

Kyiv National University of Trade and Economics

Department of Digital Economy and System Analysis

GRADUATION QUALIFICATION WORK

on the topic:

“Development of information management system of

IT enterprise’s intellectual potential”

on the basis of SOFTUUP LLC, Kyiv

Student of the 2nd year, 1m group,

specialty

051 “Economics”

specialization

“Digital Economics”



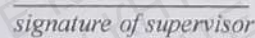
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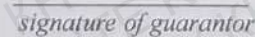
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Kyiv 2020

Kyiv National University of Trade and Economics

Faculty of Information Technologies

Department of Digital Economy and System Analysis

Educational degree Master's degree

Specialty 051 "Economics"

Specialization "Digital Economics"

Approved by

Head of the department _____ A.A. Roskladka

"15" January 2020

Task for the graduation qualification work for

Alona Kashpruk

(full name)

1. Topic of the graduation qualification work:

"Development of information management system of IT enterprise's intellectual potential"

Approved by the KNUTE decree from "2" December 2019 № 4145

2. Deadline for submitting the finished work by the student "05" November 2020

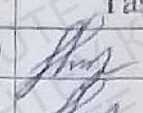
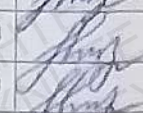
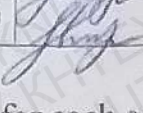
3. Target setting and initial data to work:

The purpose of the study: to analyze theoretical, methodological and practical aspects of IT enterprise's intellectual potential management, develop the prototype of information management system of IT enterprise's intellectual potential with a preliminary theoretical substantiation and empirical study of the effectiveness of the existing systems at the enterprise under research.

The object of the study: IT enterprise's intellectual potential management process.

The subject of the study: theoretical, methodological and practical bases of IT enterprise's intellectual potential management.

4. Advisors on work with the indication of the sections on which counseling is carried out:

Section	Advisor (full name)	Signature, date	
		Task issued	Task accepted
1	O.M. Ivanova	15.01.2020	 15.01.2020
2	O.M. Ivanova	15.01.2020	 15.01.2020
3	O.M. Ivanova	15.01.2020	 15.01.2020

5. Contents of the graduation qualification work (list of questions for each section)

INTRODUCTION

SECTION 1. THEORETICAL FUNDAMENTALS OF IT ENTERPRISE'S INTELLECTUAL POTENTIAL MANAGEMENT

1.1. General characteristics of the concept of an enterprise's intellectual potential

1.2. The essence of methodological approaches to the analysis of the effectiveness of intellectual and knowledge assets management of enterprise

Conclusions to the section 1

SECTION 2. ANALYSIS OF INTELLECTUAL POTENTIAL MANAGEMENT OF SOFTUUP LLC

2.1. Analysis of the quality of intellectual potential management system of the enterprise

2.2. Comprehensive assessment and analysis of the effectiveness of intellectual potential management of the enterprise

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SECTION 3. DEVELOPMENT OF THE PROTOTYPE OF THE INFORMATION MANAGEMENT SYSTEM OF IT ENTERPRISE'S INTELLECTUAL POTENTIAL

3.1. Modeling IT enterprise's intellectual potential management system at the organizational level

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6. Calendar plan of work performance

№	Name of stages of graduation qualification work	Term work performance stages	
		according to the plan	actually
1	2	3	4
1	<i>Choosing the topic of the graduation qualification work</i>	01.12.2019	01.12.2019
2	<i>Development and approval of the task for the graduation qualification work</i>	15.01.2020	15.01.2020
3	<i>Introduction</i>	01.06.2020	
4	<i>Section 1. Theoretical fundamentals of IT enterprise's intellectual potential management</i>	25.06.2020	
5	<i>Section 2. Analysis of intellectual potential management of SOFTUUP LLC</i>	02.09.2020	
6	<i>Preparation of an article in the collection of masters' scientific articles</i>	07.09.2020	
7	<i>Section 3. Development of the prototype of the information management system of IT enterprise's intellectual potential</i>	19.10.2020	
8	<i>Conclusions</i>	02.11.2020	
9	<i>Submission of the graduation qualification work to the department to the scientific supervisor</i>	05.11.2020	
10	<i>Preliminary presentation of the graduation qualification work</i>	20.11.2020	
11	<i>Correction of remarks, external review of the graduation qualification work</i>	23.11.2020	
12	<i>Presentation of the finished stitched graduation qualification work to the department</i>	25.11.2020	
13	<i>Public presentation of the graduation qualification work</i>	According to the work schedule of the EC	

7. Date of the task issue "15" January 2020

8. Scientific supervisor of the graduation qualification work

O.M. Ivanova
(surname, initials, signature)

9. Guarantor of educational program

V.F. Hamalii
(surname, initials, signature)

10. The task was accepted by the student


A.V. Kashpruk
(surname, initials, signature)

11. Feedback from the scientific supervisor of the graduation qualification work

Scientific supervisor of the graduation qualification work

05.11.2020

(signature, date)

Pre-presentation mark _____

(name, signature, date)

12. Conclusion on the graduation qualification work

The graduation qualification work of the student A.V. Kashpruk

(surname, initials)

may be admitted to the presentation of the examination board.

Guarantor of educational program _____

V.F. Hamalii

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(signature, surname, initials)

“ ”

2020

Abstract

The graduation qualification work is dedicated to the theoretical, methodological and practical aspects of IT enterprise's intellectual potential management. It allows investigating the basic principles of enterprise's intellectual potential management and ways of its improvement. Approaches to determining strategic structural components and factors which influence the successful functioning of the IT enterprise's intellectual potential management system are defined and systematized. The analysis of the current state of intellectual potential management of IT enterprise is performed. The generalized systems of IT enterprise's intellectual potential management are developed.

Keywords: intellectual potential, intellectual capital, knowledge management system, IT enterprise's management.

Випускна кваліфікаційну роботу присвячено теоретичним, методичним і практичним аспектам управління інтелектуальним потенціалом ІТ-підприємства. Представлена робота дозволяє дослідити основні засади та напрями підвищення ефективності управління інтелектуальним потенціалом підприємства. Окреслено та систематизовано підходи до визначення стратегічних структурних компонентів та факторів, що впливають на успішне функціонування системи управління інтелектуальним потенціалом ІТ-підприємства. Проведено аналіз сучасного стану управління інтелектуальним потенціалом ІТ-підприємства. Розроблено узагальнені системи управління інтелектуальним потенціалом ІТ-підприємства.

Ключові слова: інтелектуальний потенціал, інтелектуальний капітал, система управління знаннями, управління ІТ-підприємств

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LIST OF SYMBOLS

KM – knowledge management

KMS – knowledge management system

IP – intellectual potential

IPM – intellectual potential management

INTRODUCTION

The relevance of the research is determined by the necessity to organize and maintain proper IT enterprise's intellectual potential management strategy in order to sustain productive functioning of a company, create value, and meet the company's organizational goals.

Such elements as intellectual capital and knowledge management system play the crucial role in the enterprise's intellectual potential management. Intellectual assets which contain an enterprise's employee knowledge, skills, trainings or any proprietary information that may provide the company with a competitive advantage should be organized properly.

Many Ukrainian and foreign authors have devoted considerable attention to the problems of structure, development, usage and management of intellectual potential, among which we can highlight Milner B., Bulatetskaya A., Semin A., Zambon S., Marzo G., Girella L., etc.

Intellectual capital which is a constituent element of the enterprise's intellectual potential is profoundly studied by Bashirova A., Yemialyanau A., Gafiyatullina A., etc.

The research of knowledge management aspects is performed in the works of scientists and experts in the knowledge management strategy: Devece C., Palacios D., Martinez-Simarro D., Gupta J., Sharma S., Omotayo F., Perera R., etc.

Many researchers complement each other on methodological approaches to management and analysis of the intellectual potential components of the enterprise.

The purpose of the study – to analyze theoretical, methodological and practical aspects of IT enterprise's intellectual potential management, develop the prototype of information management system of IT enterprise's intellectual potential with a preliminary theoretical substantiation and empirical study of the effectiveness of the existing systems at the enterprise under research.

The purpose of the research has caused the necessity of solving the following objectives:

- to reveal the essence of the enterprise's intellectual potential;

- to define the main constituent elements of the enterprise's intellectual potential;
- to analyze methodological approaches to the analysis of the effectiveness of intellectual and knowledge assets management of enterprise;
- to analyze the formation of IT enterprise's intellectual potential management system;
- to assess and analyze the effectiveness of intellectual potential management of the IT enterprise;
- to create the generalized organizational management structure of IT enterprise's intellectual potential;
- to determine possible risks in the intellectual potential management;
- to develop the prototype of the knowledge management system of IT enterprise.

The object of the study – IT enterprise's intellectual potential management process.

The subject of the study – theoretical, methodological and practical bases of IT enterprise's intellectual potential management.

The empirical basis of the research – IT company SOFTUUP LLC which functions in the sphere of software development; creates business solutions, tests hypotheses and the impact of products on the market. SOFTUUP LLC is located at the address: Ukraine, Kyiv city, Inzhenerna Street, 1B.

Research methods. The survey method is applied which implies the data collection by questioning individuals in order to analyze the effectiveness of management through establishing the level of employees' satisfaction. The dialectical method is used in the work – the method of scientific abstraction is applied, which implies the selection of typical, stable tendencies in the researched process or phenomenon; the method of induction – theoretical conclusions, generalizations based on the study of individual facts, calculations are formulated. The method of formalization is used – the study of objects by displaying their structure in sign form using the language of mathematics. Methods of analysis and synthesis are used – the separation of the constituent parts of the subject, their study and further combination into a whole, taking into account the relationships

between them. The calculation-analytical method is applied – formulas were used and mathematical calculations were performed.

Information support of the research consists of scientific articles, monographs, magazine publications, textbooks, statistical data, information websites, other scientific publications. The set of tasks of economic calculations automation are used in the work created by the means of Excel. The UI design of the knowledge management system is created with the help of Adobe Photoshop.

The practical significance of the study. The results of the study are of practical importance and will be used in the enterprise's activity. In particular, the practical implementation of the offered enterprise's intellectual potential system can be useful in organizing and maintaining the effective company management and stimulate the growth of the company.

Approbation of research results. According to the results of the research, a report was presented at the conference of KNTEU students "Scientific research of student youth", section "Applied aspects of information technology" on the topic: "IT enterprise knowledge management system in the conditions of remote workflow", which took place on April 7-8, 2020.

According to the results of the conducted research, a scientific article on the topic "Knowledge management system as a component of IT enterprise's intellectual potential management" was published, which was included in the collection of scientific articles of KNUTE students "Digital Economy", Kyiv 2020.

Work structure. The work consists of an introduction, three sections, conclusions, a list of references and appendices, which contain (table with the compilation of software tools which are commonly associated with KMS, methods of calculating the main coefficients for assessing the intellectual potential of the enterprise, the questionnaire for measuring intellectual potential and capital, the UI design of the KM platform). The total volume of the work is 90 pages. It contains 18 tables, 18 figures, 4 formulas. Number of used references – 42, their list is given on 6 pages.

SECTION 1

Theoretical fundamentals of IT enterprise's intellectual potential management

1.1. General characteristics of the concept of an enterprise's intellectual potential

In the modern conditions of transformational changes in enterprise management and economy the role of mechanisms based on intangibles (intellectual resources) become more relevant. Among enterprises in different fields, the following tendency is clearly traceable in IT industry. Software enterprises in particular face a huge challenge complicated by the need to align the rapidly evolving technologies with the business objectives. The software industry is complicated and requires project management expertise in areas of software development and testing, quality assurance, implementation, user security, internal controls, customer relationship and change management, business processes and many other spheres. The intellectual potential is the main intangible resource that contributes to the effective development of the enterprise.

Nowadays many Ukrainian and foreign scientists pay a lot of attention to the category of intellectual potential of an enterprise and its structural components. The literature of the 21st century illustrates various opinions of different proponents of the determination of such notion as "intellectual potential". A lot of scientists determine the intellectual potential as a complex of knowledge. Taking into consideration the essence of the concept of knowledge, it should be highlighted that it is an important strategic asset in the system of information engineering of an enterprise.

Such foreign economists as Stewart T., Edvinsson L., Swibee K., Petty R. and Guthrie J. defined the intellectual potential of the company (enterprise) as the knowledge, which can become for it a source of additional competitive advantages. They assumed that the intellectual potential of the company represents the scope of the new knowledge, which it can use in order to enhance its competitive ability [19, p. 27].

Milner B. determined the intellectual potential as some complex of knowledge. In his work defines knowledge as "complex of the collective knowledge of enterprise

employees, their creative abilities, abilities to solve problems, leadership skills, business and managerial skills” [22, p. 115].

Bashirova A. and Osokina I. represent other approaches to the substantiation of the notion of the enterprise’s intellectual potential. Bashirova A. equated the intellectual potential with the human capital and considered it as “knowledge, which can be transformed into profit and assessed” [5, p. 12].

Osokina I. defined it as the “complex of knowledge, in large measure or partially alienated from its creators and being of the commercial value for the enterprise and its partners” [26, p. 69].

The intellectual potential of an enterprise is its internal and external capabilities, consisting of the following: the human potential of an enterprise, infrastructure potential of an enterprise, “corporate memory”, research and development work, innovative projects at the stage of development and implementation. All this ensures the formation of the intellectual capital of the enterprise [6, p. 1745].

There are other different interpretations of the concept of an enterprise’s intellectual potential. A great number of modern scientific works represents a wide range of approaches to the structural elements of the enterprise’s intellectual potential which combining represent the basic forms of realization of intellectual potential (Figure 1.1).



Figure 1.1. Main forms of intellectual potential realization

Source: own elaboration

The most widespread general approach to the defining intellectual potential is its division into human, structural, information and relationship potential. Their general characteristics are represented in the Figure 1.2.

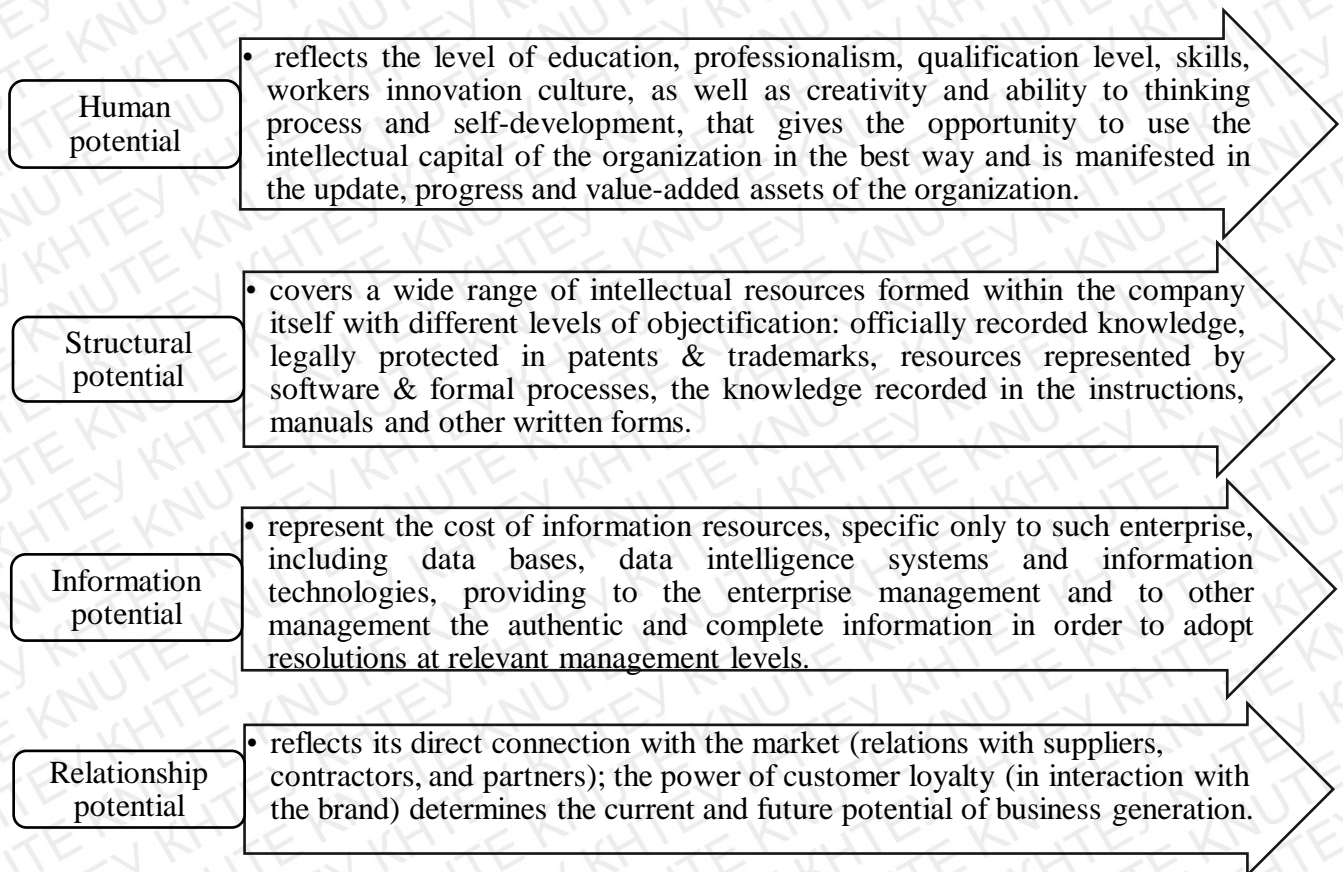


Figure 1.2. Constituents of intellectual potential

Source: designed by the author based on [6, 11, 18, 38]

Semin A. and Lukinyk M. offer a wide list of intellectual potential elements, which should be involved in the intellectual potential: organizational, an intellectual personnel, a creative and professional qualification potential, a human, organizational and client potential, innovative, managerial, marketing, informational, educational potentials, a level of education and qualifications of employees, an enterprise information support system, investments in the human potential, intangible assets and modernization of a service quality, means, conditions, opportunities, personnel, material-and-technical, effective, informational, and organizational-and-legal potential [29, p. 1034].

To the peculiarities of contemporary stage researches some certain management mechanisms of the intellectual potential and its components can be defined. For instance, Lazareva L., Stebenyaeva T. and Khudoley G. define such notion as intellectual potential of an enterprise as the complex of its basic structural components (human, relational and organizational capital, informative and dynamic potential), able, provided targeted

managerial influence, to enhance the efficiency of production activities of an enterprise, provided changed factors of the external and internal environment of its functioning. They established three basic structural components of the intellectual potential of an enterprise, namely: human capital, social (relational) capital and the organizational (structural) capital [19, p. 29].

The factors of intellectual potential management include such criteria as: quality of management, innovations, consumer preferences in three main areas (coverage and strength of the distribution network, brand and quality of customer relationship management), quality of strategy, investor relations, development of creative potential (ability to attract and retain talented professionals, to encourage and stimulate creativity) [6].

Following basic provisions of the concept of dynamic capabilities, it became necessary to include the new component – the dynamic one [19] into the structure of the intellectual potential of an enterprise. Nowadays such structural element of the enterprise's intellectual potential, as its dynamic capability is extremely important. It represents a capability to build up other elements over time in order to use it as a new opportunity to gain additional competitive benefits and increase of the efficiency of an enterprise's production activities.

As information and analytic systems are functioning within the rapidly changing environment, it is necessary to take into consideration dynamic capabilities of each enterprise in the process of its use of information and other kinds of resources for the organization of its production activities. That's exactly why in modern conditions many researchers put more focus to the concept of both dynamic capabilities and key courses of its development [3].

The economic essence of the dynamic component is that the enterprise has got dynamic capabilities, allowing it to react promptly to the change of the environmental influence, as well as to timely and efficiently transform other structural components of the intellectual potential of an enterprise in conformity with changing conditions [17, p.118].

Based on the dynamic approach to the determination of the concept of the enterprise's intellectual potential Lazareva L., Stebenyaeva T., Khudoley G. reveal the most widespread definition of the category of the enterprise's intellectual potential. It states that an intellectual potential of the enterprise implies its ability to generate future economic profits from existing intangible resources (human capital) [19, p. 28].

Stepanchuk S. determines the intellectual potential as a system with its inherent elements: intellectual capital; knowledge management system, links and properties (innovation, competitiveness); security system (informational, functional, organizational) [30, p. 66].

We consider it necessary to dwell in more detail on the issue of intellectual (human) capital and knowledge management system which have been a main point of discussion including both theoretical research and applications that are practically oriented during the past decade. It has emerged on the basis of the larger trend of transferring competitive advantage from the enterprise's tangible assets to intangible ones, for example, knowledge base, trademarks, the structure and content of computer systems.

The strategic resource of any country is its human capital, and its basis is intellectual capital. The notion of intellectual capital implies the relationship of knowledge, experience and basic competencies of personnel, corporate relationship and communication with partners and clients, which provide the formation of added value and unique competitive advantages.

Yemialyanau A. states that the concept of intellectual potential is similar to the concept of intellectual capital, but if elements of intellectual capital are involved in the activities of the enterprise and bring in income, then the elements of intellectual potential are not fully involved in the enterprise's activities and at a certain point in time do not bring income, but have the ability to bring it in the future [36, p. 116].

The enterprise personnel intellectual potential is a part of the intellectual capital, which reflects the level of education, professionalism, qualification level, skills, workers innovation culture, as well as creativity and ability to thinking process and self-development, that gives the opportunity to use the intellectual capital of the organization

in the best way and is manifested in the update, progress and value-added assets of the organization [11, p. 119].

Another important element of intellectual potential is a knowledge management. Proper KM is crucial for IT enterprises as it speeds up access to information and knowledge, improve decision-making processes, promote innovation and improve the efficiency of an organization's operating units and business processes. Nowadays the following factors are extremely significant as rapid changes are experienced by IT industry. Thus, IT enterprises should be more flexible and able to react quickly to all the new trends appearing. The role of KM in IT enterprises is very important especially for document management, storage, search and knowledge sharing, transfer and storage to improve organizational effectiveness.

Traditional knowledge management system is often regarded as a technology that helps the creation, capture and transfer of knowledge. We adhere to the opinion illuminated by Helpjuice Company that knowledge management system refer to any kind of IT system that stores and retrieves knowledge, improves collaboration, locates knowledge sources, mines repositories for hidden knowledge, captures and uses knowledge, or in some other way enhances the knowledge management process. The definition of these systems seems vague considering the fact that there is no consensus regarding knowledge management and what constitutes a knowledge management system. Furthermore, since knowledge management is involved in all areas of the firm, strict definition is very difficult [40].

As many scientists define the intellectual potential as a complex of knowledge the following figure is created to illustrate a scheme of knowledge management lifecycle (Figure 1.3).

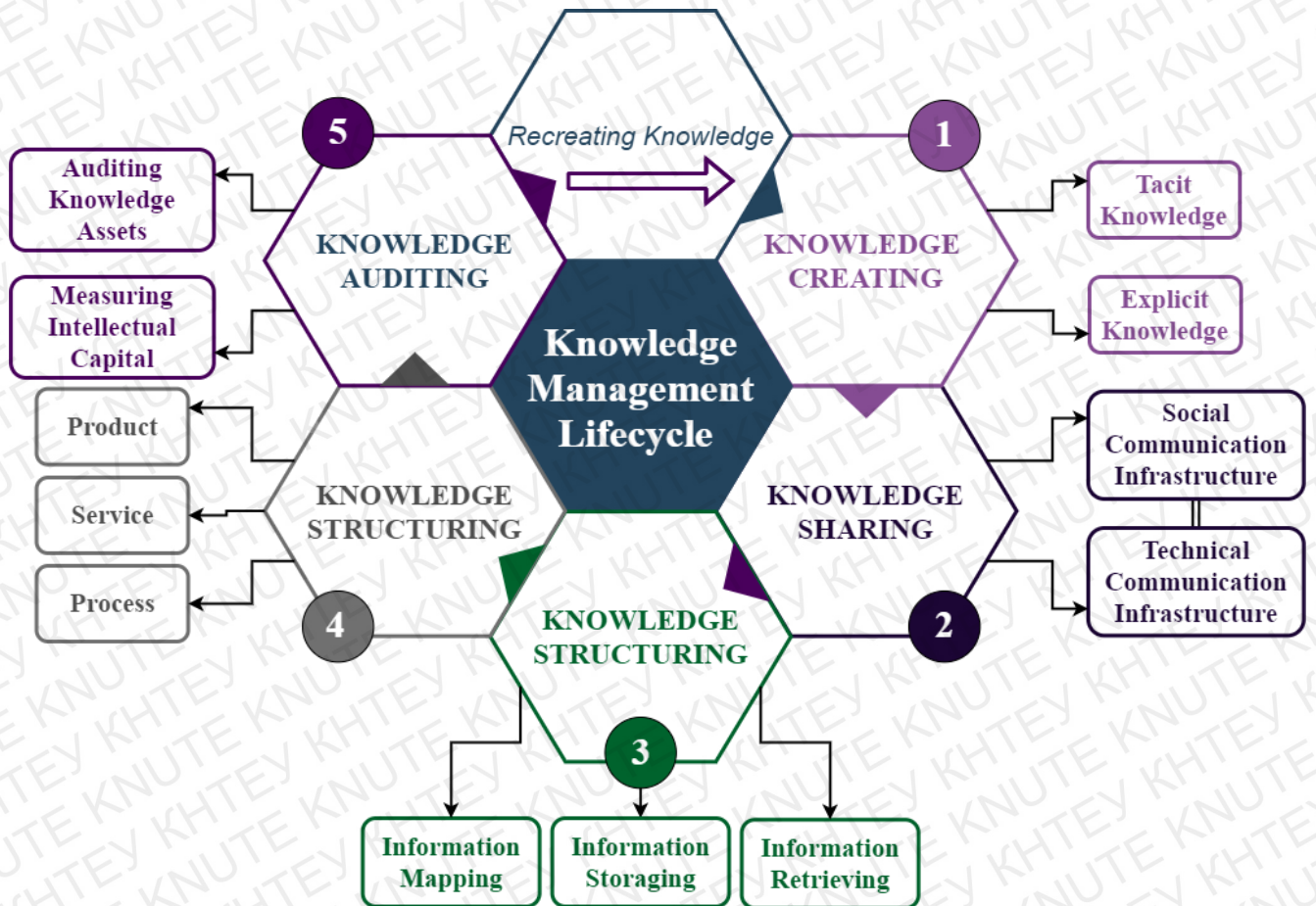


Figure 1.3. Knowledge management lifecycle

Source: designed by the author based on [40]

Implementation of KMS in enterprises brings visible results, mostly: increasing profits, cost savings, improving customer service, quality improvements, processes improvements. Among the variety of modern technical capabilities, we have defined general categories of software tools and technologies which are used to facilitate the KM processes in organizations and that cover the vast majority of systems associated with knowledge management system (Appendix A).

The main functions of intellectual potential, the results and level of which are determined by intellectual recourses of an enterprise and its employees are represented in the table below (Table 1.1).

Table 1.1

Main functions of intellectual potential

Function	Characteristics
Informational	which lies in the enterprise supply of informational recourses and the fulfillment of generally known changing actions on them (accumulation, systematization, processing, saving, application, shift); concerning the informational recourses, they are the core component of intellectual recourses formation.
Analytical	being grounded on the existing intellectual recourses and arising from the previous function, it is expressed by the ability to finding and detailed investigation, analysis of actual and possible managing problems of an enterprise, formation of objective, well-grounded conclusions according to the results of their fulfillment.
Investigating	ensures the creating of previously unknown and the imperfection of actual intellectual recourses, conducting of theoretical and applied research with the aim of the search of ideas, decisions, etc.
Creative	generally lies in non-standard problem solution of an enterprise problems (type of intellectual recourse as individual abilities of employees.
Innovational	is mainly ensured by the fulfillment of previously described functions and is expressed by the activity connected to the creation and application of innovations.
Motivational	caused by the fact that the existence of certain abilities (the very potential), their understanding encourages the employees to work intellectually, in connection to the receiving of new or application of actual intellectual recourses.

Source: designed by the author based on [14, 15]

To sum up, in the scientific literature there is no clear determinations of the concept and components of intellectual potential. The core idea of it implies that it is the main intangible resource and factor which contributes to the effective enterprise development by using all of the existing resources. Intellectual potential of an enterprise includes opportunities which are offered by the numerous intellectual resources in a certain period of time and further in the future, with the main aim to solve determined problems or to achieve established goals. After analyzing a number of different approaches to the IP components, for the further analysis of intellectual potential management of IT enterprise, we define that the structure of IP system consists of KMS (a software), intellectual capital (combination of human, structural and customer/relationship capital). We consider the IP as a complex of knowledge, research and development work, innovative activities, professionalism, qualification level, skills, as well as creativity and ability to self-development, that gives the opportunity to use the IP of the enterprise in the best way.

1.2. The essence of methodological approaches to the analysis of the effectiveness of intellectual and knowledge assets management of enterprise

The issue of calculating the intellectual potential of an enterprise, its use and formation in socio-economic development of the country from an innovation point of view is significant, and from the economic point of view is extremely appropriate.

To the most characteristic indicators that determine the assessment of the enterprise's intellectual potential are mentioned in the Figure 1.4.

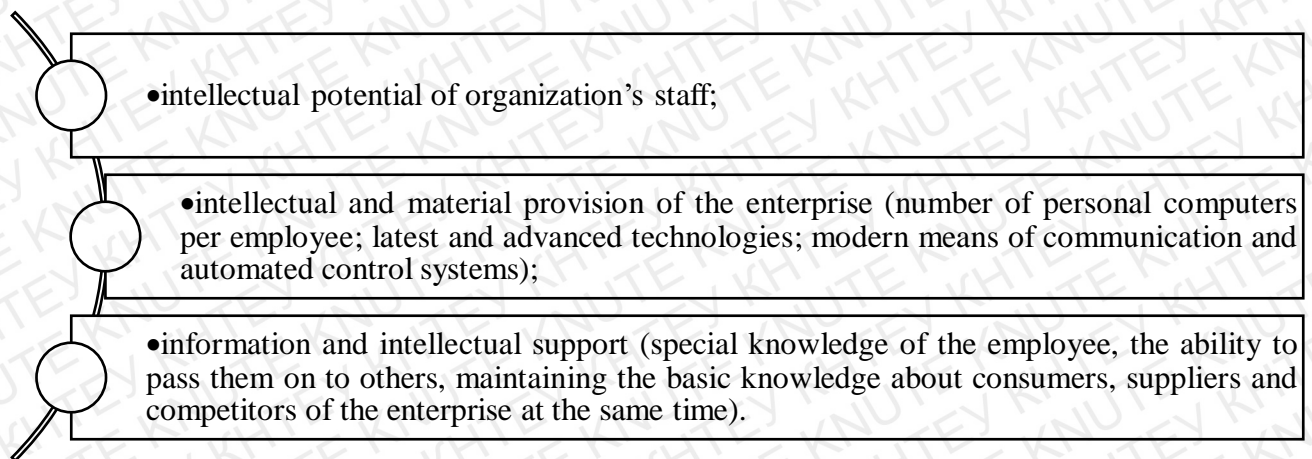


Figure 1.4. Indicators of enterprise's intellectual potential

Source: own elaboration

Thus, in order to assess the effectiveness of intellectual and knowledge assets management of an enterprise a profound complex analysis of many factors of the enterprise's intellectual potential development should be made. It is clear that there are factors which affect intellectual potential development of the enterprise, both negatively and positively, restrain or cause the growth of the enterprise's development. For example, intellectual capital is one of the main criteria for evaluating the activities of any enterprise, because the state of the modern process production is constantly changing and updating, therefore, it is possible to claim about its real value only in view of the creative abilities of the staff, its professional skills, dedication, achievements of specialists, results from activities, etc. Other factors which provide competitiveness of the enterprise are mentioned in the Table 1.2.

Table 1.2

Factors of the enterprise’s intellectual potential development

Which restrain development	Which stimulate the growth of development
<ul style="list-style-type: none"> <input type="checkbox"/> lack of intellectual property rights; <input type="checkbox"/> high degree of risk of the enterprise; <input type="checkbox"/> insufficient number of scientific and technical developments; <input type="checkbox"/> lack of assessment of intellectual potential; <input type="checkbox"/> insufficient investment; <input type="checkbox"/> lack of innovation and fear of the new; <input type="checkbox"/> insufficient level of specialists’ experience. 	<ul style="list-style-type: none"> <input type="checkbox"/> availability of intellectual property rights; <input type="checkbox"/> high level of profitability; <input type="checkbox"/> sufficient and high-quality number of scientific and technical developments; <input type="checkbox"/> qualitative and clear approaches to the assessment of intellectual potential; <input type="checkbox"/> significant support from investors and the possibility of capitalization of own funds; <input type="checkbox"/> availability of innovations and high-tech products; <input type="checkbox"/> high level of specialists’ experience.

Source: own elaboration

Intellectual capital contains some components which will be assessed in further research in order to make a complex analysis of the enterprise’s intellectual potential (Figure 1.5).

Intellectual human capital	<ul style="list-style-type: none"> • level of intelligence, knowledge, creativity and enterprise’s personnel skills
Intellectual property	<ul style="list-style-type: none"> • patents, licenses, know-how, trademarks, inventions, software security, etc.
Consumer capital	<ul style="list-style-type: none"> • enterprise’s relations with potential consumers of its products
Organizational or structural capital	<ul style="list-style-type: none"> • software and hardware support, organizational structure enterprises (patents, licenses)

Figure 1.5. Components of intellectual capital

Source: own elaboration

Intellectual human capital. The main emphasis is on highly skilled workers, because they allow to make significant profits to the enterprise from its activities by rapid both spiritual and career development, opportunity to solve complex problems. Parts of

the intellectual human capital include the cost of: training and IQ (intelligence) test; creation and monitoring of personnel database (questionnaires, resumes etc.); staff turnover and other costs.

The experience of using the methods of strategic management in local and international business environments demonstrates that today there're more active looks for the ways to increase the productivity of human resources, to activate their intellectual potential. Namely that employee search activity becomes fundamental source of successful enterprise activity, so the vast majority of the changes are carried out under the label of human factor activation [32].

Intellectual property. Among the generally accepted economic approaches regarding the valuation of intellectual property the following methods are allocated: income, expenditure, market; calculation of the price and size of the license, license payments and royalties. These generalized methodological approaches can be represented as an equation:

$$Cnn = (\sum_{i=1}^n S + P) * Kt, \quad (1.1)$$

where Cnn – the cost of implementing the knowledge-intensive products;

S – current development costs and implementation;

P – the company's profit;

Kt – coefficient of technical and economic aging of knowledge-intensive products,

which is calculated by the following formula:

$$Kt = \left(1 - \frac{Nt}{At}\right), \quad (1.2)$$

where Nt – the nominal use term of knowledge-intensive products;

At – the actual use term of knowledge-intensive products [1, p. 99].

This approach fully reflects the assessment of intellectual property in the enterprise because it takes into account all the necessary factors. However, in case a company will have inefficient relations with legislative protection against unfair competition the formula should be supplemented with such an indicator as costs that take into account legally insufficient regulatory framework [24].

Consumer capital. It includes the cost of creation: communications between consumers and enterprise; communications between the enterprise and interested business organizations; positive company image; attractive investment climate at the enterprise and other costs.

Organizational or structural capital. It is reflected in the enterprise's balance (capitalized costs) and most refers to intangible assets, includes costs of: design and research development; creation of databases; software; acquisition of intellectual property rights property; various organizational improvements of enterprise structure.

There are many measurement methods of intellectual capital and potential illustrated in the Table 1.3.

Table 1.3

Measurement methods of intellectual capital and potential

Method	Characteristic
Scorecard Methods (SC)	different parts of the organization's intangible assets are determined, and then their value as scoring is calculated (indicators); an assessment of the results is made in a comparable relative form.
Direct Intellectual Capital Methods	include methods to identify individual assets or components of the intellectual capital, then a monetary evaluation and integral assessment are carried out.
The Skandia Navigator	a model developed in cooperation with the Delphi computer program; it contains 164 metrics of measurement, which are divided into intellectual (91) and traditional (73).
Market Capitalization Methods	calculated as the difference between the market capitalization of a company and its share capital; the result is the value of its intellectual capital.
Return on Assets Methods	a ratio of the company's average income before taxes for a fixed period of time to tangible assets; then a comparison is made with a similar indicator for the industry, region, and country.
Sveiby Intangible Assets Monitor	the cost of an organization is analyzed as a set of material and financial assets, as well as the intellectual capital, which is evaluated according to the indicators of an internal and external structure, and abilities of the organization's personnel.
Kaplan & Norton's Balanced Scorecard Model	performance evaluation is carried out on the following activities: customers – how they treat us; business processes within an organization – what should be improved; training and development – what should be done to increase the value of an organization, finance – investment attractiveness for shareholders.

Source: designed by the author based on [29, 37]

In addition to the abovementioned methods, there is a large the number of methods of expert evaluation that help to investigate economic phenomena and processes which can be applied to the assessment of the enterprise's intellectual potential, these include: the Delphi method, questionnaires, interview, commission method, remote evaluation method, and many others [23, p. 99-100].

The most recommended methodical approach to determining the value of intellectual potential is considered to be a method of expert assessments. When using this method a survey of a special group of specialists is conducted, that is, experts (5-7 people) to determine required quantities and research. Poll carried out using certain criteria of intellectual potential.

Marchuk L. claims that for effective evaluation of intellectual capacity the following measures should be implemented:

- to assess the intellectual capacity at all possible levels (state, region, industry, study enterprises);
- to conduct a study of intellectual potential impact for the state economy as a whole and on activity of the investigated enterprise;
- to assess the level of wages and funding for scientific and technical developments, innovation proposals, software, etc.;
- to conduct staff appraisals of the investigated enterprise;
- to evaluate the image and intellectual resources of the company [1, p. 99].

It should also be noted that the intellectual potential of the enterprise does not take into account only qualification and professional qualities employees, but also creative qualities. Creative potential of organization is a collection opportunities and abilities of the employee to create and solve new creative tasks, develop something significantly new, which differs at the same time by its own uniqueness and originality.

The creative potential of the enterprise can be determined by the number of licenses, patents, inventions, utility models, industrial designs, innovation proposals for improvement management activities of the enterprise, etc., as well as in relation to the number of staff (specialists) enterprises; by share of new products in total sales of the firm. Professional qualification potential of employees of the enterprise, in contrast to,

creative qualities is determined by gender, age, education, work experience, qualifications and efforts of the enterprise to increase professional training [3].

It is due to productive functioning of these potentials (creative and professional qualification) at the enterprise there is an active innovative development, as objects of intellectual property is an incentive for new research and discoveries, scientific developments and technological innovations. This in turn gives an opportunity for a competitive enterprise to get the economic effect from the intellectual staff activities and form an innovative potential.

It should be noted that methodological approaches to the assessments of innovation potential are closely connected with the intellectual potential of an enterprise. For example, performing a calculation of intellectual potential in high-tech sphere the innovation is a key factor, which is characterized by:

- presence of innovations and high-tech products;
- development and constant updating of scientific and technical base of the enterprise;
- successful activities of highly qualified specialists in scientific and technical developments [1, p. 97-98].

All in all, the importance of methodical calculations of intellectual potential of the enterprise is caused by the transition of our state to a market economy as the urgent need for national development intellectual property valuation system have occurred. The analysis of evaluation methods of intellectual potential proved that in modern world there is no single and totally accurate calculation system. The method of expert estimations is considered to be one of the most efficient methods.

Conclusions to the section 1

In the following section theoretical and methodological aspects of IT enterprise's intellectual potential management were analyzed. As a result of the theoretical foundations research of the enterprise's intellectual potential issue the general essence, main functions and constituent elements of IP were revealed. However, after analyzing scientific literature, we have defined that there is no clear determinations of the concept and components of IP. The core idea of it implies that it is the main intangible resource and factor which contributes to the effective enterprise development by using all of the existing resources.

The vast majority of scientists define enterprise's intellectual potential as the ability to generate future economic profits from existing intangible resources. We consider the IP as a complex of knowledge, research and development work, innovative activities, professionalism, qualification level, skills, as well as creativity and ability to self-development, that gives the opportunity to use the IP of the enterprise in the best way.

The most widespread general approach to the defining IP is its division into human, structural, information and relationship potential. After analyzing different approaches to the IP components, for the further analysis of intellectual potential management of IT enterprise, we define that the structure of IP system consists of KMS (a software), intellectual capital (combination of human, structural and customer/relationship capital).

Among main functions of IP, the following ones can be named: informational, analytical, investigating, creative, innovational, motivational. Issues of intellectual capital and KMS which are connected with the enterprise's IP are characterized in detail. The rich variety of software products associated with KMS were described (groupware & decision support systems, content management systems, knowledge databases etc.).

The methodological approaches to the analysis of the effectiveness of intellectual and knowledge assets management of enterprise were defined. The analysis of evaluation methods of IP proved that nowadays there is no single and completely accurate calculation system. One of the most efficient of the methods is the method of expert estimations.

SECTION 2

Analysis of intellectual potential management of SOFTUUP LLC

2.1. Analysis of the quality of intellectual potential management system of the enterprise

The importance of managing intellectual potential, an enterprise's intangible assets, is underscored in the IT industry. The estimation of the enterprise's intellectual potential in the modern business environment is extremely relevant due to the importance of the obtained results for the formation of unique competitive advantages of the company.

For the analysis of the formation of intellectual resources and intellectual potential management system the limited liability company SOFTUUP was chosen. SOFTUUP LLC offers all stages of software development – analysis, architecture, design, development, testing, deployment and ongoing support.

Another reason for exploring in particular the intellectual capital and knowledge management system (main elements of intellectual potential) of the company at this time is the necessity to develop and maintain proper knowledge management strategy in remote work situations as employees of SOFTUUP LLC work remotely presently. The system of remote work has been increasing dramatically in the last decade. According to Global Workplace Analytics, remote work has increased by 140% since 2007 among non-self-employed workers, and more than one-third (37%) of knowledge workers now come into the office four or fewer times per week [39]. Annual State of Remote Work survey, conducted by Buffer & AngelList, states that such aspect as “collaboration and communication” is at the top of the list of the biggest struggles while working remotely [42].

Since we focus on remote workflow in this work, we define the abovementioned aspect as a key problem. In order to avoid all the challenges which arise from lack of interaction within the company, IT enterprises should resort to efficient knowledge management systems on both levels: organizational and technical. With remote work, employees need to be empowered to act more independently, but have timely access to

the correct information. Efficient knowledge management system ensures they can find actionable and accurate information. Thus, further we will focus at the knowledge management system levels in more detail.

As it was abovementioned, SOFTUUP LLC is a software development company which mission is to create competitive advantages in the form of IT tools for business automation. Among the best cases of company's portfolio projects the following should be mentioned: Bila Tserkva AR, Osvita 4D+ AR, Monopoly AR Game, Human Skeleton Recognition, AI Face Recognition, AR Glasses & AI, CTM Teeth Viewer, Tech020 Amsterdam, Insurance CRM, CPA havana.cash, Profit Area, WebGL Pix4d Potree, Lagoos Pool's, CTM 3D Viewer etc.

A software development company that does not just create software, but create business solutions, test hypotheses, and test the impact of products on the market uses a wide range of technologies (Figure 2.1).

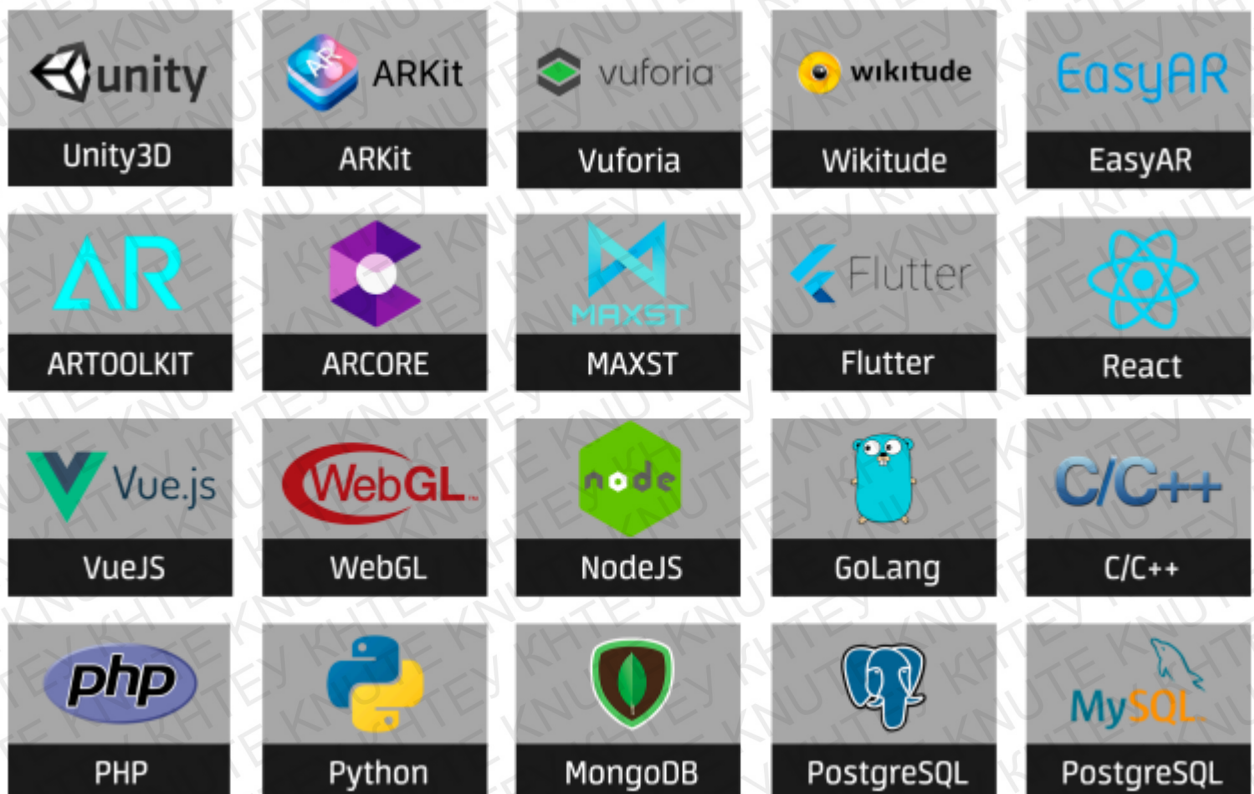


Figure 2.1. Technology stack of SOFTUUP LLC

Source: [41]

SOFTUUP LLC should be treated as a young company with up to 50 employees nowadays. The development process is described in the table 2.1.

Table 2.1

Stages of SOFTUUP LLC development

Infancy	2016	At this stage, in July 2016, a team of young guys gathered – each specialist in his industry in order to change the world of software development, at the same time solve the problems of the b2b sector, which spends extra money and time on routine tasks. Company have created the best game mechanics, used the most advanced technologies to create games for mobile devices. This is a golden time – infancy – a time when the foundation of the company was laid.
Childhood	2018	At this time – May 20, 2018, after almost 2 years of “hardening”, only the efficient and strongest remained in the team, the company switched to a new business model, and have development management departments, a financial department, accounting and a legal department, becoming cost-effective.
Heyday	2020	At the beginning of 2020, the organization of the company becomes flexible and manageable, SOFTUUP has a clear structure, prescribed functions, accounting and management systems, and a quality control department. The team consists of professionals in IT industry, making complex technical solutions that are beyond the power of competitors. The company goes to a new level of organization that pursues factors such as customer satisfaction and achievement of goals.

Source: [41]

IT is significant in itself and remains a key success factor in improving the effective process of KM. In the beginning of 2020, Apiumhub collaborated on the State of Software Development report, where software development companies pointed out their most significant challenges. In collaboration with Coding Sans, Apiumhub drilled down into the results of the survey based on responses from more than 700 leaders at software development companies around the world, from 81 countries (Figure 2.2) [31].

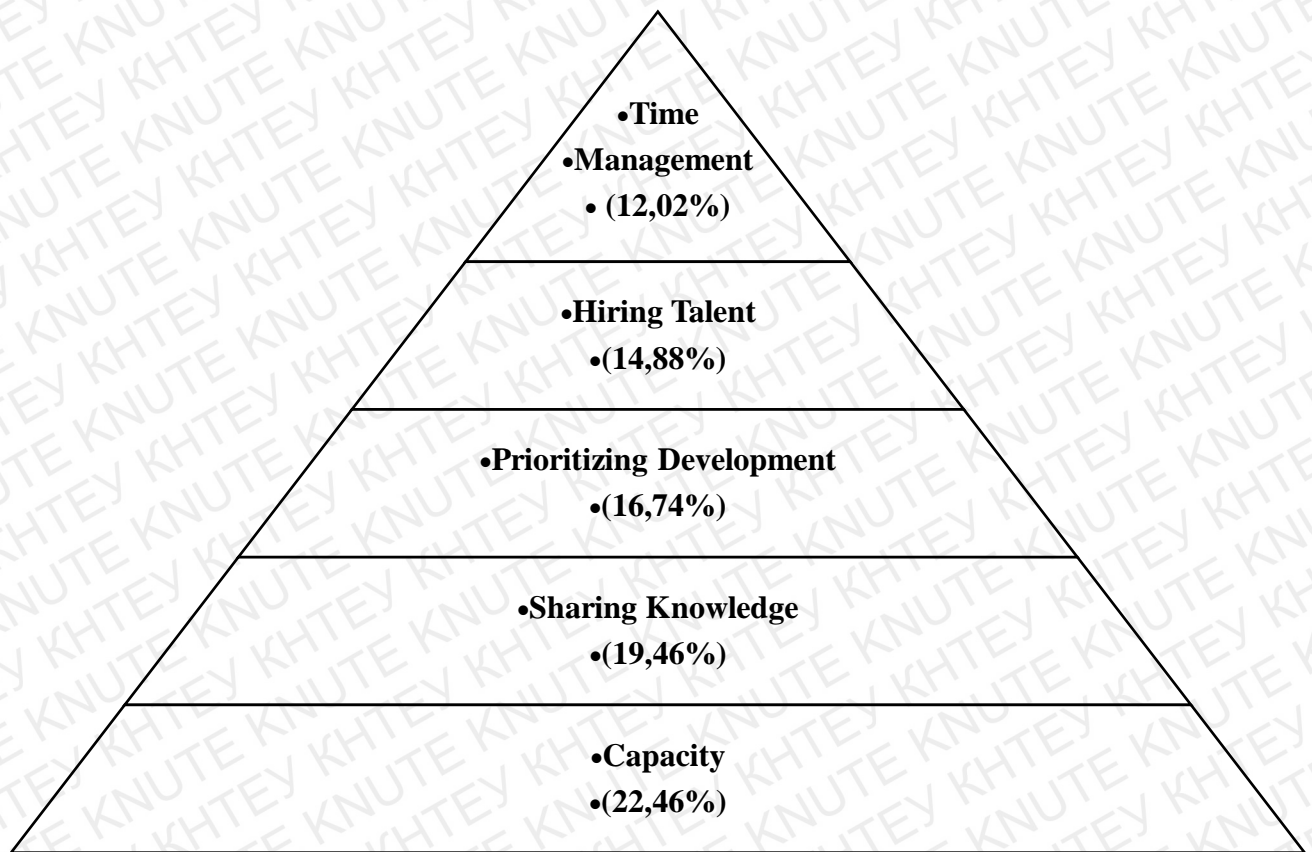


Figure 2.2. Top 5 challenges in software development enterprises

Source: designed by the author based on [31]

IT has become a common force in the business world, and can be used to store, protect, process, and transmit information. SOFTUUP LLC use Helpjuice knowledge base software in order to help scale customer support, and collaborate better with the team. In order to analyze the effectiveness of this software a survey of users was conducted.

Helpjuice is a modern and easy to use knowledge base software that's ideal for startups and small businesses (Figure 2.3). The software is being used by many reputable big brands such as Walmart to startups like Monday. Unlike most other knowledge base software, Helpjuice is easier to setup and manage. It also has an innovative editor that allows to create well-structured content while keeping change history [28].

Your Search For Knowledge Base Software Ends Here

Helpjuice's easy-to-use and most powerful knowledge base software is designed from the ground up to help you scale your customer support, and, collaborate better with your team.

Start 14 Day Free Trial

75% Of People Searching For Knowledge Base Software End Up Concluding With Helpjuice. Here's what our customers say why:



Figure 2.3. Helpjuice knowledge management system

Source: [<https://helpjuice.com/>]

A survey of effectiveness of KMS (KM software tool) that is used in SOFTUUP LLC was conducted (Appendix B). 9 parameters were selected according to their relevance (“High quality of knowledge”, “Acquired knowledge is accurate”, “KMS has increased innovation in procedures”, “KM satisfies knowledge search”, “KMS is user friendly”, “KMS provides development of knowledge”, “KMS has added to responsibilities”, “KMS has led to improvement in market share”, “KMS is absolutely necessary for enterprise's success”). The following scales were used in order to measure the respondent’s responses. All representatives of the IT enterprise (managers & IT sector) are chosen to conduct the survey as all their experiences with the KMS are valuable for further analysis. The respondents were assessed on the basis of their familiarity with Knowledge Management as users of introductory, intermediate and advanced levels (1, 2 and 3). The following parameters were assessed using the 5-point scale with 1 for “Strongly disagree”, 2 for “Disagree”, 3 for “Neither agree nor disagree”, 4 for “Agree” and 5 for “Strongly agree”. Results of the survey are presented in the Table 2.2.

Table 2.2

Results of the survey

Parameter	Level of familiarity with KMS						Total	
	Introductory		Intermediate		Advanced		Average value	Number of respondents
	Average value	Number of respondents	Average value	Number of respondents	Average value	Number of respondents		
High quality of knowledge	4,47	14	4,43	22	4,75	14	4,55	50
Acquired knowledge is accurate	4,16	14	4,06	22	4,81	14	4,34	50
KMS has increased innovation in procedures	3,17	14	3,89	22	3,02	14	3,36	50
KM satisfies knowledge search	3,52	14	4,26	22	4,62	14	4,13	50
KMS is user friendly	3,12	14	4,11	22	4,21	14	3,81	50
KMS provides development of knowledge	3,79	14	4,06	22	4,13	14	3,99	50
KMS has added to responsibilities	3,22	14	3,89	22	3,28	14	3,46	50
KMS is absolutely necessary for enterprise's success	4,53	14	4,70	22	4,68	14	4,64	50

Source: own elaboration

For the question on “Level of experience and familiarity with KM and KMS on enterprise”, out of the 50 respondents (total number), 14 respondents chose “Introductory” (28%), 22 respondents – “Intermediate” (44%) and 12 respondents – “Advanced” (24%). 44% of the respondents chose Intermediate level which represent the majority of workers.

The results of our study of existing KMS indicated a significant connection between 9 parameters of the questionnaire related to KM. Thus, according to the conducted survey we can conclude that a high quality of knowledge exists in the enterprise (52% of respondents), knowledge captured in the enterprise is accurate (62% of respondents). According to the average value given in table 2.2 the lowest values are given to the parameters “KMS has increased innovation in procedures”, “KMS is user friendly”, and “KMS provides development of knowledge”. It means that the KMS which is used in the enterprise does not work effectively in some aspects and should be improved or replaced by more effective one.

2.2. Comprehensive assessment and analysis of the effectiveness of intellectual potential management of the enterprise

To determine the effectiveness of the enterprise, it is necessary to analyze the effectiveness of intellectual potential management of the enterprise, in particular to analyze intellectual capital and knowledge management system as two key aspects of intellectual potential.

The variety of qualitative indicators of the enterprise’s intellectual potential makes it appropriate to classify them. In addition, the offered indicators for assessing intellectual potential can also be used in order to characterize the total intellectual potential that ensures the functioning of the enterprise as a whole.

The indicator of an estimation of intellectual potential of the organization is a quantitative expression of properties of intellectual potential of collective, showing a degree of their display in the conditions of its formation, use and development. Indicators for assessing the intellectual potential of the organization are subject to certain requirements (Figure 2.4) [32].

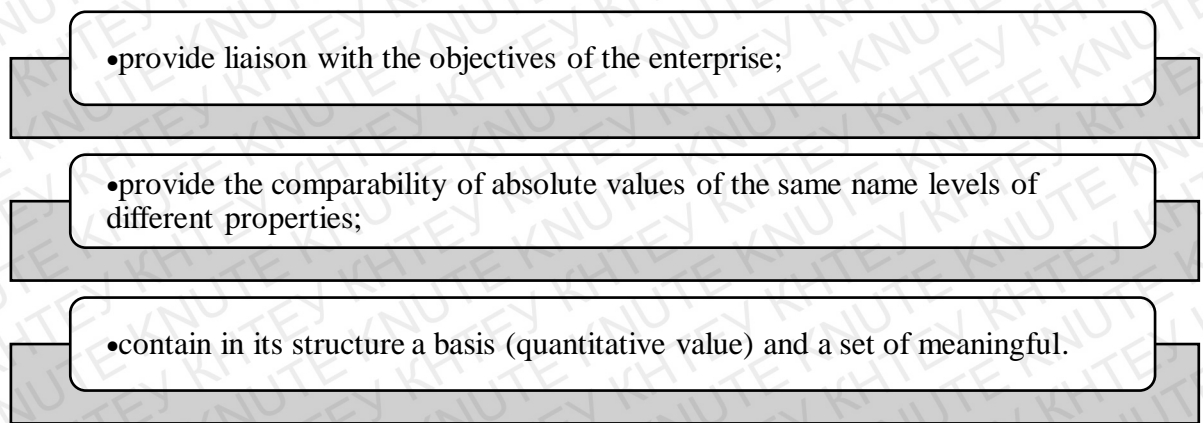


Figure 2.4. The main characteristics for indicators for assessing the enterprise's intellectual potential

Source: designed by the author based on [32]

It is necessary to conduct both a comprehensive assessment of intellectual potential, which is a system resource of the enterprise, and the achievements of individual workers. The evaluation procedure starts with top managers, and extends to lower levels of management. The procedure leads to better results if it is carried out by line managers with the help of HR managers (support and assistance). Some companies set up special commissions, but this is not always considered the best solution, as such commissions can conflict with managers because they are not responsible for ongoing work in this area.

The system of partial indicators is formed on the basis of analytical approaches research. They present all its constituent elements: constancy of qualified staff (employees that carried out advanced training or retraining) of the enterprise, inventive activity and degree of its implementation, scope of staff by all types of professional research, its scientific and technical providing, educational level of employees.

We have formed a system of partial indicators that reflect all its substantive aspects: consistency of qualified personnel (employees who have improved their skills or carried out retraining) of the company, inventor activity and degree of its implementation, scope of personnel by all types of vocational training, its technical and scientific support, educational level of employees.

We have applied the method of integrated assessment of intellectual potential by using the methods of expert survey and mathematical statistics, which are universal in

terms of its use by enterprises of different industries, ownership and size. Involving managers and other key figures (experts) in enterprise was seen as a crucial factor in raising awareness and gaining commitment to the topic. It includes the following stages: defining weighting coefficients of indicators, checking the coordination of participants' opinions of expert group for each of them and in general after the coordination coefficient, including its verification for statistical significance by the criteria of χ^2 , normalization of their value and calculation of the integrated indicator taking into consideration the weight coefficient.

Research of a number of scientific publications [8, 12, 34] and own considerations allowed to form a system of analytical indicators, using which it is possible to assess the intellectual potential of the enterprise. Indicators for assessing the intellectual potential of the enterprise are described in the table 2.3.

Table 2.3

Indicators for assessing the intellectual potential of the enterprise

№	Indicator	Calculation algorithm
1	Coefficient of qualified personnel constancy	The ratio of the number of employees who have experienced advanced training (were retrained) and were on the lists enterprises for the last 2 years, to the average number of employees for the relevant period.
2	Coefficient of innovative activity	The ratio of the number of inventions (utility models, innovation offers), created (initiated) by staff to the average number of employees for the relevant period.
3	Coefficient of implementation of inventions (offers)	The ratio of the offers of the implemented inventions (innovation offers) to those that were officially registered at the enterprise.
4	Coefficient of staff coverage by professional training	The ratio of the number of employees who passed all types of training (training, retraining, promotion qualifications) during the reporting period, to the average number of employees for the relevant period.
5	Coefficient of engineering, technical and scientific support	The ratio of the number of engineering and scientific employees (employees with a degree) to the average number of staff for the relevant period.
6	Coefficient of education level of personnel	The ratio of the number of employees with higher and secondary special education by job profile to the average number of employees for the relevant period.

Source: designed by the author based on [8, 12, 34]

The coefficient of qualified personnel constancy characterizes the level of sustainability and loyalty to the enterprise of employees who have developed their professional and intellectual abilities and for a long time use them for the benefit of the employer.

The coefficient of inventive activity indicates the ability of staff to generate innovative ideas, technical and technological solutions, and the coefficient of implementation of inventions (innovation offers) – the level of viability of such ideas (solutions).

The coefficient of staff coverage by professional training is an indicator of how much the company pays attention to its professional self-determination and the development of intellectual abilities.

The coefficient of engineering, technical and scientific support testifies to the ability of employees to solve production (management) problems of high technological complexity and scientific and applied nature.

The coefficient of the educational level of personnel shows what proportion of employees in the enterprise meets the qualification requirements in accordance with the positions held and has the appropriate specialized education.

The methodical sequence of further calculations consists of several stages (formulas with detailed description are illustrated in Appendix C):

1. Conducting an expert survey among the heads of structural units (their deputies, managers) of the analyzed enterprise and determining the weighting factor (ω_i) of each of the six indicators of the level of its intellectual potential as their arithmetic mean values;
2. Assessment of the consistency of experts' opinions on each component-indicator of intellectual potential by the coefficient of variation (V_k);
3. Assessment of the consistency of experts' opinions as a whole based on the results of the survey on the basis of a multiple rank correlation coefficient (concordance coefficient);
4. Normalization of indicators values;
5. The calculation of the integrated indicator of the enterprise's intellectual potential taking into account the weighting factors.

To conduct the study, an expert group was selected including the heads (deputies, managers and other key figures of the enterprise) of structural units of SOFTUUP LLC and a questionnairing was conducted, according to which they were to place the share of significance of partial indicators of the company's intellectual potential (Appendix D). Further actions with them, described in paragraphs 1-2 above, can be seen in table 2.4.

Table 2.4

Expert assessment and determination of consistency of experts' opinions on partial indicators of intellectual potential of SOFTUUP LLC

№	Indicators	Experts										Average (\bar{x}_k, ω_k)	Dispersion	Standard deviation (S_k)	Coefficient of variation (V_k)
		1	2	3	4	5	6	7	8	9	10				
1	Coefficient of qualified personnel constancy	0,19	0,23	0,23	0,25	0,25	0,22	0,26	0,20	0,23	0,25	0,23	0,00018	0,0136	5,92
2	Coefficient of innovative activity	0,18	0,13	0,20	0,10	0,11	0,16	0,18	0,14	0,20	0,11	0,16	0,00120	0,0346	22,06
3	Coefficient of implementation of inventions (innovation offers)	0,15	0,18	0,22	0,15	0,18	0,17	0,16	0,17	0,16	0,18	0,17	0,00058	0,0242	14,38
4	Coefficient of staff coverage by professional training	0,20	0,21	0,18	0,20	0,21	0,18	0,21	0,23	0,18	0,21	0,20	0,00020	0,0140	7,07
5	Coefficient of engineering, technical and scientific support	0,12	0,15	0,10	0,12	0,15	0,14	0,10	0,11	0,13	0,15	0,12	0,00040	0,0199	16,05
6	Coefficient of education level of personnel	0,16	0,10	0,07	0,18	0,10	0,13	0,09	0,15	0,10	0,10	0,12	0,00136	0,0368	29,69
	Total	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	–	–	–

Source: own elaboration

As it can be seen from the results of the analysis, the opinions of experts on particular indicators are consistent, as their coefficients of variation do not exceed 33%. The coefficient of qualified personnel constancy is considered to be the most significant one (0,23), and the coefficients of engineering, technical and scientific support and educational level of personnel have the minimum specific weight (0,12).

To determine the homogeneity of opinions of experts-employees of the studied enterprise as a whole on the results of the survey (stage 3, described above) a table 2.5 is created.

Table 2.5

Interim calculations to determine the consistency of experts' opinions based on the results of the survey

№	Indicators	Experts										Sum	Deviation of the sum from the average value	Standard deviation
		1	2	3	4	5	6	7	8	9	10			
1	Coefficient of qualified personnel constancy	1	1	1	1	1	1	1	2	1	2	12	-23,0	529,0
2	Coefficient of innovative activity	5	5	3	6	3	4	4	5	2	3	40	5,0	25,0
3	Coefficient of implementation of inventions (offers)	3	3	2	4	5	3	3	3	4	5	35	0,0	0,0
4	Coefficient of staff coverage by professional training	2	2	4	2	2	2	2	1	3	1	21	-14,0	196,0
5	Coefficient of engineering, technical and scientific support	4	4	5	5	6	5	5	6	5	6	51	16,0	256,0
6	Coefficient of education level of personnel	6	6	6	3	4	6	6	4	6	4	51	16,0	256,0
	Total	21	21	21	21	21	21	21	21	21	21	210	-	1262,0

Source: own elaboration

It is necessary to calculate the concordance coefficient and check it by the Pearson's chi-squared test (χ^2) (formulas are taken from Appendix C).

$$W = \frac{1262}{\frac{1}{12} * 10^2 * (6^3 - 6)} = 0,721; \quad (2.1)$$

$$\chi_p^2 = \frac{S}{\frac{1}{12} * 10 * 6 * (6+1)} = 36,057. \quad (2.2)$$

The tabular value of χ^2 ($p = 0,05$; $k = 4 - 1 = 3$) is equal to 11,07, which is lower than the calculated, and the multiple rank correlation coefficient exceeds the mark of 0,7. It leads to the conclusion about the reliability of the data obtained by experts, and the feasibility of their further use for analytical purposes.

For the analyzed period, normalization of indicators values and an integrated indicator of the intellectual potential of SOFTUUP LLC cannot be measured due to the lack of data in the dynamics. The coefficient of qualified personnel constancy is considered to be the most significant one (0,23), and the coefficients of engineering, technical and scientific support and educational level of personnel have the minimum specific weight.

Therefore, we can conclude that obtained results let us trace the main landmarks for further work to improve the intellectual potential of the researched enterprise, among which the key ones will be: increasing the level of motivation of skilled workers, and stimulating creative initiatives of staff.

We have already analyzed the KM software tool used in the enterprise and the key indicators which influence the general state of intellectual potential on the enterprise. It is necessary to examine intellectual capital in general on the enterprise. A group of employees was surveyed by means of a questionnaire developed in order to study the effectiveness of intellectual capital management system of an enterprise. There were a couple of key reasons for using this method (the survey method) in this study. Firstly, the team under research had very tight deadlines in order to complete the project (2 months) and recognized that it could achieve very limited progress in measuring intellectual capital. Secondly, in order for this study to be practical for the company the most useful

place to start was to find out managers' thoughts about managing and measuring intellectual potential and key influences of its formation.

We have defined a number of indicators which are related to human, structural and customer capital. The example of questionnaire is illustrated in Appendix E.

Top four human indicators are "Motivation of employees", "Leadership skills (managers)", "Satisfaction of employees", and "Years of experience". Each of human capital indicators had a mean rating of 4 or higher on a 5-point scale (Table 2.6). For SOFTUUP LLC such human capital indicators as "Cost per hire" and "Ratio of managers to employees" are significantly less relevant when it comes to measuring a component of their intellectual capital.

Table 2.6

Results of the survey: human capital indicators

Human Capital Indicators	Average Value	Rank
Motivation of employees	4,62	1
Leadership skills (managers)	4,41	2
Employees' information technology literacy	4,38	3
Satisfaction of employees	4,30	4
Years of experience	4,20	5
Turnover rate	3,92	6
Proportion of challenging assignments	3,62	7
% of employees with degrees	3,41	8
Number of innovations per employee	3,38	9
Training expense per employee	3,24	10
Cost per hire	3,15	11
Ratio of managers to employees	2,95	12

Source: own elaboration

Top four structural indicators are "Number of new product introductions", "Average length of time for product design", "Number of multi-functional project teams", and "Volume of information systems use". Each of structural capital indicators had a mean rating between 2 and 4 on a 5-point scale (Table 2.7). The following structural capital indicators as "Ratio of R&D expense to admin. expense" and "Number of software licences" are less relevant.

Table 2.7

Results of the survey: structural capital indicators

Structural Capital Indicators	Average Value	Rank
Number of new product introductions	3,44	1
Average length of time for product design	3,20	2
Number of multi-functional project teams	3,15	3
Volume of information systems use	3,07	4
Product life-cycle trend	3,03	5
Ratio of IS expense to total revenue	2,90	6
Number of computer links to corporate database	2,85	7
Number of times corporate database is accessed	2,63	8
Revenue generated per R&D expense	2,62	9
R&D invested in product design	2,55	10
Number of software licenses	2,53	11
Ratio of R&D expense to admin. expense	2,45	12

Source: own elaboration

Top four customer indicators are “Customer satisfaction”, “Growth in business or service volume”, “Customer loyalty”, and “Number of customer complaints”. Each of customer capital indicators had a mean rating of 2 and higher on a 5-point scale (Table 2.8). For SOFTUUP LLC such customer capital indicators as “Profits per employee” and “Number of supplier/customer networks” are significantly less relevant in terms of measuring a component of their intellectual capital.

Table 2.8

Results of the survey: customer capital indicators

Customer Capital Indicators	Average Value	Rank
Customer satisfaction	4,78	1
Growth in business or service volume	4,54	2
Number of customer complaints	4,25	3
Customer loyalty	4,15	4
% of sales by repeat customers	4,02	5
Number of alliances or partnerships	3,83	6
Market share	3,66	7
Ratio of customers to employees	3,53	8
Ratio of sales to total customers	3,21	9
Number of supplier/customer networks	3,13	10
Profits per employee	2,33	11

Source: own elaboration

A correlation between indicator use and usefulness can be traced at the individual indicator level on the same order as the usefulness of the indicator by categories: human, customer, structural. In the top eight most useful indicators we observe seven indicators that are currently used. Factors that constrain the ideal correlation are the difficulties associated with measuring and collecting some indicators (Table 2.9).

Table 2.9

Results of the survey: all indicators

All Indicators	Category	Average Value	Current Use Ranking	Usefulness Ranking
Customer satisfaction	Customer	4,78	4	1
Employee motivation	Human	4,62	7	2
Growth in business or service volume	Customer	4,54	3	3
Leadership skills (managers)	Human	4,41	5	4
Employees' information technology literacy	Human	4,38	8	5
Satisfaction of employees	Human	4,30	2	6
Number of customer complaints	Customer	4,25	9	7
Years of experience	Human	4,20	1	8

Source: own elaboration

To the top three factors which impact development or application of indicators the following ones belong: "Time associated with developing indicators", "Cost associated with developing indicators", "Comparability (externally)" (Table 2.10).

Table 2.10

Results of the survey: factors impacting development / application of indicators

Factors Impacting Development / Application of Indicators	Average Value	Rank
Time associated with developing indicators	4,66	1
Cost associated with developing indicators	4,39	2
Comparability (externally)	3,85	3
Communicating the value of indicators (internally)	3,80	4
Comparability (internally)	3,76	5
Using/Interpreting indicators	3,71	6
Communicating the value of indicators (externally)	3,49	7

Source: own elaboration

After analyzing preferred indicator usage, we can claim that human capital indicators are used in order to manage human resources, improve operational efficiency, allocate resources, and gain a competitive edge. Structural capital indicators are used in order to facilitate budget planning, improve operational efficiency, secure

funding/capital, and gain competitive edge. Customer capital indicators are used in order to market product, gain competitive edge, influence government policy, and improve quality of product (Table 2.11).

Table 2.11

Results of the survey: in terms of human, structural, customer indicators

Factors Impacting Development / Application of Indicators	Human Capital Indicator	Structural Capital Indicator	Customer Capital Indicator
Manage human resources	100%	30%	34%
Improve operational efficiency	84%	78%	27%
Allocate resources	86%	58%	48%
Gain competitive edge	73%	75%	84%
Facilitate budget planning	65%	83%	53%
Increase shareholder value	55%	70%	61%
Improve quality of product	28%	65%	68%
Secure funding/capital	32%	78%	66%
Market product	30%	63%	89%
Influence government policy	28%	42%	73%

Source: own elaboration

Analyzing the groups with whom the enterprise should share human, structural, and customer capital indicators we have defined that all indicators should be shared with the designated “Board of Directors/Governors”. In addition to an internal governing board, SOFTUUP LLC would share human indicators with internal employees, customer indicators with their customers in order to attract more clients, and structural indicators with the designated Board of Directors/Governors.

Thus, after estimating intellectual potential of SOFTUUP LLC we have defined the discrepancy between main indicators which influence the intellectual potential in the enterprise currently and the exact useful ranking of the same indicators. The prioritization should be changed accordingly in order for the enterprise to work more effectively based on the intellectual potential management. Besides, after analyzing the effectiveness of intellectual potential system (including KMS: software aspect) in the enterprise we have defined that it is necessary to model the brand-new IT enterprise’s intellectual potential management system at the organizational level and offer the prototype of the information management system of IT enterprise’s intellectual potential at a technical level.

Conclusions to the section 2

According to the results of the analysis of some SOFTUUP IPM aspects, some steady trends are traceable. A high quality of knowledge exists in the enterprise, knowledge captured in the enterprise is quite accurate. The results of our study of existing KMS indicated a significant connection between 9 parameters of the questionnaire related to KM. Thus, according to the conducted survey we can conclude that a high quality of knowledge exists in the enterprise (52% of respondents), knowledge captured in the enterprise is accurate (62% of respondents). According to the average value the lowest values are given to the parameters “KMS has increased innovation in procedures”, “KMS is user friendly”, and “KMS provides development of knowledge”. Thus, KMS which is used in the enterprise does not work effectively in some aspects and should be improved or replaced by more effective one. The most significant factor which influences the development of IP of the enterprise is qualified personnel constancy. However, the engineering, technical and scientific support and educational level of personnel have the minimum specific weight which means that more attention should be paid to the engineering, technical and scientific support development.

The survey of the effectiveness of the enterprise’s intellectual capital management system has showed the discrepancy between main indicators which influence the IP in the enterprise currently and the exact useful ranking of the same indicators. The prioritization should be changed accordingly in order for the enterprise to work more effectively based on the IP management. Thus, the reorientation to more important priorities should be carried out: from years of experience, satisfaction of employees to customer satisfaction including reduction of customer complaints, employee motivation and employees’ IT literacy. On the development / application of indicators mostly effects time and cost associated with developing indicators. Besides, after analyzing the effectiveness of IP system (including KM software) we have defined that it is necessary to model the brand-new IT enterprise’s IPM system at the organizational level and offer the prototype of the information management system of IT enterprise’s IP at a technical level.

SECTION 3

Development of the prototype of the information management system of IT enterprise's intellectual potential

3.1. Modeling IT enterprise's intellectual potential management system at the organizational level

Intellectual assets which contain an company's employee knowledge, trainings, skills or any type of proprietary information which may provide the enterprise with a competitive advantage should be formed and organized in a proper way. There is a high necessity to sustain effective functioning of a company, create value, and specify the enterprise's knowledge assets in order to meet the company's organizational goals.

On organizational level of knowledge management system we observe the expediency of creating a consolidated information infrastructure of an IT enterprise, in which a knowledge center that ensures an integrated information resource of the company will be the focal element. This infrastructure will contribute to resolving the issue of enterprise agility as globalization has caused very high local or international competition, which impacts software enterprises in terms of pricing structures, customer coverage and retention, service level agreements and other factors. In this case, the type, complexity and hierarchy of organizational structure of intellectual potential management of SOFTUUP LLC depends on a number of factors, including:

- the size, basic strategy and existing organizational structure of a company;
- the scale and diversity of intellectual resources (knowledge) of the enterprise;
- the IP structure and its importance to achieve the commercial objectives of the enterprise;
- the qualification-educational and professional level of personnel;
- product differentiation and dynamism;
- the level of specialization, concentration, combination, cooperation of production etc.

When it comes to the formation of the organizational structure of IP management it should be mentioned that three models of the organizational structure of IP management can be offered. Three main positions on the formation of this structure in the overall system of enterprise management are the following: the use of the existing organizational structure of the enterprise, its expansion through the creation of a specialized unit, implementation of parallel independent structure.

First model is not formed as a separate object (Figure 3.1); the responsibilities of the management subsystem are distributed among the existing units and are regulated by the relevant functional policies.

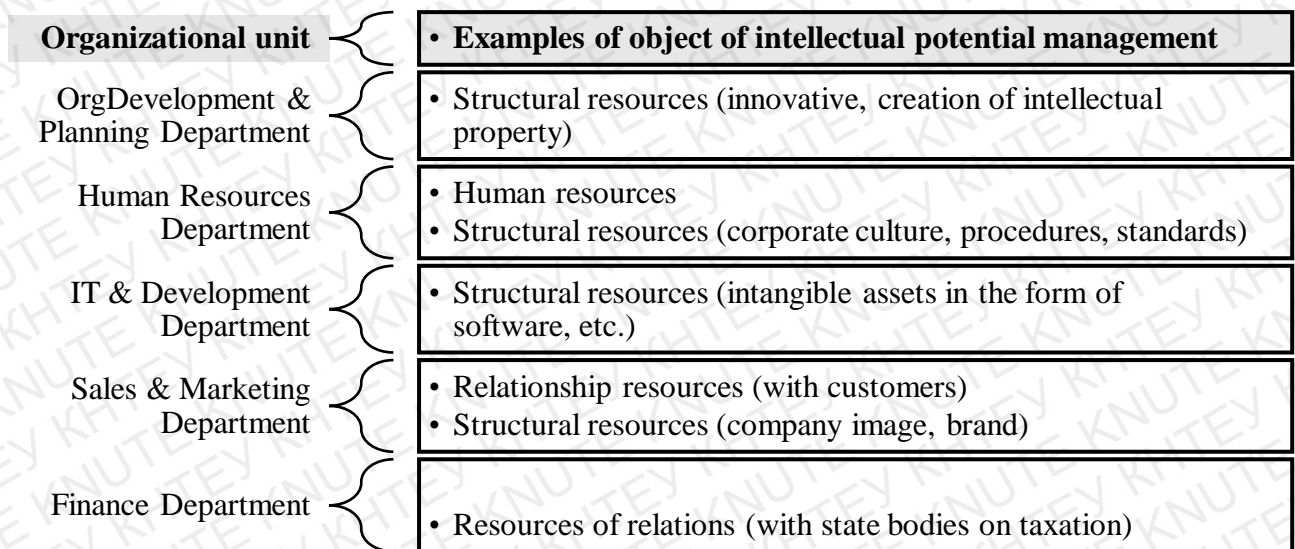


Figure 3.1. Possible distribution of responsibilities for the management of intellectual potential within the existing organizational structure of the enterprise

Source: own elaboration

The company can have a model of using the existing organizational structure of the enterprise. In this case management of IP is transferred to the following structural units:

- human resources → human resources department;
- structural resources → organizational development & planning department, sales & marketing department, HR-department, IT & development department, etc.;
- resources of relations → sales & marketing department in relation to customers, finance department.

The main *advantages* of choosing the following model of organizational structure of intellectual potential management include:

- no duplication of control functions, as there is a single control subsystem for the intellectual potential and for other control objects;
- preservation of the organizational structure that already exists in the enterprise and ensures its effective operation;
- low investment in the reorganization and maintenance of the management structure of IP, as there is no need to recruit managers, it is possible only to increase the salaries of some employees due to the increase in functions performed.

The main *disadvantages* of the approach, in our opinion, are the lack of a single coordination center for the management of intellectual potential, as well as a rather limited list of activities performed within the existing structure. Accordingly, such a structure can be effective for the purposes of simple reproduction of IP or its restructuring.

The second approach implies the improvement of the structure through the creation of a specialized unit (Figure 3.2), which is responsible for managing the IP of the enterprise, as well as delegating part of the authority to the intellectual groups that are formed within the existing structural units.

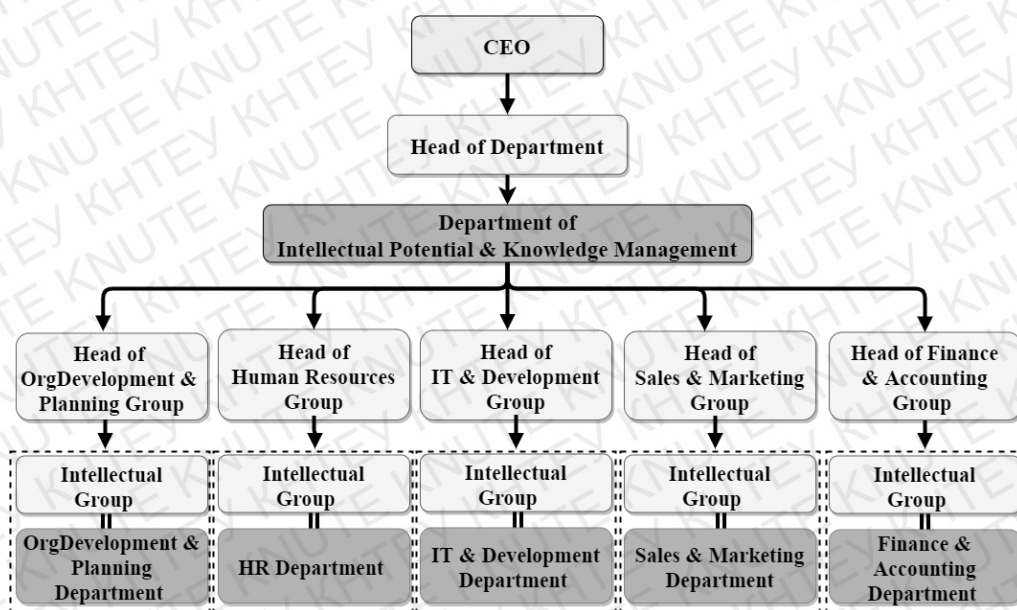


Figure 3.2. Organizational structure of IP management of IT enterprise in case of formation of a specialized department

Source: own elaboration

The leaders of the groups are the employees of the department of intellectual potential (knowledge) management. The main responsibility of the specialized structural unit is to create the basic concept and objectives of intellectual potential management of the IT enterprise, as well as monitoring the implementation of the strategy within departments (functional group leaders' responsibility). At the same time, the direct implementation of the tasks will take place at the level of functional groups.

Using this approach ensures centralized knowledge management, timely data collection at a functional level and its further analysis at a centralized level. In addition, the effective cooperation of specialists in the field of knowledge management (head of department, team leaders) and qualified direct executives, who are well aware in the specifics of work of a certain department (intellectual groups), allows to achieve the goals set in the enterprise.

The *advantages* of the approach, in our opinion, are the following:

- the single center for the management of IP, which will ensure its higher efficiency;
- the possibility of rapid data collection at the functional level and their analysis at the centralized;
- high qualification of direct executors, supplemented by strategic vision of group leaders, which allows to achieve the set results in the management of IP.

The *disadvantages* of the approach are similar to those that arise in the functional organizational structure:

- double subordination of employees to the functional management and to the responsible for the direction of intellectual potential management;
- the risk of inconsistency of goals and resources for their implementation in the management of intellectual potential and other functional elements;
- the complexity of monitoring the implementation of tasks;
- low flexibility due to the interdependence of structures.

Thus, this structure may be the best option, as it occupies an intermediate place in the need to attract investment and issues in the management of IP, as the company may not be able to move to a full-scale focus on IP while reducing attention to its other types.

The third approach is the most comprehensive approach: to form a full-fledged separate structure of IPM with the allocation of a position in the field of top manager. Nowadays the most effective is the creation of departments or directorates for the management of IP, which are responsible primarily for the identification, monitoring, evaluation and promotion of the effectiveness of the use and reproduction of IP. In this scheme, departments are included in the organizational structure of enterprise management, and direct management of IP is dispersed by various performers and departments in the enterprise (Figure 3.3).

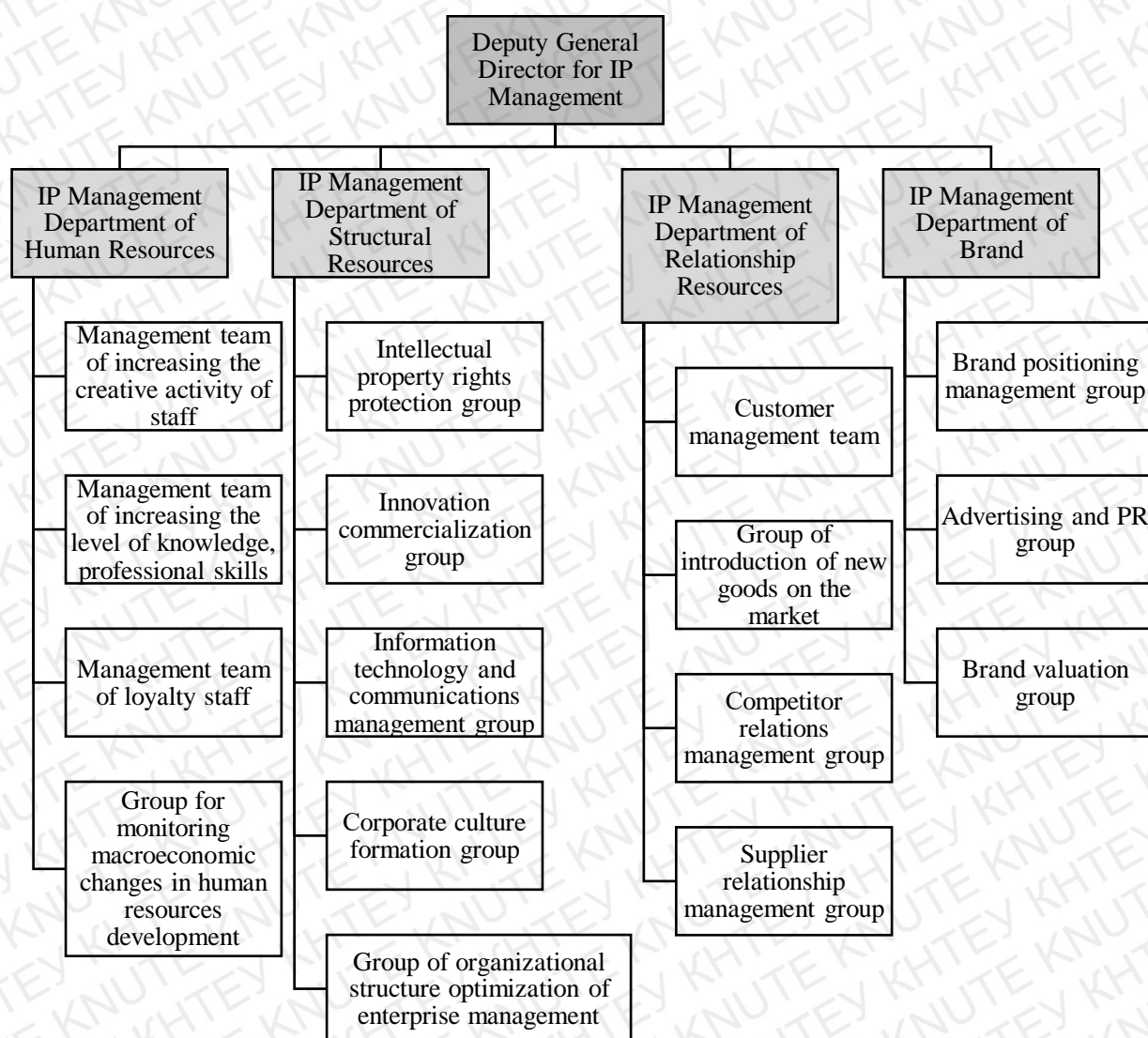


Figure 3.3. Organizational structure of IP management
by the approach of separate formation

Source: own elaboration

In our opinion the exceptional effectiveness of such a position can not be justified. Assimilation of IP management in existing structures of the organization is also expedient and optimum for a certain stage of development of the enterprise. Firstly, the formation of a new management structure duplicates management functions, and hence costs. Secondly, the formation of such a structure at the enterprise is not always justified. It will be better to combine functions in one department.

Thus, the main *advantage* of this structure, in our opinion, is the comprehensive management of the IP of the enterprise and, accordingly, its significant efficiency.

The *disadvantages* are the high cost of organizing a new management structure based on the intellectual department and the need for a change process that can affect the performance of other departments, as well as reduce the role of the existing organizational structure as a separate intellectual resource. Accordingly, this structure can be formed only in the implementation of the strategy of IP development, when the company has enough resources for basic changes in the structure, as well as readiness for them in connection with the transition to a new quality level (for example, access to a completely new market, reorientation to knowledge-intensive or innovation strategy, etc.).

The table 3.1 provides a generalized description of each of the organizational structures and the prerequisites for their application in practice.

Table 3.1

Approaches to the organizational structure of IP management

Approach	Features of formation in relation to the existing system	Prerequisites for implementation
Distribution of IP management functions within the existing org. management system.	The responsibilities of employees are complemented by functions for the management of IP without the creation of new structural units.	An enterprise with an unstable economic condition without the possibility of significant investment in IP.
Formation of a coordinating department for IP management.	A specialized department for the management of IP is being formed to coordinate the direct performance of tasks by employees from other functional units.	An enterprise with a stable financial and economic condition and a balanced portfolio of resources.
Formation of a parallel organizational structure of IP management.	A new organizational structure of IP management is being created, which is integrated into the existing org. system of enterprise management.	Actively developing enterprise passes to a new qualitative level of activity.

Source: own elaboration

In our opinion, the most suitable approach for SOFTUUP LLC to implement is the second one because of the mentioned advantages. However, a number of risks still may occur in the intellectual potential management as for as the second approach to the formation of the organizational structure of IP management is concerned. Phases of reproduction of intellectual potential can be characterized by various aims and mechanisms of management, which leads to the emergence of differentiated risks in each section of this process (Figure 3.4).

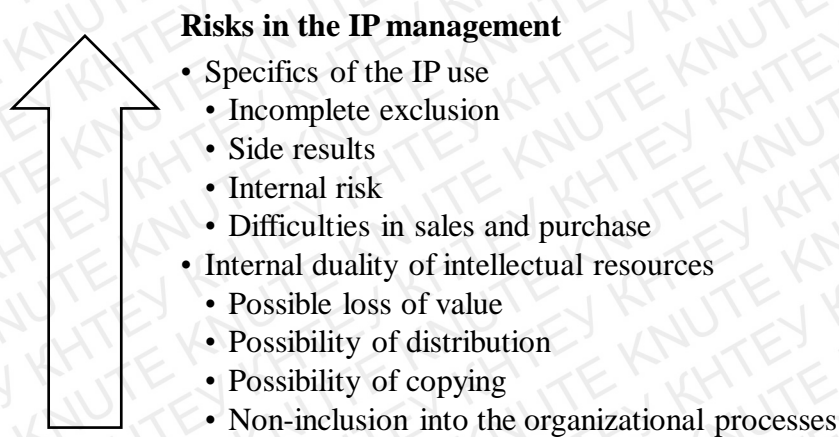


Figure 3.4. Risk occurrence factors in the intellectual potential management

Source: designed by the author based on [6]

As the most common division of intellectual potential implies the combination of human, structural, and relationship potentials, risks may appear in managing each of the them. The following classification allows to understand the nature and features of risks in the intellectual potential management and helps to define the reduction or prevention methods. Some aspects of the chosen IP management structure such as double subordination of employees, the complexity of monitoring the implementation of tasks, low flexibility and risk of inconsistency of goals and resources for their implementation can become the main reasons of possible risks occurrence while using this structure. That is why it is necessary to provide a table describing possible risks and develop ways to prevent them, basing on the second approach to the formation of IP management structure (Table 3.2).

Table 3.2

Risks in an enterprise's IP management and ways to prevent them

Type of potential	Risks	Ways to prevent risks
Human potential	<p>high turnover of key managers and staff; inadequate position and skill level; insufficient validity of creating a culture that perceives new and appreciates learning; high resistance to change, learning inefficiency; training specialists for competitors (investment in training will bring results for other organizations); losses together with the transfer of workers of non-formalized knowledge, and, consequently, the efficiency of processes.</p>	<p>careful selection of employees according to qualification, social, personal characteristics, possessing creativity, ability to learn; the introduction of an effective system of motivation to increase productivity and reduce malpractice and reduce employee turnover; conducting periodic certification of workers and identifying the necessary level of knowledge and skills; taking personal recognizance for non-disclosure of official information; periodic (annual or quarterly) reminder to employees of the need to comply with certain rules of conduct; the motivation of employees in the most effective training, so that development investments have a full-fledged return; refund by the employee in case of dismissal of funds spent on his training for the recent period, for example, a year.</p>
Relationships potential	<p>high elasticity of loyalty to the corporation of consumers and partners; the commitment of individuals, not the company as a whole; unfair competition in poaching customers; stakeholder vulnerability to corporate policy change; negative associations with the corporation as a producer of goods/services, an employer, a partner, including in terms of the level of reliability of fulfilling obligations in bilateral and multilateral relationships.</p>	<p>fixing controversial points in contracts, implementing a flexible implementation policy, and maintaining the image of the corporation through marketing activities. Separately, it is worth highlighting measures aimed at preserving customer loyalty, for example, after-sales service and recall of low-quality goods that allow you to keep loyal customers in the long run and reduce the risks of losing a sustainable competitive advantage.</p>
Structural potential	<p>infringement of intellectual property rights; incorrect (deformed) documentation and dispersion of hidden knowledge; weak and/or incompatible workflows; "freezing" of culture when its leading carriers leave the team; incomplete use by employees of software capabilities, instructions, standards; loss of flexibility and relevance, corporate procedures and processes; brand threats.</p>	<p>measures to preserve ideas and formalize individual knowledge, in particular, their implementation in the daily activities of the corporation, ensuring sound effective training and consistent quality control.</p>

Source: designed by the author based on [29]

Risks of intellectual potential can create a wide impact on the activities of a corporation, stretched in a time continuum. The loss of a sustainable competitive advantage manifests itself as a future performance effect, causing a gradual loss of position in the target market and a reduction in input cash flows. The risk of losing direct cash flow due to the lack of income from intellectual property has impact in current period. Finally, previously invested funds in the development of intellectual potential may not be reimbursed (it does not pay off), that is, the influence vector is directed to the results of previous periods [6, p.1747].

To sum up, the introduction of effective management of intellectual potential requires the organization of the subject of management. We have defined three main approaches to the formation of the IP management organizational structure in the overall management system of the enterprise, as well as outlined the basic factors influencing the choice of the best option and defined the possible risks in an enterprise's IP management providing ways to prevent them. In our opinion the most suitable approach for SOFTUUP LLC to implement is the second one owing to the mentioned advantages. Besides, it occupies an intermediate place in the need to attract investment and issues in the IP management of intellectual potential, as SOFTUUP LLC due to its size may not be able to move to a full-scale focus on intellectual potential.

3.2. Creating the prototype of the information management system of IT enterprise's intellectual potential at a technical level

The survey conducted in the second section has shown that a KMS used on the IT-enterprise SOFTUUP is not effective enough and should be improved or replaced. That is why in order to solve a number of issues connected with the KMS we offer a prototype of new KM platform which will resolve some problematic moments:

- 1) the need to develop effective innovative technologies and products as determining factors for IT enterprise to obtain additional competitive advantages (the survey has shown that software used by the company now does not increase enough innovation in procedures);

2) the need to develop easy to use and engaging software, that will provide development of knowledge, will keep information organized and will satisfy knowledge search (the survey has shown that software used by the company is not user friendly enough and causes employees to face with difficulties connected with knowledge search and development of knowledge);

3) the need to develop system that will stimulate:

- **customer capital aspects:** customer satisfaction, growth in business or service volume, customer loyalty, emergence of regular customers and reduction of number of customer complaints → in order to gain competitive edge, influence government policy, create good quality market product;

- **human capital aspects:** motivation of employees, employees' information technology literacy, development of leadership skills (managers), satisfaction of employees → in order to manage human resources, allocate resources, improve operational efficiency;

- **structural capital aspects:** growth of the number of new product introductions, reduction of average length of time for product design, growth of number of multi-functional project teams, growth of volume of information systems use and facilitation of product life-cycle trend → in order to facilitate budget planning, improve operational efficiency, secure funding/capital, increase shareholder value.

Besides the necessity of creating new KM platform is determined by the number of general factors connected with current trends and changes:

- the growth of the quantitative and qualitative resource base, which an IT enterprise should operate for successful operation in a constantly changing market environment;

- the growing role of intangible assets including the need for their reproduction and development;

- the necessity for innovative development of national economy & globalization of economic processes;

- the new requirements for managerial and professional competencies of IT company's specialists;
- the need for maximum compliance by the enterprise to accelerate the pace of change in economic conditions;
- the level of development of the the enterprise's IP increasingly determines the success of its production, the enterprise's intellectual capital, the quality of the used information-analytical management systems.

The software industry is constantly looking for ways to increase the productivity and quality of software. One approach to creating better software products is a software process improvement. The main beliefs of the software process improvement is that improving the process will lead to the final product improvement. The main idea is to evaluate enterprise's current practices and improve the software process on knowledge-, competencies-, and experience-based process of working practitioners in the enterprise. In addition, the enterprise can not ensure the transition to innovative production, as well as the implementation of some effective activities without the appropriate level of functional development of intellectual potential. We believe that the development and effective use of quality software, which is well suited to the existing organizational structure and specificity of a particular IT enterprise, promotes the improvement of work in the company at all levels.

Based on the analysis of existing software tools in order to improve the KMS at the technical level and taking into account the main challenges with software used on the enterprises (insufficient promotion of innovations and knowledge development, not very user friendly KMS), we have created a prototype of a platform for IT enterprises, aimed at remote work process for the enterprise's team. Examples of user interface design are illustrated in Appendix F.

The key benefits of KM Platform usage are the following:

- creating new avenues for knowledge creation;
- providing easy collaboration and communication in remote work;
- keeping information up to date and easy to find;
- converting support emails to knowledge base articles;

- reducing wait times to get access to information needed;
- providing security and accountability.

The suggested KM Platform is a collaborative tool available for up to 100 team members including Android and iOS apps for efficient remote work process. The main features of the Platform are condensed and illustrated in Figure 3.5.

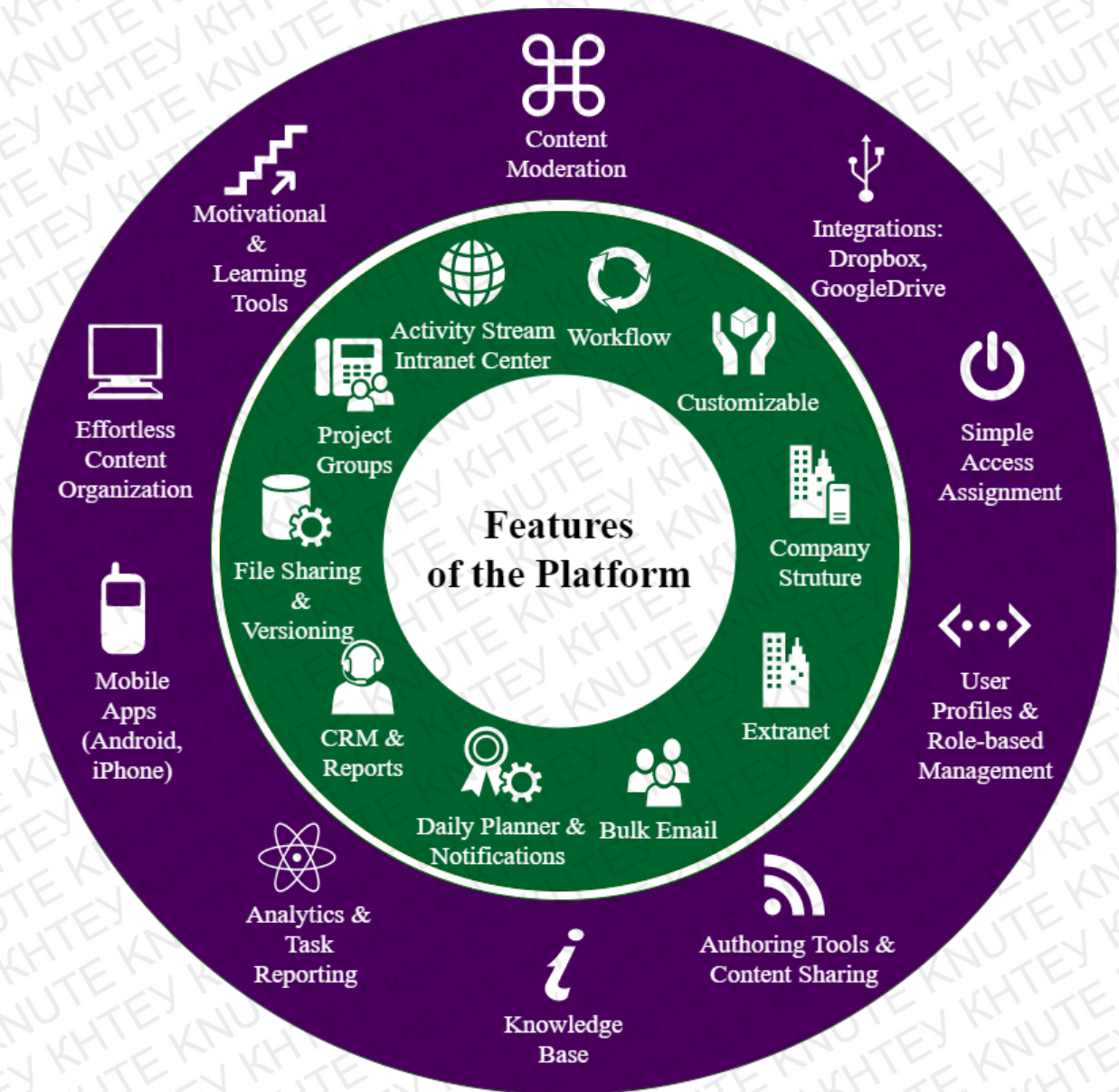


Figure 3.5. Features of KM platform

Source: own elaboration

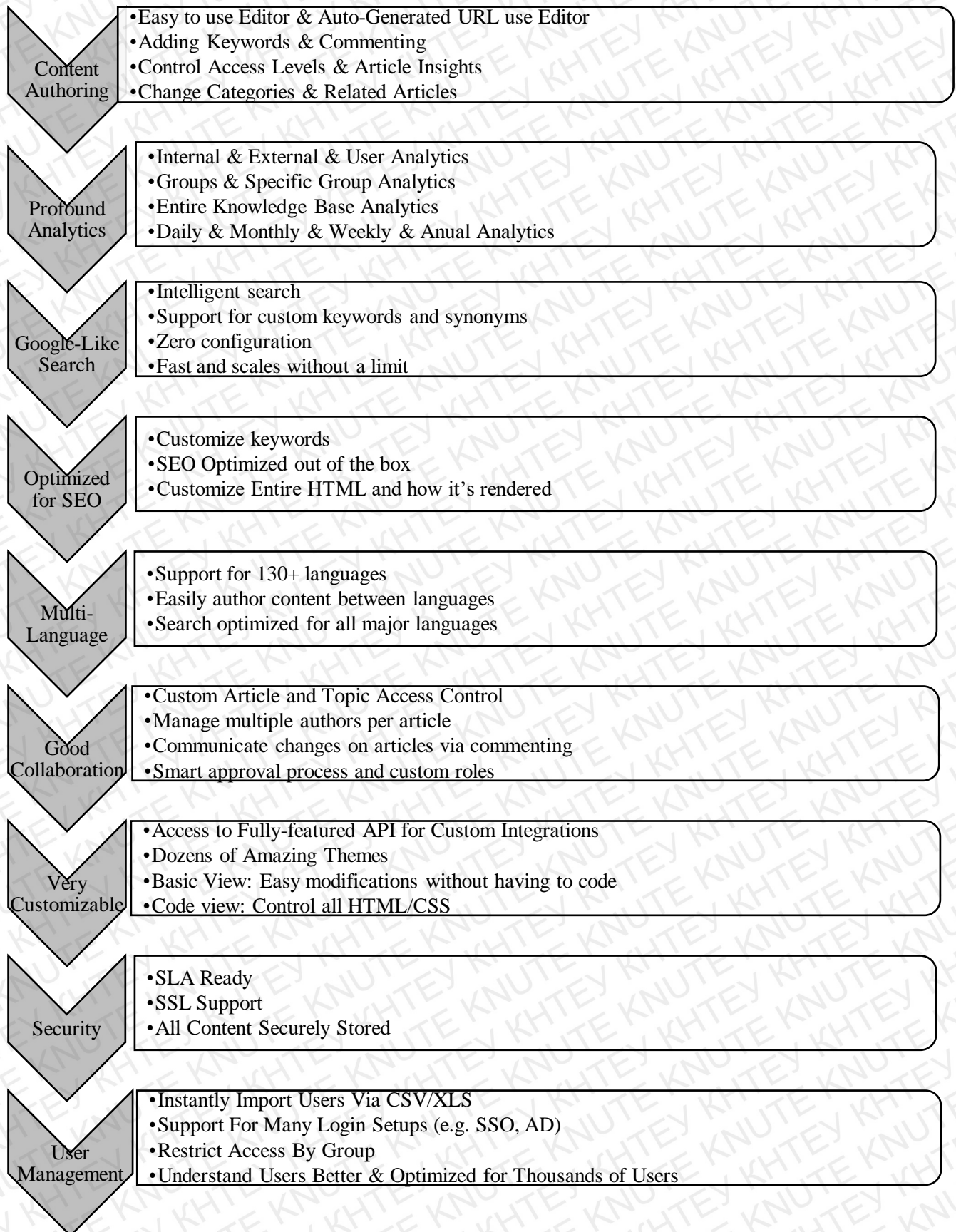


Figure 3.6. Feature list of KM platform

Source: own elaboration

Features of intellectual potential management system (KM platform):

- **carefully organized information:** the offered system focuses on the organization of IP-related information; the data (for instance, products covered by a range of patents or patents for more than one product), dates (to meet timely for payment of issue fees, other costs), documents are correct and stored in the correct folders. Managing IP often connected with indexing information in order to find it quickly (*resolves the issue of the need to develop easy to use and engaging software, that will provide development of knowledge, will keep information organized*).
- **detailed records:** keeping accurate records of intellectual potential can help to prove ownership. For example, a paper confirmation that illustrates created inventions is a crucial part of the patent acquisition process. Besides, even email correspondence is useful to record in case it involves discussing licensing or disclosing an invention. Reliable KM platform provides managers with a tool (enterprise-level) for recording intellectual potential-related data and providing them with access to the right staff; dragging and dropping documentation into the interface in order to collect records (*resolves the issues of satisfying knowledge search and stimulating employees' information technology literacy, growth of volume of information systems use*).
- **preservation and provision of project artifacts:** project managers are responsible for uploading documents to the KMS after the projects have been completed in order to provides discipline and a structured system of knowledge spreading, and strict method of knowledge exchange (*resolves the issues of keeping information organized and stimulating development of leadership skills (managers), reduction of average length of time for product design, facilitation of product life-cycle trend*).
- **profound content:** articles are chunked into a set amount of topic categories (4-6 categories); frequent links within article content to other helpful and related links, videos, and trainings are included in addition to a sidebar that links out to supplementary resources like chat, community, and courses; a feedback mechanism system is included in order to measure the response to articles (*resolves the issues of knowledge development and stimulating satisfaction of employees, the growth of number of multi-functional project teams, the growth of volume of information systems use*).

- **hierarchical boundaries:** all employees at different levels are treated equal in the process of creation, sharing, and spreading of knowledge to contribute and participate in discussions and knowledge sharing with higher or lower links in the hierarchy (*resolves the issue of stimulating satisfaction of employees in order to manage human resources*).
- **strict quality control:** documents submitted to the portal are checked for accuracy and reliability in order to meet the standards (*resolves the issue of the need to develop system that will improve operational efficiency, secure funding/capital*).
- **personnel education:** KMS contains flexible educational component including academies and training programs, specialized learning courses, webinars and integration with education companies that offer a variety of video training courses (individual development plans for team members) (*resolves the issue of stimulating employees' information technology literacy, satisfaction of employees, growth of the number of new product introductions, growth of number of multi-functional project teams, growth of volume of information systems use*).
- **employee onboarding and planning & tracking:** the introduction of a KM platform for joining employees is a cost-effective and efficient response to the training of new workers and helps to quickly absorb a lot of information; the platform allows creating user stories and tasks, planning sprints and assigning tasks to development team, prioritizing and discussing team's work in absolute transparency (*resolves the issues of improving operational efficiency and stimulating growth of the number of new product introductions, allocating resources, reduction of average length of time for product design, and facilitation of product life-cycle trend*).
- **making releases & creating reports:** the platform helps to improve team productivity with real-time visibility into team members and release new versions and be sure that the latest information is always at your fingertips (*resolves the issue of improving operational efficiency, increasing shareholder value, stimulating reduction of average length of time for product design*).
- **integration with other tools:** streamlining the process with hundreds of other development tools: easy-to-configure, integrated CI / CD system to automate code from testing to production deployment, Git code management tool which provides teams with

a single hub for project planning, code collaboration, testing, and deployment; the offered prototype of a platform can be adaptable to existing information systems in enterprises. Thus, it can be integrated with, for instance, existing enterprise resource planning systems, 1C (*resolves structural capital issues, including facilitating budget planning*).

– **synchronization team work with the product roadmap:** the platform can provide acceleration delivery and improve reliability by creating more accurate plans for team and organization as a whole (*resolves the issue of the need to develop system that will stimulate growth of the number of new product introductions, reduction of average length of time for product design*).

Among other aspects of KM platform the following ones should be mentioned:

- KM platform provides multidimensional features for intranet and extranet services: different types of files support.
- It considers cloud PC integration or on-premise deployment (cloud-hosted) and provides external communications management through extranet and CRM.
- The platform includes employee directory, task and work time reporting, absence tracking.
- It provides the possibility to carry out operations with documents including versioning of documents, and flexible permission systems.
- Collaboration and communications platform has tools for tasks tracking and coordination, time management and time planning (check-in/out feature, regular reports, events and meetings scheduler, and calendars).
- It enables the access to forums/wiki/communities (including corporate blogs and company wiki).
- Analyzing and optimizing KMS is provided with the help of a binary feedback form (for example, at the end of each article).

There are a number of other challenges in addition to those mentioned in the table 3.2 in software development such as rapid technology advancement, increasing customer demands, limited infrastructure/resources, conflicts with software testing teams. Some basic challenges KM platform facilitates in IT enterprise are described in the table below (Table 3.3).

Table 3.3

Challenges KM platform facilitates in IT enterprise

Challenge	Characteristics	Solution
Development Expectations and Outcome	the constant changing of requirements adds complexity for developing software projects; 33% of the respondents of the Stack Overflow developer Survey consider building products with unspecific requirements, as their biggest challenge.	to ensure that the product outcomes align with expectations and requirements, a solid process and line of communication need to be established which the KM platform provides.
Project Management	very often multi-tasking might give more trouble than expected. Resources cannot focus on a single task or module if their manager bombards them with tasks.	one obvious way to be an excellent planner is to leverage project management tools like KM platform and keep projects, resources, teams organized and on track. Platform facilitates staying on track, meeting all deadlines, working seamlessly across applications, and efficiently and effortlessly managing projects.
Security Infrastructure	security breaches are on the rise; a recent study estimates that 96% of all web applications contain at least one serious vulnerability. Security is mainly the responsibility of the software the enterprise uses.	In order to keep infrastructure and enterprise safe it is necessary to perform essential core activities to produce secure applications and systems. KM platform should be developed using high-level programming languages with built-in security features.
Remote workflow	“collaboration and communication” are at the top of the list of the biggest struggles while working remotely	in order to increase efficiency and productivity KMS makes it easy to find information or people who store the information.
Risks of people leaving	all companies hurt their talented people leaving, but the impact is especially strong amongst software companies where the tech people are the crucial assets.	KM platform is the platform which motivates employees to share their knowledge and communicate both formally and informally which stimulates the consistency of personnel.
Issues with time management	developers often complain for short time period, sometimes it is due to the project manager that he not pays attention to time scheduling and the resources, and sometimes customer give very short time period.	tasks tracking and coordination, time management and time planning (check-in/out feature, regular reports, events and meetings scheduler, and calendars) helps to avoid issues with time management.

Source: designed by the author based on [33]

Advantages of KM platform:

– **promoting innovation and cultural change.** Enabling and encouraging the exchange of ideas, collaboration and access to the latest information allows employees to stimulate the innovation and cultural change in order to develop the enterprise (*resolves the issue of the need to develop effective innovative technologies and products as determining factors for IT enterprise to obtain additional competitive advantages*).

– **sharing expert knowledge & better search engine ranking and speeding up access to information and knowledge.** KM platform is filled with guides and documents made by experts. It is a great source for SEO due to optimization of knowledge articles and content to rank higher on search engines for specific keywords. To increase efficiency and productivity KMS makes it easy to find information or people who store it (*resolves the issues of the need to develop easy to use and engaging software, that will provide development of knowledge and keep information organized, satisfy knowledge search and stimulate motivation of employees, employees' information technology literacy, and satisfaction of employees*).

– **increasing customer satisfaction.** Knowledge sharing and mutual cooperation help to increase the value offered to customers. An enterprise is able to respond faster or reduce the time it takes to improve a product/service (*resolves the issue of stimulating customer satisfaction and loyalty, growth in business or service volume, emergence of regular customers, reduction of number of customer complaints to gain competitive edge, influence government policy, create good quality market product*).

– **reducing the costs of customer support.** Customers and employees have an opportunity to find solutions by themselves in a knowledge base (*resolves the issue of facilitating budget planning*).

– **improving problem solving & decision-making processes.** Members of team can improve the quality and speed of decision-making process by gaining access to the entire enterprise's knowledge when they need it. Platform helps to save time by providing on-demand solutions. There is no need for customers to call and wait for hours to solve the issue as well as employees do not need to undergo monthly training to answer ordinary questions (*resolves the issue of satisfaction of employees and customers, speeding up the time for product creation*).

– **improving the efficiency of the enterprise's operating units and business processes.** With faster access to information, resources team members can act quickly as the usage of social collaboration technologies improves business processes and the efficiency of the enterprise as a whole.

The Figure 3.7 illustrates use case diagram of the KM system to be built. The use case diagram describes the interactions which are made by each actor to the KMS.

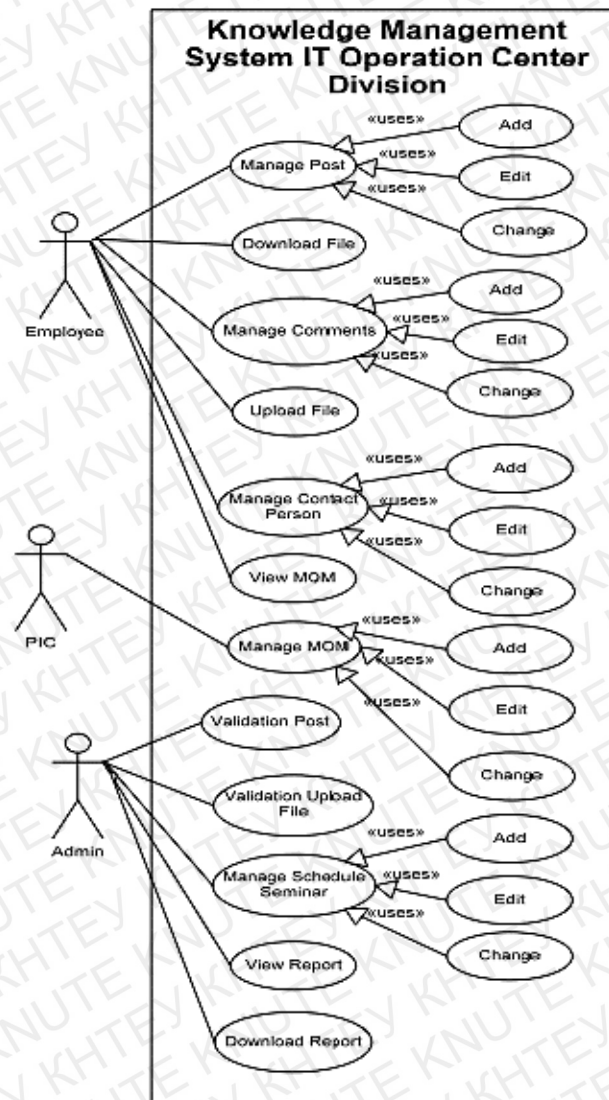


Figure 3.7. Use case diagram for knowledge management system

Source: [16]

The results of the analysis of the sources of intellectual resources formation on the basis of SOFTUUP LLC have helped to define the elements of the IP and advices which should be followed in order to facilitate the development of IP. KM as a key factor of IP is a multidimensional phenomenon which consists of different aspects. After conducting a research of existing KMS on organizational level we offer the division of its five main components which are the most crucial for IT enterprise's IP especially in the conditions of remote workflow. The Figure 3.8 illustrates the correspondence of the results of the mentioned analysis with the features of KM platform.

COMPONENTS



People

- holding smart meetings
- setting clear expectations
- asynchronous communication
- establishing well-balanced communication norms
- keeping up team morale (writing & speaking & listening)
- maintaining people's attention
- being empathic & giving everyone space to speak



Culture

- culture of trust & accountability
- reminders to adhere to team values
- acknowledgement & rewarding for developing new ideas
- breaks' encouraging: give time, flexibility to think, create innovations
- building team cohesion: new 'rituals': e.g, morning surveys, mid-day photo shares, end of day highlight connections, virtual competitions,
- constant postings in 'activity stream' (team camaraderie)



Technology

- constant updating of tech infrastructure & comfort with new ways of working while implementing 'work from home' arrangements
- frictionless software automation & self-service support (automated tagging, assignment rules, help center, chatbots) to avoid lack of clarity
- investments in collaboration & knowledge sharing tools



Process

- time consuming transition to remote work
- challenges with time zone differences
- work from home at least couple of days per week – time-saving
- time for self-development during the working day – individual development plans with access to online-courses



Content

- flexibility to avoid obsolescence
- frequent updates
- relevant information
- system of notifications
- automatic documentation system
- greater transparency

CHARACTERISTIC

PROVIDE

COMPONENTS

- Knowledge Holders & Consumers
- Team Work & Motivation
- Communication
- Management & Leadership
- Training & Mentoring
- Attitudes & Sharing
- Innovations & Skills
- Communities Standards

- Vision & Objectives
- Policy & Strategy
- Senior Support & Comprehension
- Willingness to Share, Collaborate & Support

- Networks
- Data Stores
- Data Mining & Analysis
- Integration with & between Systems
- Usability & User-centricity
- Automation Standards

- KMM Maps & Workflows
- Integration
- Best Practices
- Knowledge Capturing & Consistency & Quality & Awareness & Adherence to Processes
- Business Intelligence Standards

- State & Location of Content
- Consistency of Structure & Architecture
- Dynamism of Content
- Understanding of Usage (Analytics)

Figure 3.8. Components of offered KMS

Source: own elaboration

Figure 3.9. illustrates a design of network architecture for KMS on the IT Operations Center division. The personal computer used as a server which is connected via a LAN network (local area network), so all workers to be able to access the KMS in the enterprise only.

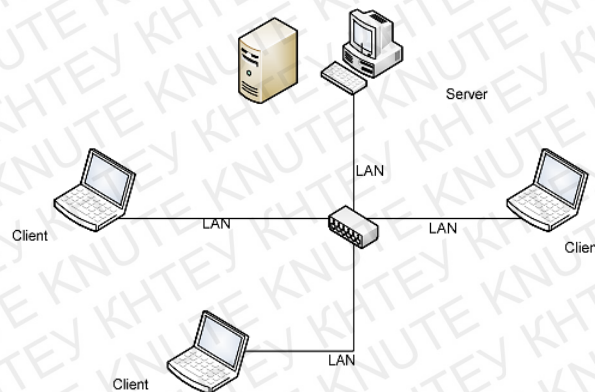


Figure 3.9. Network architecture

Source: [16]

As far as we have decided that the second approach to the formation of the IP management organizational structure of the enterprise is the optimal variant, there is the correspondence between offered KM platform and the chosen structure. The creation of a specialized unit, which is responsible for managing the intellectual potential of the enterprise, as well as delegating part of the authority to the intellectual groups that are formed within the existing structural units helps to adjust the division of responsibilities connected with the IP management of enterprise and KM platform control in particular between the members of the specialized department and intellectual groups.

The single center for the management of IP and establishing control over the platform will ensure its higher efficiency. The possibility of rapid data collection at the functional level and their analysis at the centralized level as one of the key advantages of the approach becomes possible due to the implementation of the KM platform. Sharing and implementation of strategic vision of group leaders and strategic culture of the enterprise in general (mainly developed by the mentioned specialized unit) become possible by virtue of offered software.

Owing to the features of the offered KM platform, we claim that it will help to reduce or resolve completely the possible negative effects of the approach, for example:

- double subordination of employees to the functional management and to the responsible for the direction of IP management;
- the risk of inconsistency of goals and resources for their implementation in the management of intellectual potential and other functional elements;
- the complexity of monitoring the implementation of tasks;
- low flexibility due to the interdependence of structures.

All these aspects illustrate that the organizational structure and technologies used at the enterprise are closely connected and intertwined in the light of the enterprise's IP development. The offered approach to the IP management organizational structure becomes functionally efficient because of KM platform implementation, active positive usage and vice-a-versa proper functioning of KM software becomes possible due to the creation of a specialized department and proper organizational structure management.

It is necessary to define a set of indicators that will allow us to evaluate the efficiency increase of business processes in an IT enterprise through the use of the offered KM platform. Thus, a KPI (Key Performance Indicators) system (Table 3.4) was formed.

Table 3.4

KPI system for evaluating the efficiency of the KM platform implementation

Performance indicators	Evaluation	Criteria for evaluating
Time for work tasks performance by employees (h)	general fixed time spent on tasks performance divided by employees involved in tasks	Decrease
Communication difficulty level (%)	measured based on the survey of platform users	Decrease
The amount of tasks completed	the total number of operations	Increase
The level of task automation (%)	correlation between general number of operations and automated operations through the platform	Increase
The amount of overhead (monetary units)	all costs related to maintaining the operation of the platform	Decrease
Privacy level (%)	correlation between number of methods of information protection, level of authentications and the number of cases security breach	Increase

Source: own elaboration

It is important to notice that all mentioned performance indicators should be relatively measured (in dynamics) for further assessment of the effectiveness of the platform. Basing on KPI, the developed platform can provide:

- reduction of time spent on fulfilling all necessary, mainly organizational, duties of the employee (including the time needed for communication within the team, getting access to knowledge, performing tasks, etc.), which will help to increase the level of effective interaction between employees within the company and between company, customers and partners (human & structural & customer capital);
- increasing the volume of completed tasks due to the increase in the speed of directly project activity performance of the IT enterprise (human capital);
- optimization of the roles of the employees involved, as the implemented software adopts certain functions and tasks that are usually included in the duties of workers (workload reduction, reduction of the number of indicators involved) (human capital);
- timely transmission of information, rapid documentation preparation (human & structural & customer capital);
- reducing the cost of providing workers with “workplaces” (human capital);
- increasing the security level within the company, which is guaranteed by the platform, while interacting with employees, documentation, etc (structural capital).

The following platform is aimed at automation and standardization of knowledge management and provides help with security, data accuracy, and changes in technology (cost, implementation, usability). It is oriented on medium-size IT enterprises with remote team work and may be customized to individual features of existing processes, workflows and culture of the company. Effective knowledge management system will help employees to avoid redoing work and introduce synergies through additional measures that can be taken from the system and supplemented by specific to the project work.

To sum up, we have defined that the knowledge management software serves to help maintain and organize a robust and scalable KMS. We have proved the necessity of KM software implementation in IT enterprise. That is why a prototype of KM platform was offered to facilitate a number of challenges in IT enterprise.

Conclusions to the section 3

In the following section practical aspects of IT enterprise's intellectual potential management were analyzed.

The effective IT enterprise's working process requires the implementation of the proper organizational system of intellectual potential realization and the knowledge management system on technical level.

Three models were offered to improve the organizational level of enterprise's IPM system (distribution of responsibilities for the management of intellectual potential within the existing organizational structure of the enterprise; formation of a specialized department in the organizational structure of IP management of IT enterprise; formation of a full-fledged separate structure of IPM with the allocation of a position in the field of top manager). The most suitable approach for SOFTUUP LLC to implement implies the improvement of the structure through the creation of a specialized unit which is responsible for managing the IP of the enterprise, as well as delegating part of the authority to the intellectual groups that are formed within the existing structural units.

The main possible risks in an enterprise's IP management include those which are connected with human, structural and relationships potentials. The ways to prevent them are offered in the work.

We have defined that the knowledge management software helps to maintain and organize a robust and scalable KMS and thus facilitates a number of challenges in IT enterprise. That is why the offered prototype of KM platform should be implemented in the enterprise to promote the improvement of work in the enterprise at all levels and helps to build more effective intellectual potential management system.

The KPI system is created to evaluate the efficiency of the KM platform implementation.

The intellectual potential systems (knowledge management systems on organizational and technical levels) offered in the graduation qualification work can be improved and deepened to provide proper organizational management within a company. Further prospects in developing a mechanism for improving the quality of the enterprise's intellectual potential management are observed.

CONCLUSIONS

In the graduation qualification work theoretical, methodological and practical aspects of IT enterprise's intellectual potential management were analyzed. A preliminary theoretical substantiation and empirical study of the effectiveness of the existing intellectual potential management system on the example of the IT enterprise SOFTUUP LLC were conducted. On the basis of the study IP management system at the organizational level and the information management system of IT enterprise's intellectual potential were developed.

The results of the study allow us to draw the following conclusions:

1. As a result of the theoretical foundations research of the enterprise's intellectual potential issue the general essence, main functions and constituent elements of IP were revealed. The vast majority of scientists define enterprise's intellectual potential as the ability to generate future economic profits from existing intangible resources. The most widespread general approach to the defining intellectual potential is its division into human, structural, information and relationship potential. Among main functions of intellectual potential, the following ones can be named: informational, analytical, investigating, creative, innovational, motivational. Issues of intellectual capital and knowledge management system which are greatly connected with the IP of the enterprise are characterized in detail. The rich variety of software products associated with knowledge management system were presented.

2. The methodological approaches to the analysis of the effectiveness of intellectual and knowledge assets management of enterprise were defined. Indicators of enterprise's intellectual potential, factors of the enterprise's intellectual potential development and measurement methods of intellectual capital and potential are described.

3. According to the results of the analysis of some aspects of SOFTUUP LLC intellectual potential management, some steady trends are traceable. A high quality of knowledge exists in the enterprise, knowledge captured in the enterprise is quite accurate. However, KMS (software tool) has not increased innovation in procedures, KMS is not very user friendly and it does not sufficiently ensure the development of knowledge. It

means that the KMS which is used in the enterprise does not work effectively in some aspects and should be improved or replaced by more effective one.

4. The most significant factor which influences the development of intellectual potential of the enterprise is qualified personnel constancy. However, the engineering, technical and scientific support and educational level of personnel have the minimum specific weight which means that more attention should be paid to the engineering, technical and scientific support development.

The survey of the effectiveness of the enterprise's intellectual capital management system has showed the discrepancy between main indicators which influence the intellectual potential in the enterprise currently and the exact useful ranking of the same indicators. Thus, the reorientation to more important priorities should be carried out, for instance, from years of experience, satisfaction of employees to customer satisfaction including number of customer complaints, employee motivation and employees' information technology literacy. On the development / application of indicators mostly effects time and cost associated with developing indicators.

5. The effective IT enterprise's working process requires the implementation of the proper organizational system of intellectual potential realization and the knowledge management system on technical level.

Three models were offered to improve the organizational level of enterprise's intellectual potential management system. The most suitable approach for SOFTUUP LLC implies the improvement of the structure through the creation of a specialized unit which is responsible for managing the intellectual potential of the enterprise, as well as delegating part of the authority to the intellectual groups that are formed within the existing structural units.

The main possible risks in an enterprise's IP management include those which are connected with human, structural and relationships potentials. The ways to prevent them are offered in the work.

6. We have defined that the knowledge management software helps to maintain and organize a robust and scalable KMS and thus facilitates a number of challenges in IT enterprise. That is why the offered prototype of KM platform should be

implemented in the enterprise to promote the improvement of work in the enterprise at all levels and help to build more effective intellectual potential management system. The main features and advantages of the platform are mentioned. Besides, challenges KM platform facilitates in IT enterprise with the ways to prevent them are outlined and components of SOFTUUP LLC KMS are described. The KPI system is created to evaluate the efficiency of the KM platform implementation.

The intellectual potential systems (knowledge management systems on organizational and technical levels) offered in the graduation qualification work can be improved and deepened to provide proper organizational management within a company. Further prospects in developing a mechanism for improving the quality of the enterprise's intellectual potential management are observed.

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APPENDICES

Appendix A

Software tools (Knowledge management systems)

Type 1	Characteristics 2
Groupware Systems	<p>refers to any collaborative work platform that facilitates interactions between team members and are usually intended for workers who need to communicate remotely including a wide range of applications. There are synchronous groupware (collaborate and update in real time, e.g., chat), asynchronous (e.g., e-mail) groupware and community-focused tools (e.g., e-groups). Groupware systems can be divided into three main groups:</p> <ul style="list-style-type: none"> • communication tools: for sending messages and files, including email, publishing on web, wikis, filesharing, etc. • conferencing tools: e.g. video/audio conferencing, chat, forums, etc. • collaborative management tools: tools for managing group activities, e.g. workflow systems, project & information management systems etc. <p>Examples of groupware include shared authoring tools, electronic whiteboards, desktop video conferencing (DVC), online forums, e-mail, online screen sharing, multimodal conferencing, electronic meeting systems (EMS), as well as systems for workflow and business process reengineering (BPR).</p> <p>Examples: <i>O365 / Teams, Slack, ShareFile, Firmex, Yammer, Microsoft Exchange, Lotus Notes.</i></p>
Electronic Document & Content (Records) Management Systems	<p>performs versioning, storing and sharing documents; designed to manage, secure and control documents across an enterprise; repositories of important corporate documents. Codifying knowledge almost always results in documentation (or another form of created content). Content Management tools manage contents: fax, e-mails, HTML forms, computer reports, paper, video, audio or spreadsheets.</p> <p>Examples: <i>Alfresco, Documentum, Box.com, OpenText, GoFileRoom, O365 / SharePoint, Excalibur RetrievalWare, File Net.</i></p>
Data Warehousing	<p>the main component of KM infrastructure; extracts data captured by multiple business applications and organizes it in a way that is meaningful to the business for any future references in the form of knowledge; designed to support decision making rather than simply efficiently capturing transaction data.</p>
Knowledge Warehousing	<p>another type of warehouses aimed more at qualitative data, than the kind of quantitative data typical for data warehouses. Knowledge warehouses store the generated knowledge from a wide range of databases including databases, data warehouses, work processes, news articles, external databases, web pages, and people.</p>
Data Mining & OLAP	<p>process for collecting and managing data from varied sources to provide meaningful business insights, typically used to connect and analyze business data from heterogeneous sources for data analysis and reporting.</p>

Continuation of Appendix A

• 1	2
Innovation Support Tools	<p>tools which contribute to knowledge creation through the product design process and may consist various features:</p> <ul style="list-style-type: none"> • <i>tech databases</i> with the recordings of patents, articles and research projects; • <i>simulation tools</i> used for modelling a real-world scenario and for testing insecure or not economical to perform with the real-world equivalents' functions; • <i>combinatory tools</i> which aim is to support unusual opportunities in innovation design or other creativity processes. <p>Example: <i>Tech Optimizer</i>.</p>
Authoring Tools	<p>word processing editors, multimedia editors, graphics programs, image and sound editors, video editing systems, as the focus is put on time-saving and efforts-saving technologies facilitating the process of creation of relevant highquality content.</p>
Data Capturing Tools	<p>technologies used for data capture are defined by the source and in this field there are technologies as web data capture (public search engines), optical character recognition (OCR) technologies (for printed material), to convert printed text to machine-readable text; besides working with text, speech, and images, data capture technologies can be applied to physical objects as bar codes identification technologies, and real-time location sensors supporting object tracking.</p>
Intranet (Portals) & Extranet	<p>an intranet serves as a private secured network where employees can create content, communicate, collaborate, develop the company culture, operated by a large enterprise which uses internet technologies, but is detached from the global internet. An extranet serves as an intranet that can be accessible to figures from outside the enterprise (partners, suppliers etc.), or shared by more than one company; it is often used as a supplementary system which provides a shared network with limited, controlled access to organizational information and knowledge resources, and using security protocols (authentication) to limit access.</p> <p>Example: <i>Microsoft Internet Information Server</i>.</p>
Decision Support Systems	<p>the main objective is support decision-making and solve problems by collaborating with the manager rather than replacing him through the means of accessing and manipulating data often by operating with data warehouse, online analytical processing system (OLAP), data mining techniques. Presents information to user in a manner that they can make informed decisions more easily.</p>
Topic Maps	<p>an advanced solution to the problem of structuring, storing and representing knowledge within a corporation; established an ISO standard, as an answer to the problem of coherent representation of relations between topics (or ideas) and associating those topics with actual documents (topic occurrences); limited instruments when it has to be represented the knowledge of each employee within a corporation.</p>

Continuation of Appendix A

1	2
Skill Maps	an extension of topic maps, creating new structures for storing information about employees, their knowledge and their skills, and it is created by copying specified topic map objects and adding individual modifications, providing mechanisms to enhance searching knowledge repositories that can take into consideration the state of each employee's knowledge and skills.
Knowledge Map Systems	profile of competencies of the members of an organization that contain a 'who knows what' list, without storing knowledge. Examples: <i>Lotus Discovery Server, Trivium Gingo.</i>
Competitive Intelligence Tools	constant feeding the company's decision-making process with information about the enterprise's environment with the further aim to make possible to learn about it and take better decisions. Examples: <i>VigiPro, Knowledge Works.</i>
Knowledge Databases	technologies aimed at complex structured and unstructured information storage used by a computer system. A database is a computer app which helps to capture, store, analyze, and interact with data. Examples: <i>Zoominfo, Verve, Wealthbar, Boldbrush, InspectionXpert, Nexcess.</i>
Expert Systems	record tacit knowledge from a limited domain of human expertise and convert that knowledge into the rules.
Decision Support Systems	allow managers and other knowledge workers to make decisions by reviewing and manipulating the data stored; include text summarizing utilities, outline generators, statistical programs to analyze data, and decision tables to verify that every possible scenario has been considered.
ERP, ERM, CRM	Enterprise Resource Planning, Enterprise Resource Managing, Customer Relationship Management – can embed significant knowledge about the organization, customers, and suppliers; to what extend the knowledge available is explicitly represented for enquiry, modification and refinement, focusing mainly on the knowledge about the nature of the processes, organization structure and strategic plan.
Skill & Lessons Learned Databases	a knowledge repository system through which enterprise's staff capture, store and manage intangible (tacit) knowledge from projects, events or operations making it clear and available to other users.
Artificial Intelligence Tools	adopted into KM systems replaces the human consultants that had been analyzing the data and monitoring the KM processes (cognitive computing, adaptive technology, and intelligent filtering tools).
Intelligent Agents	also known as bots or software robots, can be used to connect people to knowledge available on the Internet/intranets, relying on pattern matching technology to do their work; especially significant in acquiring information from the web, commercial databases, and intranets or corporate intranets.
Case-Based Reasoning System	allows companies to take advantage of previous problems or cases and related attempts to solve them; for example, manuals, newsletters, and other similar types of knowledge are typically provided in a document, list, or rule format.
Enterprise information portals (EIPs)	evolving as a single source of knowledgebased systems as they integrate access to knowledge and applications; EIPs provide a single point of entry to all the disparate sources of knowledge and information within and outside an organization, through the Internet/intranet, allowing the companies to serve their customers, interact with business partners and suppliers, offer employees access to online tools and the right content, knowledge for decision making.

Source: designed by the author based on [7, 13, 27, 40]

Appendix B

Questionnaire: Part 1

Measuring Effectiveness of KMS (KM Software Tool)

SOFTUUP LLC is participating in a survey of measuring the effectiveness of KMS (KM software tool). Traditional knowledge management system is often regarded as a technology that helps the creation, capture and transfer of knowledge. Software tools stimulate this process.

* Please answer the questions from the perspective of KM software tool you use in the enterprise.

1. What is your level of experience and familiarity with KM and KMS on enterprise?

Introductory	Intermediate	Advanced
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2. The following parameters represent some of the measures that can be used to evaluate the effectiveness of KMS of an enterprise. Assess each parameter: 1- totally disagree, 5- totally agree.

Parameters	Agree					Disagree	Commentary
High quality of knowledge	5	4	3	2	1		
Acquired knowledge is accurate	5	4	3	2	1		
KMS has increased innovation in procedures	5	4	3	2	1		
KM satisfies knowledge search	5	4	3	2	1		
KMS is user friendly	5	4	3	2	1		
KMS provides development of knowledge	5	4	3	2	1		
KMS has added to responsibilities	5	4	3	2	1		
KMS is absolutely necessary for enterprise's success	5	4	3	2	1		

Appendix C

Methods of calculating the main coefficients for assessing the intellectual potential of the enterprise

Indicator	Comment	Calculation algorithm
1	2	3
Assessment of the consistency of experts' opinions on each component-indicator of intellectual potential by the coefficient of variation (V_k).	The coefficient of variation is used here to characterize the homogeneity of the totality, which is achieved when the value is less than 33%.	$V_k = \frac{S_k}{\bar{x}_k}$ <p>S_k – standard deviation of the k^{th} ($k = 1, 2, \dots, n$) sign-indicator;</p> $S_k = \sqrt{\frac{\sum_{i=1}^w (x_{ik} - \bar{x}_k)^2}{w}}$ <p>\bar{x}_k – the average value of the k^{th} sign-indicator;</p> $\bar{x}_k = \frac{\sum_{i=1}^w x_{ik}}{w}$ <p>x_{ik} – the value of the k^{th} feature-indicator for the i^{th} object of the study.</p>
Assessment of the consistency of experts' opinions as a whole based on the results of the survey on the basis of a multiple rank correlation coefficient (concordance coefficient).	–	$W = \frac{S}{\frac{1}{12} * m^2 * (n^3 - n)}$ <p>S is the sum of the squares of the deviations of the ranks' sum of a single k^{th} sign-indicator from the average value of the sum of all indicators ranks; m – number of experts; n – number of indicators.</p>
Experts' opinions are considered agreed if the concordance coefficient exceeds 0,7. The non-randomness of its value is assessed by the Pearson's chi-squared test.	If the calculated value χ^2 exceeds the tabular value at a certain level of significance and degrees of freedom, the concordance coefficient is a non-random value, and the results of the expert survey make sense.	$\chi_p^2 = \frac{1}{\frac{1}{12} * m * n * (n + 1)}$

Continuation of Appendix C

1	2	3
Normalization of values of indicators.	–	$x_k^* = \frac{x_k}{\bar{x}}$

		\bar{x} – normative value (for example, average or reference).
An integrated indicator of the intellectual potential of the enterprise, taking into account the weighting factors.	The higher the value of the integrated indicator of the enterprise's intellectual potential and its dynamics increasing, the better. If the results of the assessment revealed its negative changes, it is necessary to pay attention to the most problematic components of intellectual potential, to investigate more deeply the reasons for its insufficient level, to develop and implement measures to improve the situation in certain areas of its formation and development.	$x^* = \frac{\sum_{i=1}^n x_k^* \cdot w_k}{n}$

Source: designed by the author based on [9]

Appendix D

Questionnaire: Part 2

Measuring Intellectual Potential of the Enterprise

SOFTUUP LLC is participating in a survey of measuring intellectual potential. The intellectual potential of an enterprise is its internal and external capabilities, consisting of different elements, for instance, the human potential of an enterprise, infrastructure potential of an enterprise, “corporate memory”, research and development work, innovative projects etc.

* Please complete the following task from the perspective of managing within your area of responsibility.

Task. A number of indicators for assessing the intellectual potential of the enterprise is provided in the table. Please fill in the table: arrange the indicators according to the influence on the development of intellectual potential respectively to the current situation in the enterprise and give a percentage value to each of the indicators (the total amount for all indicators is 100%).

Indicator	Priority number (1-6)	Value (total 100%)
Qualified personnel constancy		
Innovative activity		
Implementation of inventions (offers)		
Staff coverage by professional training		
Engineering, technical and scientific support		
Level of personnel education		

Source: own elaboration

Appendix E

Questionnaire: Part 3

Measuring Intellectual Capital: Experience, Problems & Prospects

SOFTUUP LLC is participating in a survey of measuring intellectual capital. Intellectual Capital includes intangible resources within an enterprise that are related to knowledge and information that are not generally measured but contribute to an enterprise's success. It is usually classified into three main categories:

Human Capital – “That which is in the minds of individuals”. Examples: knowledge, competencies, experience, know-how, etc.

Structural Capital – “What are the intangible results for employees?”. Examples: information systems, work processes, databases, etc.

Customer Capital – Examples: customer relationships, trademarks, brands, etc.

* Please respond to the following questions from the perspective of managing within your area of responsibility.

1. The following structural, human, and customer capital indicators represent some of the measures that can be used to evaluate the intellectual capital of an enterprise. Which of the following indicators would be useful to you in managing your area of responsibility? Which do you already use?

Human Capital Indicators	Very Useful					Not Useful	Which indicators do you currently use
Employees' information technology literacy	5	4	3	2	1	<input type="checkbox"/>	
Years of experience	5	4	3	2	1	<input type="checkbox"/>	
Satisfaction of employees	5	4	3	2	1	<input type="checkbox"/>	
Cost per hire	5	4	3	2	1	<input type="checkbox"/>	
Leadership skills (managers)	5	4	3	2	1	<input type="checkbox"/>	
Motivation of employees	5	4	3	2	1	<input type="checkbox"/>	
% of employees with degrees	5	4	3	2	1	<input type="checkbox"/>	
Ratio of managers to employees	5	4	3	2	1	<input type="checkbox"/>	
Training expense per employee	5	4	3	2	1	<input type="checkbox"/>	
Proportion of challenging assignments	5	4	3	2	1	<input type="checkbox"/>	
Number of innovations per employee	5	4	3	2	1	<input type="checkbox"/>	

Structural Capital Indicators	Very Useful					Not Useful	Which indicators do you currently use
Number of new product introductions	5	4	3	2	1	<input type="checkbox"/>	

Number of multi-functional project teams	5	4	3	2	1	<input type="checkbox"/>
Number of software licenses	5	4	3	2	1	<input type="checkbox"/>
Ratio of information systems expense to total revenue	5	4	3	2	1	<input type="checkbox"/>
Volume of information systems use	5	4	3	2	1	<input type="checkbox"/>
Number of times corporate database is accessed	5	4	3	2	1	<input type="checkbox"/>
Number of computer links to corporate database	5	4	3	2	1	<input type="checkbox"/>
R & D invested in product design	5	4	3	2	1	<input type="checkbox"/>
Ratio of R & D expense to admin. expense	5	4	3	2	1	<input type="checkbox"/>
Revenue generated per R & D expense	5	4	3	2	1	<input type="checkbox"/>
Number of patents or copyrights per employee	5	4	3	2	1	<input type="checkbox"/>
Number of new product introductions	5	4	3	2	1	<input type="checkbox"/>
Product life-cycle trend	5	4	3	2	1	<input type="checkbox"/>
Average length of time for product design	5	4	3	2	1	<input type="checkbox"/>

Continuation of Appendix E

Customer Capital Indicators						Very Useful	Not Useful	Which indicators do you currently use
Growth in business or service volume	5	4	3	2	1	<input type="checkbox"/>	<input type="checkbox"/>	
% of sales by repeat customers	5	4	3	2	1	<input type="checkbox"/>	<input type="checkbox"/>	
Customer loyalty	5	4	3	2	1	<input type="checkbox"/>	<input type="checkbox"/>	
Ratio of sales to total customers	5	4	3	2	1	<input type="checkbox"/>	<input type="checkbox"/>	
Customer satisfaction	5	4	3	2	1	<input type="checkbox"/>	<input type="checkbox"/>	
Number of customer complaints	5	4	3	2	1	<input type="checkbox"/>	<input type="checkbox"/>	
Ratio of customers to employees	5	4	3	2	1	<input type="checkbox"/>	<input type="checkbox"/>	
Market share	5	4	3	2	1	<input type="checkbox"/>	<input type="checkbox"/>	
Number of supplier/customer networks	5	4	3	2	1	<input type="checkbox"/>	<input type="checkbox"/>	
Number of alliances or partnerships	5	4	3	2	1	<input type="checkbox"/>	<input type="checkbox"/>	
Profits per employee	5	4	3	2	1	<input type="checkbox"/>	<input type="checkbox"/>	

Other indicators that can be useful: _____

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2. To what extent would the following factors impact your ability to develop and apply these indicators?

	<u>Strong Impact</u>				<u>No Impact</u>
Cost associated with developing indicators	5	4	3	2	1
Time associated with developing indicators	5	4	3	2	1
Using/Interpreting indicators	5	4	3	2	1
Communicating the value of indicators (internally)	5	4	3	2	1
Communicating the value of indicators (externally)	5	4	3	2	1
Comparability (internally)	5	4	3	2	1
Comparability (externally)	5	4	3	2	1
Other _____	5	4	3	2	1
Other _____	5	4	3	2	1

3. Keeping in mind the indicators in question 1 that you feel are useful, please indicate the ways in which you would use each of the human, structural, and customer capital indicators.

	<u>Human Indicators</u>	<u>Structural Indicators</u>	<u>Customer Indicators</u>
Market product	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Manage human resources	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Secure funding/capital	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Gain competitive edge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Improve quality of product	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Increase shareholder value	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Improve operational efficiency	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Allocate resources	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Influence government policy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Facilitate budget planning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

How else would you use this information?

Continuation of Appendix E

4. Please indicate the groups with whom your enterprise should share human, structural, and customer capital indicators:

	Human Indicators	Structural Indicators	Customer Indicators
All employees within your organization	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Internal managers only	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Current and potential donors/funders/business and educational partners	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Customers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Board of Directors/Governors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Investors/Shareholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Suppliers (groups that provide knowledge, services, or goods to your organization)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Competitors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Thank You for taking the time to respond this questionnaire!

Source: designed by the author based on [4, 21]

Examples of user interface design of KM platform



Figure F.1. User interface design of KM platform: tab “Chat & Calls”

Source: own elaboration

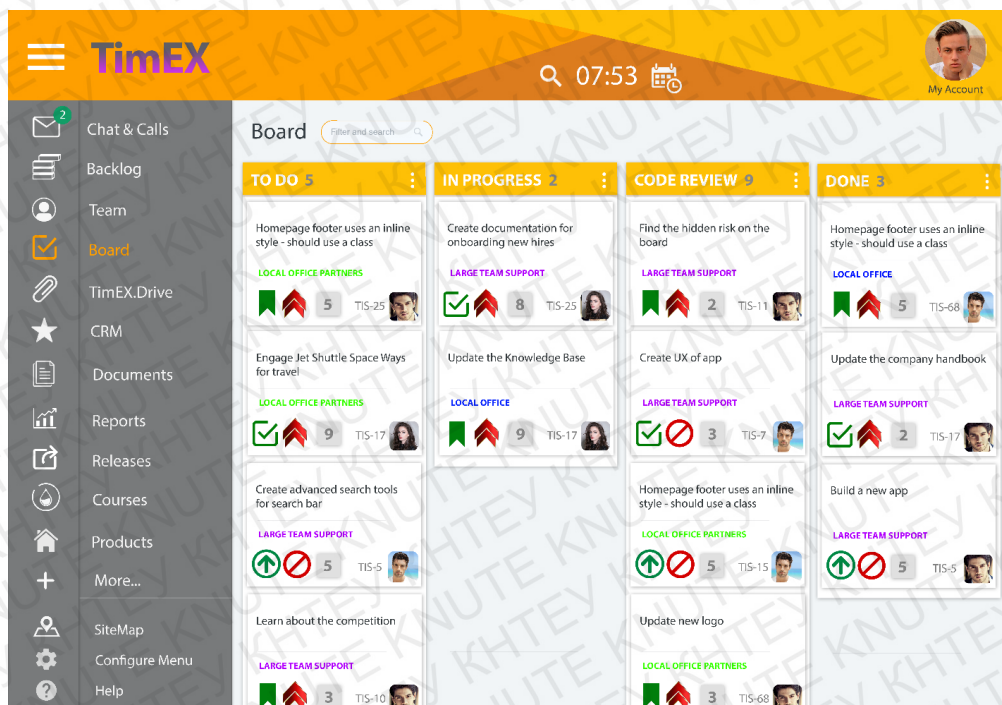


Figure F.2. User interface design of KM platform: tab “Board”

Source: own elaboration

Continuation of Appendix F



Figure F.3. User interface design of KM platform: tab “Releases”

Source: own elaboration

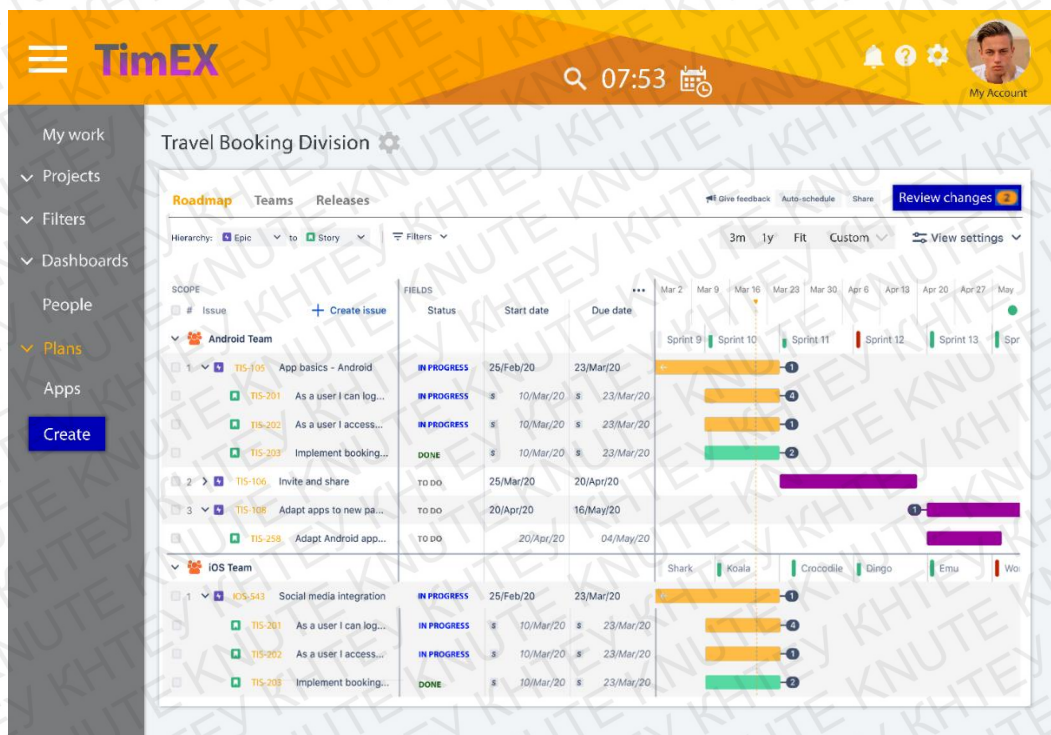


Figure F.4. User interface design of KM platform: tab “Plans”

Source: own elaboration