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USER NEEDS AND REQUIREMENTS ANALYSIS FOR A SENIORS DEDICATED AI DRIVEN KNOWLEDGE TRANSFER PLATFORM

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Abstract: *The development of a European scaled Knowledge Transfer Platform must answer the needs of all its envisaged users while creating an efficient and stable environment acknowledging all the cross-cultural challenges and adapt to the requirements of each type of user: mentors, companies, or development team. A detailed analysis of these needs is presented in the paper covering the independent needs of each group and analyzing the possible interferences grouped in three categories: positive, neutral and negative. This analysis determines the further development of the platform and represents a critical aspect in the achievement of an attractive environment which can reach European-spread scale.*
Key words: *Learning management system, senior knowledge transfer, software architecture, requirements analysis*

1. INTRODUCTION

The last years have seen a lot of changes in the industry and the progress of science and technology which had a direct influence on the learning strategy for the younger generations as the influx of information grows continuously and the market has already made the shift from mass product interest into personalized items [1].

The current learning strategy promoted by the OECD, which should answer to the current progress speed is the 2030 Learning Compass which suggests the development of competences and the early transfer of responsibility towards the younger generation working in teams rather than individual activities. This strategy has been implemented since 2015, enabling younger engineers to become creative earlier but lacking specific knowledge on different processes [2].

A natural answer to this transformation is the knowledge transfer platforms which have evolved as a need for faster communication in groups. In the same way as industry evolved, the first step the companies took was to use the classical social networks, but the companies exponential growth and the lack of information filtering limited a lot their use especially in technical fields.

In the engineering field, the Fourth Engineering Revolution, Industry 4.0, has raised both opportunities and challenges for the large, small- and medium- sized companies (SMEs). The large enterprises managed a swift transition toward Industry 4.0 having the financial, technological and human resource capabilities, while SMEs found it a lot harder to adapt to this new philosophy. While there were multiple initiatives from the European Commission to support SMEs in this endeavour, such as the creation of Digital Innovation Hubs, they still experience a serios lack of knowledge for the transformation [3].

In [4], the authors propose a thorough analysis of on-line social networks (OSN) proposing four dimensions for their analysis:

1. Pattern and Knowledge discovery;
2. Scalability;
3. Information fusion and integration;
4. Visualization.

This analysis has revealed the outstanding potential of these OSN in many computational fields, mainly around the management of Big Data, but also emphasized the lack of

information control which in certain areas can lead to misinformation and user misleading.

Despite their limitations in certain domains, OSNs have created a new paradigm in communication, data transfer and social interaction, very useful in professional areas if properly used.

Thus, as the worldwide trend changed on the global market, from mass production to personalization, OSN's experience can be applied, if implemented correctly towards the knowledge transfer platforms, where dedicated products for a small segment of the industry can better answer to their specific needs [5], maximizing the benefits and minimizing (up to eliminating) the spam.

The paper structure is as follows: Section 2 presents a critical analysis of the large non-specific KTPs (Knowledge Transfer Platform) and small KTPs, followed by the introduction of a new KTP platform where the specific needs of each type of user is analysed and weighted. Section 3 analyses the results aiming to identify interdependencies and to characterize them. Section 4 presents the platform main functions and Section 5 presents the conclusions.

2. USER NEEDS ANALYSIS FOR A KNOWLEDGE TRANSFER PLATFORM

The need for faster and more efficient communication has facilitated the exponential growth of on-line social platforms, whereas the market leader, Facebook has, based on statistical data from July 2021 [6], a reported number of 2,853 million of active users, which is proven to be very efficient in non-professional communication, but not capable of providing professional focused interaction. Information sharing to achieve competitiveness is becoming more popular as it stimulates faster progress and development [8]. An area where this can be easily observed is the software industry which embeds large platforms with open-source coding that enabled exponential progress in many technical fields with an example being the 3D printing industry where optimised printing solutions can be found and used free of charge. However, even if this speeds up some areas of products development the "code-stitching" strategy makes it very difficult for any future change [11]. Therefore, in many instances, when educating the new generation, universities like Stanford forbid the use of "code-copying" enforcing it with specific detection tools to stimulate students to learn to develop rather than use.

In research, science and technology, the community has made efforts to communicate efficiently but at a certain professional level, thus leading to the creation of platforms like ResearchGate or LinkedIn. Another element aiming to expand the accessibility of research results is the Open Access publishing strategy. Without debating the pros and cons of this trend, by considering two Q1 ranked open access journals with medical topics, the first on science and technology registered over 850 full reads in 18 month [12] and the second on medicine registered over 300 reads in less than one month [13].

This accessibility, large number of reads and overall impact is impossible outside Open Access Publications. The motivation behind the aspects illustrated above, consists in the level of information reliability requested by clients/mentees, which are willing to use smaller but more efficient KTPs where the risk of receiving low quality of misleading data is much smaller.

In order to establish also the financial efficiency of some KTPs, in [14] the business model of two such platforms which host large number of users, both in terms of mentors and mentees, compared the well-known Udemy and Skillshare. Udemy is using a pay-per-course charge for its mentees while the revenue model for mentors is proportional with the number of registrations, Skillshare is using monthly subscriptions, paying the mentors based on a "streaming model" [14].

A new, technology oriented KTP (WisdomOfAge [15]) is currently under development by an international team of specialists [1,5] which aims to exploit one of the growing unused resources, namely senior specialists with extensive experience in technological processes, which should provide on-site, on-time and on-demand support for new/developing companies for their specific needs.

As it was already shown in this paper, KTPs that provide information transfer exist worldwide, but even the more professional oriented ones do not focus on providing support for the specific needs of companies or trainees. However, in order to fill this gap in an efficient manner, the user profiles targeted by the platform and their needs must be identified and integrated (figure 1).

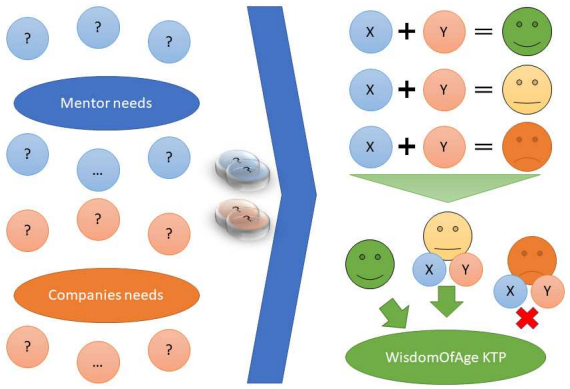

Fig. 1. Identify, sort and integrate the different user types needs into the WisdomOfAge platform.

2.1 WisdomOfAge mentors

The new KTP platform aims to solve a growing social challenge referring to the well-being of senior experts that are closing to/reaching retirement age where they experience a change from an active towards a passive role in the society.

While the overall benefits and specific challenges of developing on-line tools suitable and attractive for seniors with extensive technical expertise was discussed in [1], the authors focus now on the definition of their needs, requirements and expectations to get involved and use a KTP.

Based on several workshops organised at European level with selected groups of seniors and technology focused companies, figure 2 illustrates the results of the MoSCoW analysis on the platform functions.

In order to determine the specific needs of the senior users, during the organised workshops, they were provided with a general presentation of the KTP concept and requested to identify the most important needs/ characteristics/ requirements the platform should have.

Must have	Should have
✓ Register ✓ Login ✓ Create profile ✓ Collect payment req. ✓ Change password ✓ Matchmaking	❑ Search for a user ❑ Create content and courses ❑ Communication tools ❑ Progress tracking ❑ Feedback management
Could have	**Won't have**
o Link other social media o Change platform language o User manual/ tutorials o Monitor trainer's activity o Schedule management	▪ Advertising ▪ Uncontrolled profile access ▪ Unsupervised communication

Fig. 2. MoSCoW analysis of platform functions

Interface. The interface must be easily readable, visually attractive, without animations, large fonts, colour blind friendly (no red/green), a good search function, intuitive.

Registration/Application Process. This process must be multilevel structured, easy to start with, enabling the adding of further information at later times.

Matchmaking Tool. As users are willing to commit some time to the platform but not 8 hours daily an efficient matchmaking tool should be created to relate mentors with companies correctly. Seniors expressed the fact that companies should be looking for them (their expertise) and not vice versa.

Private Sessions. As to provide specific assistance, once the matchmaking tool relates an expert with a client, they must work in private sessions, due to security, copyright, privacy.

Data Security. The system must be secure for the older user avoiding any spam which could lead to data breach.

Fee Policy. Seniors opted for specific fee policies being willing to assist NGOs and start-ups for free, but to charge for their services otherwise. The costs policy should be done on individual bases not to hinder access to the platform based on fees.

Communication. Mentors would like to communicate among them, share ideas and experiences but this must be separated from the relationship with the companies/mentees.

Content Format. Mentors are willing to share their experience and support developing businesses but without having to create "general use" videos/documents, as to serve as consultants rather than educators.

Workload. Mentors should be able to decide on their time spent on the platform and when all their allocated time is distributed, the matchmaker should not pick them up.

These requirements have been analysed using the Analytical Hierarchy Process tool [16] which enables the definition of their importance and amount of effort required for their implementation.

Group
VOC

VOC AHP Prioritization

Is the row item - more important (>1), - equally important(1), or - less important (<1) compared to the column item?	Content format	Interface	Reg./app. process	Fee policy	Communication	Workload	Private sessions	Matchmaking tool	Data security	Importance in Group
Content format	1	1	1/2	1/2	1/2	1/2	1/4	1/5	1/5	4%
Interface	1	1	1	1/2	1/2	1/2	1/4	1/5	1/5	4%
Reg./app. process	2	1	1	1	1	1	1/3	1/3	1/3	7%
Fee policy	2	2	1	1	1	1	1/3	1/4	1/4	7%
Communication	2	2	1	1	1	1	1/3	1/3	1/3	7%
Workload	2	2	1	1	1	1	1/2	1/3	1/3	8%
Private sessions	4	4	3	3	3	2	1	1	1	19%
Matchmaking tool	5	5	3	4	3	3	1	1	1	22%
Data security	5	5	3	4	3	3	1	1	1	22%
Consistency (Lamda - N):	0.08									

Fig. 3. Prioritization results for the critical requirements defined by senior mentors

All the legal aspects and privacy regulations are considered as standard compulsory features which must be agreed upon registration and then enforced by the platform, according to all and upcoming regulations.

2.2 WisdomOfAge mentees

As already pointed out WisdomOfAge is targeting, for the second set of users, the mentees, students, young engineers, and companies working in the technological field, which, based on the requirements to survive on the global markets would represent a boost. This would increase the competitiveness of European companies, no matter their size. Digital Twin, the company leading the development team has a pool of over 1500 individuals from international companies which benefit from their training resources. As the existing content provides somewhat standard courses many companies requested more specific support, with extremely positive feedback on the WisdomOfAge idea. In a complementary survey upon these companies, their requirements have been analysed.

Registration process. Simple and fast, with possibility to setup the privacy level. Some companies expressed the need to remain private.

Matchmaking Tool. Must be capable to provide/generate reliable mentor results based on very specific search terms and conditions. In case of multiple results, a hierarchy should be

displayed enabling the company to select the best options.

Search Function. While mentors nominalization, before going into direct contact was not requested, the possibility of conducting survey on the competences, availability and expertise on different topic is very important.

Private Sessions. Answering the statement of the platform, the companies are mainly interested in specific one-on-one services, which would be different from the already available on-line services.

Mentors Ranking. Even with different fees, the companies would like to be able to decide, when more options are available for a certain request, to choose the mentor based on a ranking system.

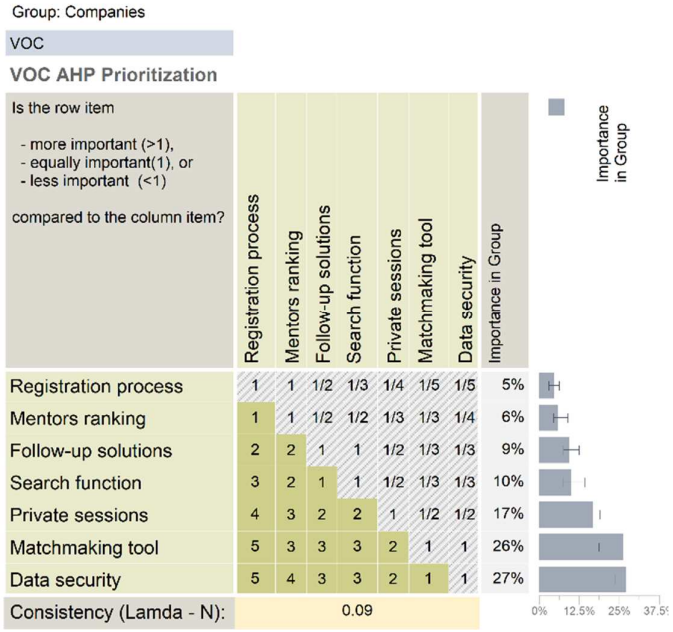

Fig. 4. Prioritization results for the critical requirements defined by companies

Data Security. As many aspects could target future products/technologies data security is really important, along with non-disclosure agreements (NDA) on certain aspects. The NDA should be signed on an individual bases between the mentor and the company.

Follow-up Solutions. As direct contact is not necessarily requested, the use of the same mentors based on exceptional previous work or vice-versa, rejecting a mentor in case of a non-efficient work. This should not be known for the mentors.

3. OVERVIEW OF THE IDENTIFIED REQUIREMENTS

The data from the two sets of analysis reveals some joint requirements and several independent one for each type of user.

The joint requirements, data security, the matchmaking tool and private sessions represent in the same time the most critical features for both types of users, illustrating that these should be the development priorities for the new KTP.

Data Security. The companies see this feature as the most important one as on the global markets it is important for each player to preserve its internal results, strategies and products, especially when they integrate unique selling points.

For the senior users, the experience and competences they share represent the result of a work spread over multiple decades and each mentor values its own achievements and competencies.

Matchmaking Tool. The success of WisdomOfAge is highly reliant on the capability of properly connecting mentors with the

companies which request specific assistance or consultancy.

The development team envisions the use of AI agents as detailed in [5]. The use of convolute neural networks on already existing databases will enable the testing of multiple options on reliable data, allowing the selection of the best possible configuration for the final solution. The training algorithm for the ANN is selected (Gradient descent, Newton method, Conjugate gradient, Quasi-Newton method, Resilient Backpropagation or the Levenberg-Marquardt algorithm) based on multiple parameters: the confusion matrix four prognostics, the accuracy, sensitivity, specificity, geometric mean or the Receiver Operating Characteristic. To provide the necessary information for the AI agents, a specific set of input data is required for the senior engineers when enrolling in the platform, which is achieved in a standardized manner. On the companies' side forms with standard keywords will support an efficient use of the AI agents.

Private Sessions. Both types of users have shown great interest in one of the unique selling propositions of WisdomOfAge, namely the focus one-on-one sessions between the mentors and the mentees which is the key of providing specific assistance rather than general information about a subject. A specific observation from the mentors which might interfere with the intentions of some companies is the fact that through these services they will provide mentorship, advice, counselling, but under no circumstance decisions for the company. The mentors expressed specifically the fact that they want to be paid strictly for the mentorship services and not be employed by the company. This means that in every case any managerial/ business decision will be taken and assumed by the companies.

The other requirements are generally straightforward and do not require large implementation efforts, as they just define the specifics of the platform.

4. KTP FUNCTIONALITIES

Based on the initial feedback from the envisioned platform users, the developers have defined a set of four major functionalities and subsets for each of them. Figure 5 illustrates these functionalities. In addition, there are several aspects, non-functional, which should be implemented to ensure the platform successful implementation.

Accessibility. The website will host, as users, seniors which require specific elements different from classical web interfaces: larger fonts, text alternatives for video and image content, proper contrast between the elements features on a page and content organized according to the latest Web Content Accessibility Guidelines (ver. 2.1 - 2018). As the platform aims to have European spread it must incorporate multiple languages, which, should cover first at least English, French and German.

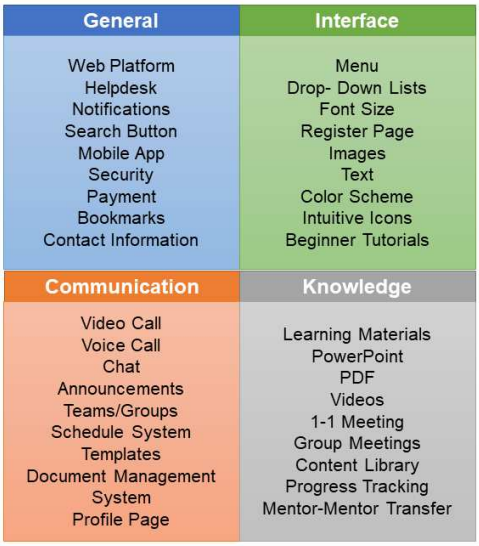

Fig. 5. Main platform functionalities

Security. Apart from a simple description available on the home page, all content must be secured and encrypted. Specifically, all users will have password protected accounts and all transaction data will be transmitted in encrypted form. Considering Intellectual Property Rights, access to documents and other information shared should only be accessible to registered users.

Legal. The site should notice the users regarding cookies, allow them to customize and request users' consent. The site should provide information on privacy policies about the collection, handling, and processing of user data. A link to the privacy policies should appear with the Consent for cookies pop-up. Upon creating a user profile, the users should be presented with

the terms and conditions of the website, request consent and agree GDPR (General Data Protection Regulation). The terms and conditions page should include disclaimer limiting liability in case of errors, copyright, and privacy policies.

Browsers and Devices. The website should feature a mobile version for better usability on mobile devices and tablets, for both Android and iOS operating systems. The website should be compatible with and perform well on the top 6 browsers - Chrome, Safari, Firefox, Microsoft Edge, Opera and Brave.

5. CONCLUSIONS

The paper presents the development of a new knowledge transfer platform focusing on the proper identification of the user needs and requirements and their prioritization in terms of criticality.

The current evolution of digital communication has lead, on a worldwide level, to the existence of multiple large communication platforms widely used by users of all ages. However, due to the extremely large volume and uncontrolled flow of information it became clear that these platforms are suitable for non-technical and non-professional discussions but improper for more specific usability. This led to the development of smaller, professional on-line platforms, one such area being the knowledge transfer and education. However, the content, even though verified, is non-specific.

The authors proposed an innovative approach, focusing on the development of a knowledge transfer platform, WisdomOfAge, with a unique selling point, which brings together senior specialists in engineering and technological domains willing to provide, on-time, on-site specific support for companies which face different challenges. To ensure a proper and successful development strategy several co-creation workshops were and will be organized, targeting seniors from 3 countries for identifying the specific user needs and requirements. The data from each major group of users are analysed to identify the priorities of each group. This information leads to the definition of the main platform functionalities and multiple aspects regarding the content, structure and accessibility.

As the matchmaking tool revealed to be one of the most important platform features, future work will focus on its implementation using efficient artificial intelligence agents.

6. ACKNOWLEDGEMENTS

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ANALIZA NEVOILOR ȘI CERINȚELE UTILIZATORULUI PENTRU O PLATFORMĂ DE TRANSFER DE CUNOAȘTERE DEDICATĂ SENIORILOR BAZATĂ PE IA

Rezumat: Dezvoltarea unei Platforme de Transfer de Cunoștințe la scară europeană trebuie să răspundă nevoilor tuturor utilizatorilor săi preconizați, creând în același timp un mediu eficient și stabil, care să recunoască toate provocările interculturale și să se adapteze la cerințele fiecărui tip de utilizator: mentori, companii sau echipă de dezvoltare. O analiză detaliată a acestor nevoi este prezentată în lucrarea care acoperă nevoile independente ale fiecărui grup și analizează posibilele interferențe grupate în trei categorii: pozitive, neutre și negative. Această analiză determină dezvoltarea ulterioară a platformei și reprezintă un aspect critic în realizarea unui mediu atractiv care poate ajunge la scară europeană.

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