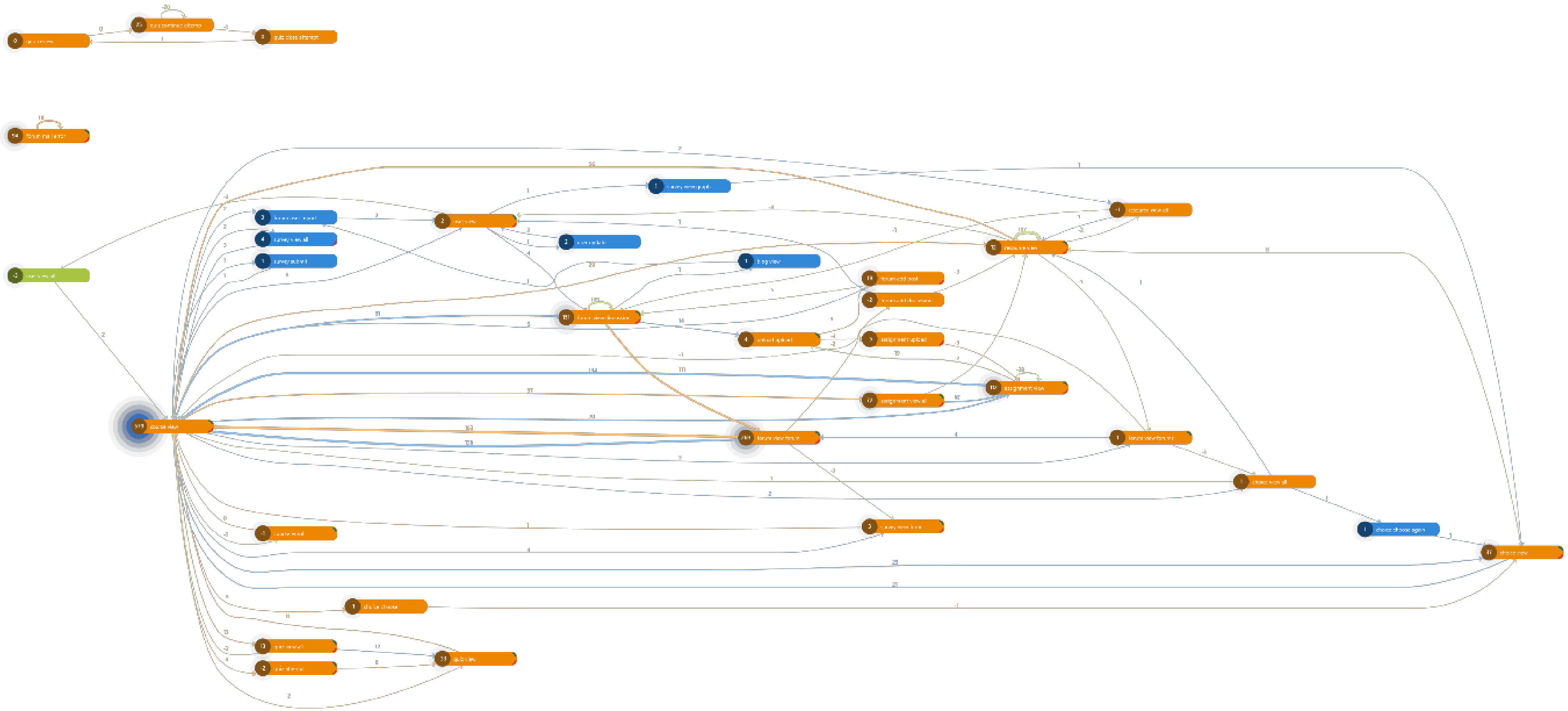
```
MC506TN-ON-SP16;2016 jún 16 14:51;194.160.75.75;Renata Janošcová;course update mod;label 3460CRLF
MC506TN-ON-SP16;2016 jún 16 14:51;194.160.75.75;Renata Janošcová;label update;"CRLF
CRLF
  CRLF
    CRLF
      9.WEBINÁR - STREDA (7. 6. 2016..."CRLF
MC506TN-ON-SP16;2016 jún 16 14:51;194.160.75.75;Renata Janošcová;course view;Jar 2016 [TN]: MC 506s - Janošcová [online]CRLF
MC506TN-ON-SP16;2016 jún 16 14:49;194.160.75.75;Renata Janošcová;course update mod;label 3460CRLF
```

Activity comparison

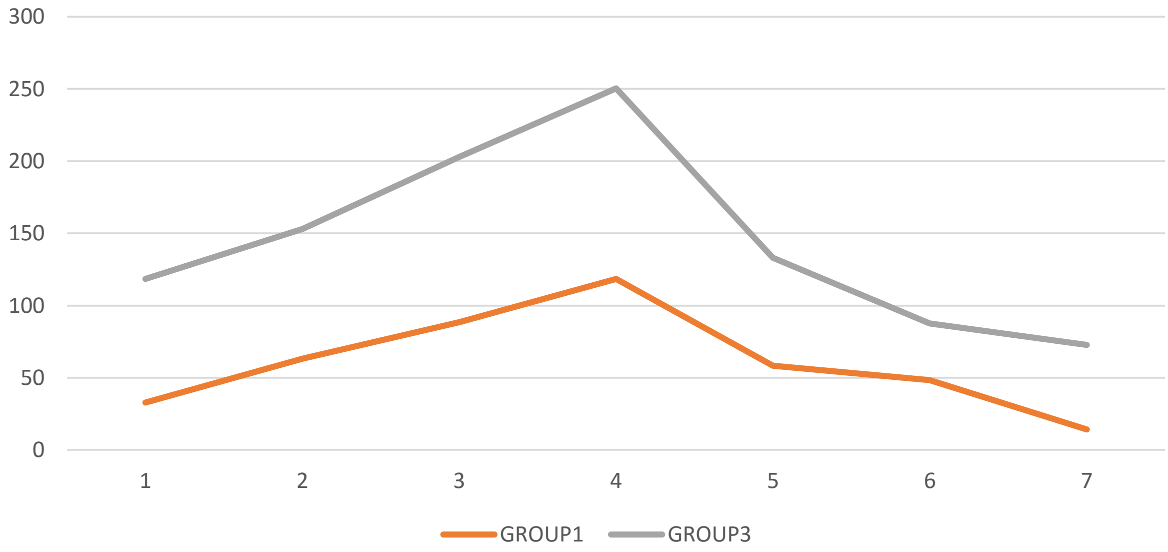


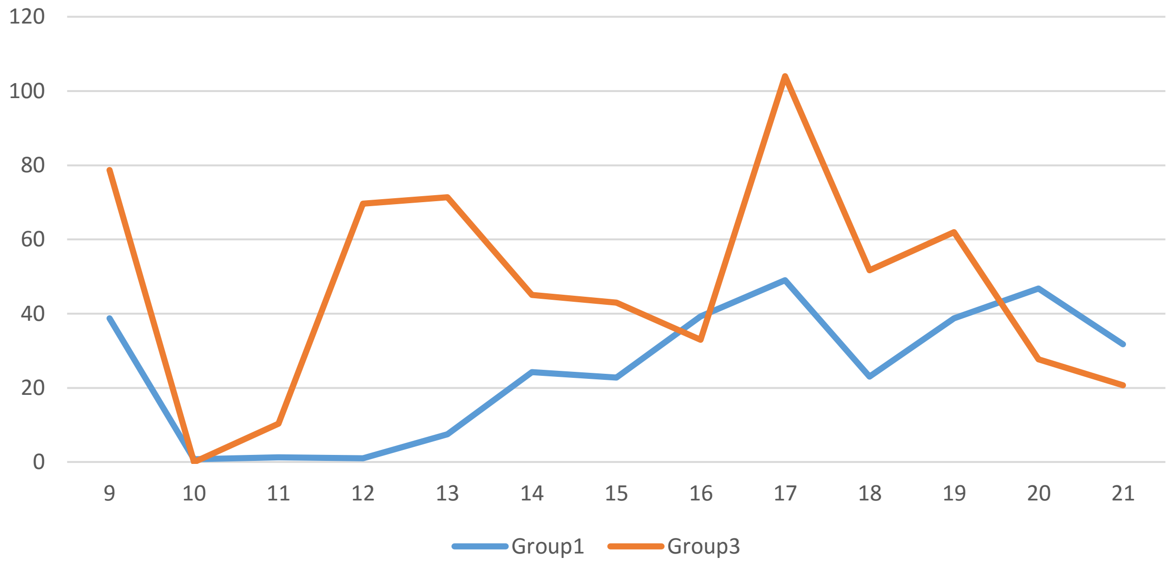


Process comparison



Activity distribution comparison





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Prognózovanie pomocou neurónových sietí v systéme WEKA

Seminar on Big Data

International Workshop on Knowledge Management

IWKM'2016

Bratislava 20 - 21. 10. 2016

Ing. Renata Janoščová, PhD.
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Neurón

- Neurónové siete (N.S.) sú tvorené množstvom vzájomne prepojených elementov (neurónov) podobne ako v ľudskom mozgu
  - **Neurón** – tu chápeme ako bunku, ktorá prijíma **podnety** od iných neurónov, ktoré sú k nej pripojené „na vstupe"
  - Ak **súhrnný účinok** týchto **vstupných podnetov PREKROČÍ určitý prah**, neurón sa aktivuje a sám začne svojím **VÝSTUPOM pôsobiť** na ďalšie neuróny:

Model neurónu - Adaline

(Widrow, 1960)

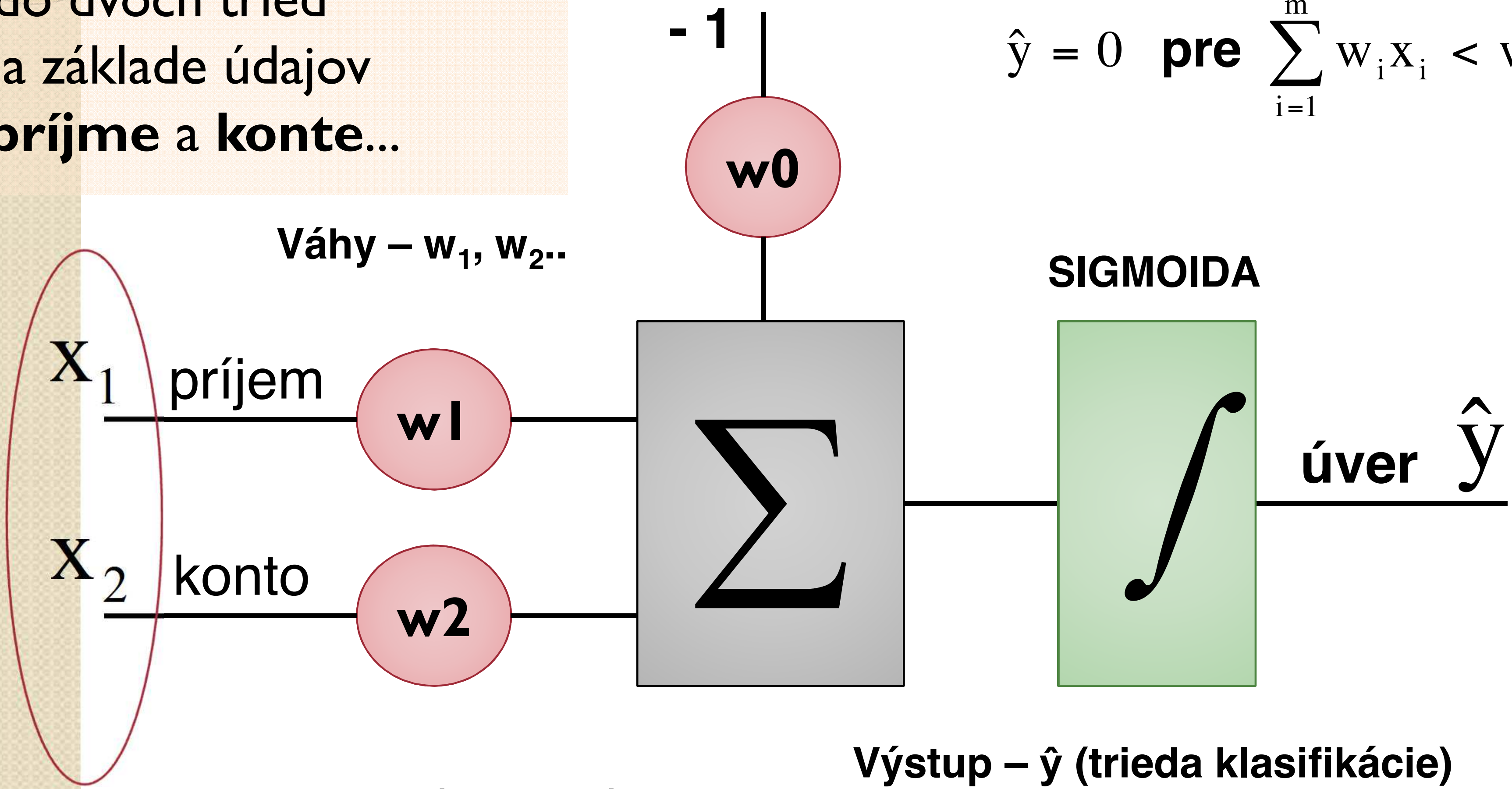
Klasifikuje klientov banky
do dvoch tried
- na základe údajov
o **príjme** a **konte**...

skoková funkcia

$$\hat{y} = 1 \quad \textbf{pre} \quad \sum_{i=1}^{m} w_i x_i \geq w_0$$

$$\hat{y} = 0 \quad \textbf{pre} \quad \sum_{i=1}^{m} w_i x_i < w_0$$

PRAH – w_0



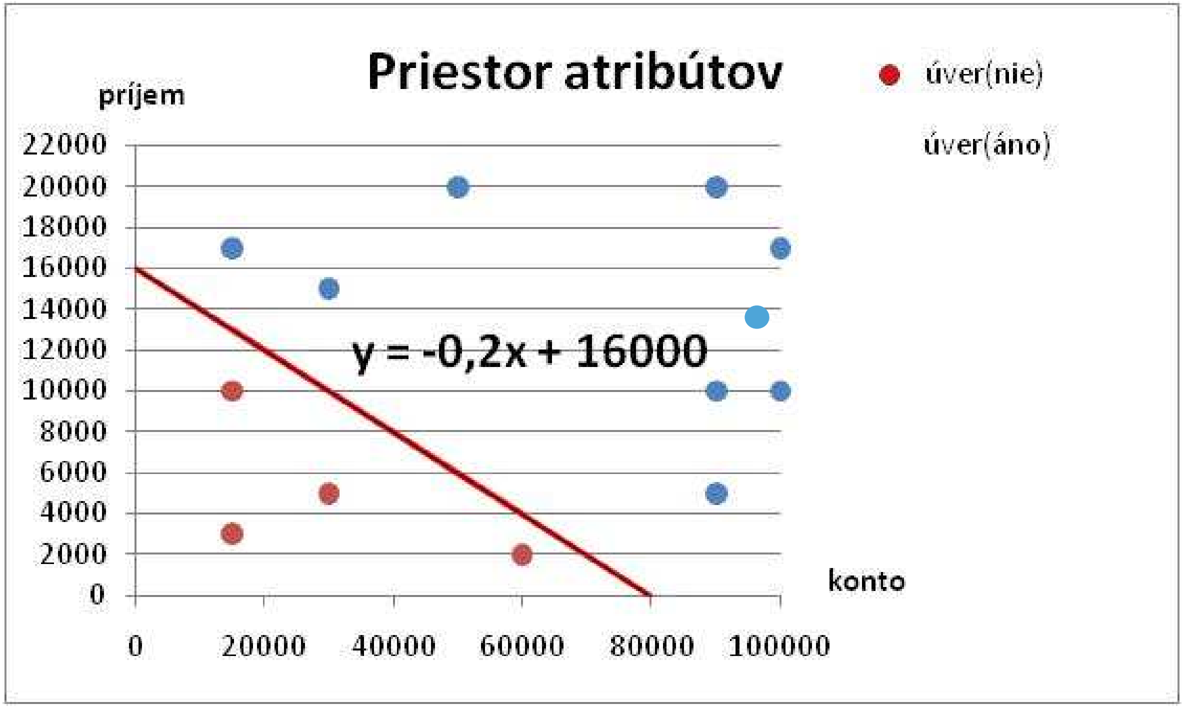
Výstup – ŷ (trieda klasifikácie)

Vstupy - x_1, x_2,..hodnoty (podnety)

Geometrická interpretácia Adaline

- Lineárny klasifikátor objektov do dvoch tried
  - Ak máme napr. dva numerické atribúty **príjem, konto**
  - **v D_{TR}:**

Klient	příjem	konto	úvěr
K101	3000	15000	ne
K102	10000	15000	ne
K103	17000	15000	ano
K104	5000	30000	ne
K105	15000	30000	ano
K106	20000	50000	ano
K107	2000	60000	ne
K108	5000	90000	ano
K109	10000	90000	ano
K110	20000	90000	ano
K111	10000	100000	ano
K112	17000	100000	ano



- Adaline zistí v procese učenia pre D_{TR} váhy:

w_1=1, w_2=0,2, a w_0=16000 (normalizácia hodnôt)

Rozdeľovacia priamka bude definovaná rovnicou:

príjem + 0,2*konto – 16000=0

Schopnosť učiť sa

- Dôležitou vlastnosťou neutrónu je schopnosť učiť sa:
  - Učenie neurónu - algoritmus nastavenia váh **w** na základe predložených príkladov $[x_i, y_i]$ tak, aby systém čo najsprávnejšie spracovával (klasifikoval) aj neznáme prípady x_k
  - Na začiatku učenia sú váhy nastavené na náhodné malé hodnoty, napr. w=0,05...
- Adaline používa na učenie **gradientnú metódu**

learning rate – krok iterácie [0,10]; 0,1 alebo 0,05...

- **Min** $\mathrm{Err}(\mathbf{w}) = \frac{1}{2}\sum_{i=1}^{n}(y_i - \hat{y}_i)^2$

$$\mathbf{w} \leftarrow \mathbf{w} + \Delta\mathbf{w},$$

$$\Delta\mathbf{w} = -\eta\frac{\partial \mathrm{Err}}{\partial \mathbf{w}} = \eta\sum_{i=1}^{n}(y_i - \hat{y}_i)\,\mathbf{x}_i$$

Viacvrstvový perceptrón – neurónová sieť

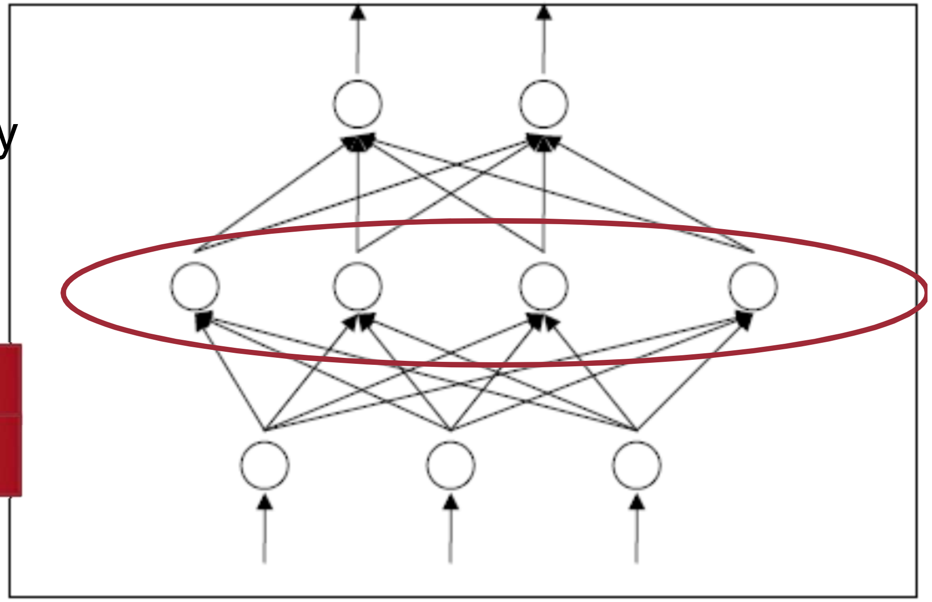
- (*multi-layer perceptron*) – je **viacvrstvová sieť** zložená z vrstiev neurónov. Každý neurón z jednej vrstvy je prepojený so všetkými neurónmi susednej vrstvy. Neuróny z jednej vrstvy nemajú žiadne vzájomné väzby
  - Najpoužívanejšou topológiou je **sieť s jednou skrytou vrstvou**

m –počet neurónov výstupnej vrstvy (počet tried)

? –počet neurónov strednej vrstvy l

- **Rôzne vzorce:** **l=2*(n+m)** **l=2*n**

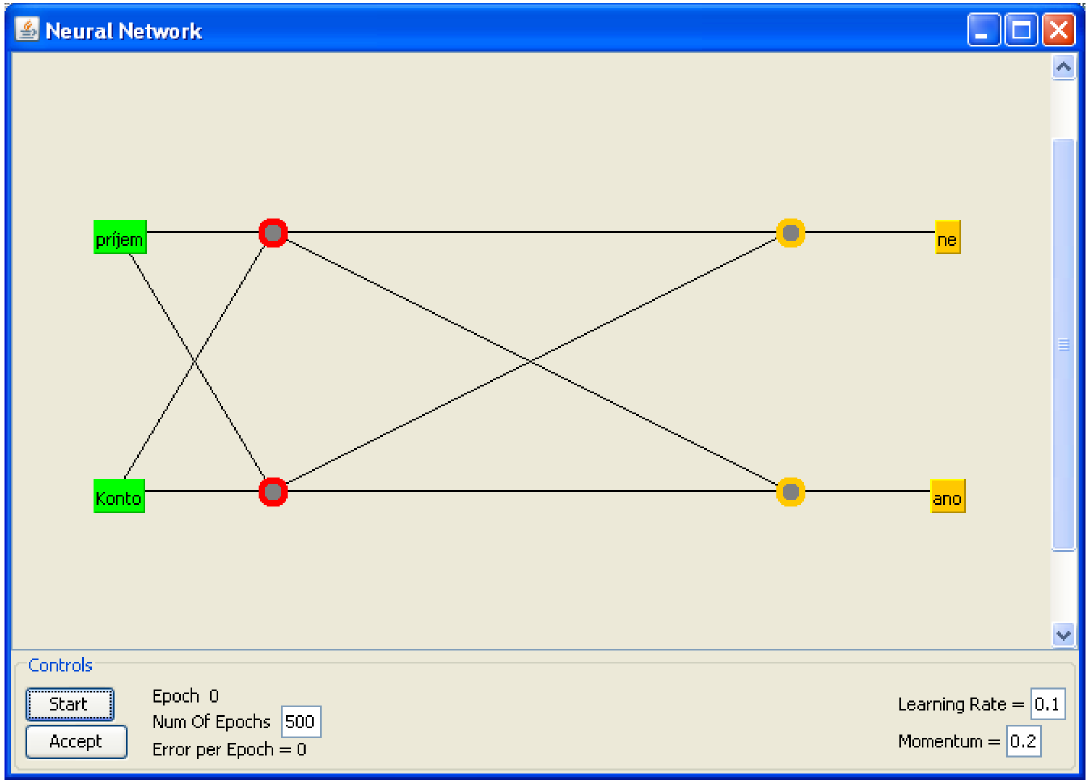
n –počet neurónov vstupnej vrstvy (počet atribútov)



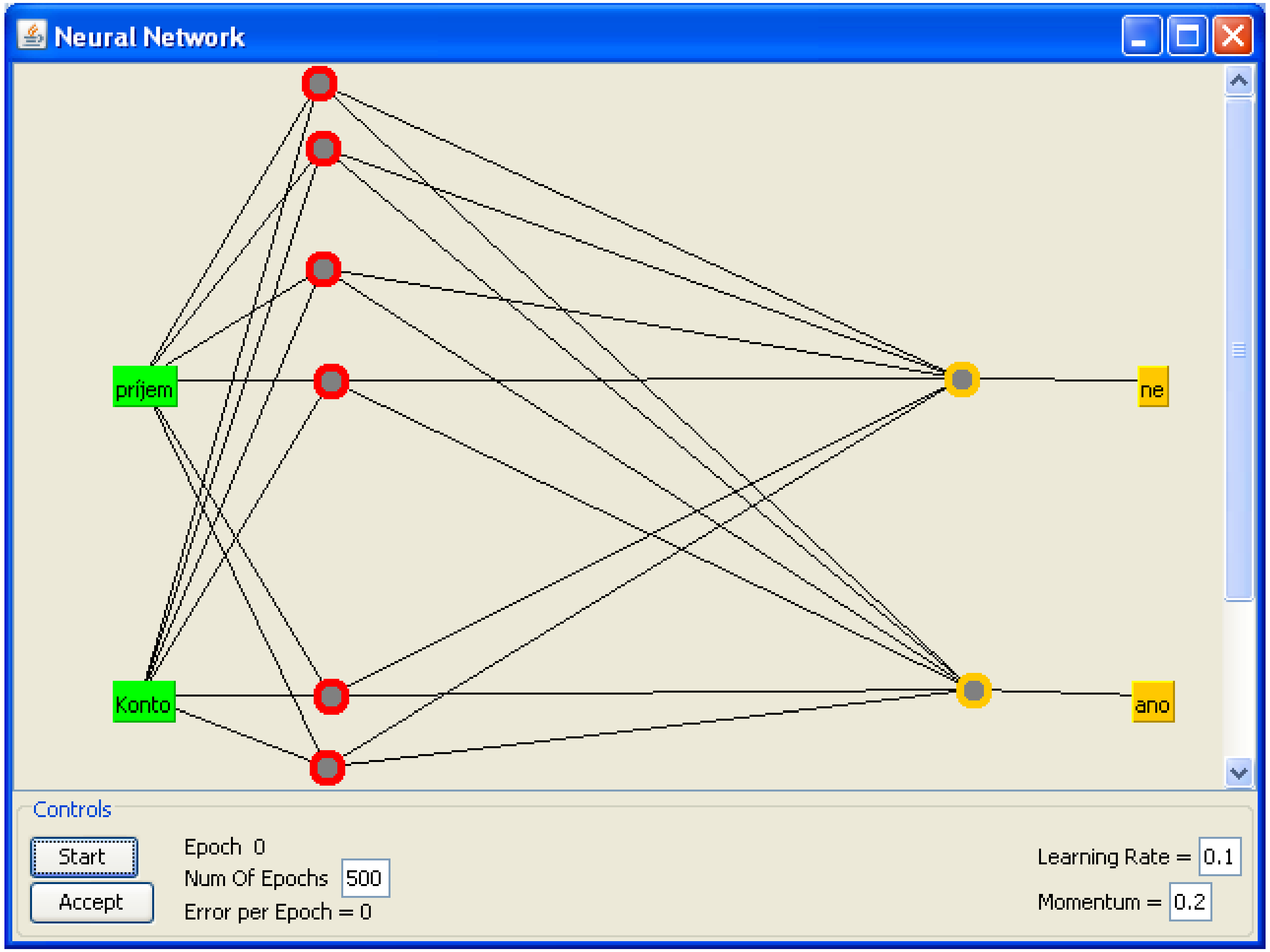
- **Pre učenie sa používa algoritmus** „Spätného šírenia chyby" – (*Error backpropagation algoritmus*)

Označenie NS: **2-2-2**

- 2 neuróny vstupnej vrstvy, 2 neuróny skrytej vrstvy, 2 triedy *(vo Weka modeli NS zobrazená dvomi bodmi pre hodnoty triedy – áno; nie)*



2-6-2



Neural Network
príjem
Konto
ne
ano
Controls
Start
Accept
Epoch 0
Num Of Epochs 500
Error per Epoch = 0
Learning Rate = 0.1
Momentum = 0.2

Využitie N. S.

- **ZNALOSTI** sú v N. S. dané topológiou siete a váhami jednotlivých väzieb medzi neurónmi
  - (Informácie sú „rozprestreté" po celej sieti vo váhach, - funkčnosť aj v prípade poškodenia siete)
    - **Čierna skrinka** – nie je celkom zrejmé,čo sa deje vo vnútri
- Typy úloh, ktoré rieši N.S. :
  - **Klasifikácia; Predikcia; Asociácia; Kódovanie**
  - N.S. – jeden z **najpoužívanejších nástrojov** tvorby automatických systémov **pre klasifikáciu a predikciu**
  - **Vhodná alternatíva** k R. S. a R. P. (N. S. je vhodnejšia pre numerické dáta)

Ďakujem za pozornosť

Zdroje:

BERKA, P. 2003. Dobývání znalostí z databází. Praha: Academia

BERKA, P. Slajdy k přednáškám na VŠE: http://sorry.vse.cz/~berka/4IZ450/4IZ450-slajdy.htm

KELEMEN, J. a kol. 2007. Pozvanie do znalostnej spoločnosti.