Agile-Oriented Management Educational Projects on the Base of the Global Trends

Sergey Buschuyev[a], Carsten Wolff[b], Stephan Recker[b] and Olena Verenych[a]

[a] Kyiv National University of Construction and Architecture, Povitroflotskiy Av., 31, Kyiv, 03037, Ukraine
[b] Dortmund University of Applied Science and Arts, Sonnenstraße 96-100, Dortmund, 44139, Germany

Abstract

The global development of the world's leading countries is accelerating due to the active introduction of innovative information and communication technologies, the growth of global capacity of computer systems, their openness and data transfer speed. The digitalization of economies and the active use of accumulated knowledge are key drivers formation the global societies acceleration. The rapid development of society requires much more knowledge and skills, the acquisition of which requires more time and the involvement of a wide range of teachers from around the world. One of the challenges of the last year has been the COVID-19 pandemic, which has given a strong impulse to the revision of approaches to education and the educational services provision in the face of limited mobility. The development of information technologies and global trends of world development allowed to find a way out of this situation. The article considers approaches to the organization of distance learning and the application of flexible project approaches to the management of educational projects. The article presents the Ukrainian-German project "ViMaCs" results of the implementation.

Keywords 1

Project management, Agile, innovation, educational projects, digitalization, project ViMaCs

1. Introduction

The global development of the world's leading countries is accelerating due to the active innovative information and communication technologies introduction, the growth of global capacity of computer systems, their openness, and data transfer speed. At the same time, the global trends economic digitalization, smart systems construction at different levels, databases using, large amounts of data processing, information protection systems using based on blockchain technologies, competence approach implementation in HEIs and educational standards, using of the cloud, fog computing, and innovation development are saved. Many projects and programs have shifted their management to the line of the Agile methodology using as a response to these trends and challenges. This methodology is a key driver for accelerating innovation development through the speeding-up of new products development. In the global dimension, this means the life cycles compressing of innovation and waiting for the new products according to the formula "faster - more powerful - cheaper".

The next group of trends is related to the paradigm change and the shift from a "rational economy" to a "behavioral economy". The main idea of the "rational economy" lays in the understanding that an individual makes a choice based on the possible optimal result. On the basis of this, the manager will make the choice of the project (-s) impartially, acquiring only the best of what can afford, based on rational expectations [1]. Irrational decisions are increasingly being made in the shifting to a "behavioral economy." These trends affect all processes of individual development, organizations and businesses, countries' economy, and the global economy. They form challenges in the convergence

(approximation) processes of knowledge systems and decision-making. The processes study of such systems development requires the flexible approaches using for the management processes analysis. The appearance of the global trend of shifting to a new "behavioral economy" instead of the "rational economy" significantly changes the techniques support of information systems, managers' behavior patterns on the base of the state-of-the-art methodologies of management development on the base of projects, programs, and portfolios. These trends influence societies' development, public administration systems, and the real economy.

The convergence hypothesis is a statement that no matter how different information technologies and management systems differ in the process of development, they reject ineffective tools while maintaining effective ones. This is a reason why they become relatively similar or close after such a gradual selection. The knowledge development, technologies and methodologies of the large data processing, techniques and technologies that focus on value creation and reduce the distance between management information systems of different industries, creating a single methodological basis, taking into account the features of management objects, facilitate the selection [2].

Also, according to the convergence hypothesis, if the control object is initially away from the position of stable equilibrium, its development speed will be higher than the system that is closer to the stable equilibrium [3]. Accordingly, in the long run, the differentiation can be smoothed. In practice, most companies in today's market conditions consider the selection and creation of an effective methodology for projects, programs, and portfolio management as a key element in competitiveness ensuring and maintaining. Modern technologies, of communication means, increased rates of information accumulation and availability allow to speed-up learn and use new methodologies, to provide their information support and their adaptation speed.

In the process of new information systems and management methodologies creating, benchmarking technologies are widely used. They are not always sufficiently substantiated, don't have a clear integration and harmonization for their practical implementation. The benchmarking methods using in project management are appropriate where a systematic approach to the knowledge shifting from existing knowledge models to project management systems [4].

Coupled with the above information, the economies' digitalization and the active use of accumulated knowledge are the key drivers the global societies' acceleration forming.

The COVID-19 pandemic is one of the challenges over the past year, which has given a strong impulse to the rethinking of the informational project creation. Educational projects and educational services have been one of the lines of the informational projects. They again have turned back to distance education and new approaches for their implementation creation in the face of travel restrictions. The development of information technologies and global trends in world development made it possible to find a way out of this situation [5].

2. Global trends analysis

[5] has defined the next four major global trends and challenges: globalization, inequality, demographic change and environmental degradation. To reduce the influence of the identified trends and challenges, it is necessary to create strategies development that should be based on a holistic approach. This approach requires knowledge covering many, often related, areas and analytical thinking. Moreover, the highly qualified specialists training can take place not even in one country, but in several, studying certain areas from specialists.

The global trends and challenges influence is reflected not only in everyday life, but also in the process of knowledge acquiring and education spreading in the world. Let's take a closer look at the impact of each trend/ challenge on the education system.

1. Globalization. It is not something new. At the beginning of the 19th century, the world economy has already been under influence of globalization. It was the first globalization. However, now it has completely different trends and directions. "Beyond the mere expansion of trade and investment flows, underlying global production patterns have changed in recent decades, in particular since the turn of the millennium, driven by the rise of transnational corporations and global value chains. Instead of shallow integration, characterized by trade in goods and services between independent corporations and portfolio investments, this new phase of globalization has brought deep integration,

organized by transnational corporations which link the production of goods and services in cross-border value adding networks" [5, 6].

"Information and communications technologies have also made the diffusion of information easier, and have facilitated better access by developing countries to the global knowledge pool. At the same time, innovative activity and technology development continue to be concentrated in a small number of advanced economies. Only very few countries such as Brazil, China and India, have entered this segment in recent decades, because core research and development activities are very rarely outsourced and remain overwhelmingly centered at corporate headquarters in developed countries" [5].

Furthermore, globalization, coupled with information and communication technologies in the context of COVID-19, has provided greater virtualization of the education process. The development of appropriate technologies that provide a virtual attendance in the classroom using online communications has provided a new impulse to the education forms development and the educational services boundaries delivery expanding.

The Bologna Process helps to reduce such inequalities through the joint educational courses and curricula creation, to obtain diplomas from several universities through the curricula harmonization, and also contributes to the opportunities appearance to find job in those countries where the necessary specialists with the appropriate qualifications level are required.

2. Inequality. The educational level in the information society begins to determine the social status. Total informatization does not lead to the low-skilled labor deleting - and in the information society, a labor market where the manual work is required is essential sector of the economy. The moving from one social status to another requires certain knowledge, and the educational system helps to make this move.

3. Demographic changes. This factor of the information society development is a consequence of the information sphere development. This is a natural increase in the time spent on education, and - due to the early retirement age - a reduction in the time spent on actual labor activity. The problems of hunger, disease, indigence, property lawlessness have been resolved and society can afford late marriages, limiting the number of children in a family in the frame of one or two, long non-participation of young people in material production and an increase of social maturation period from 17-18 to 24-25, associated with the fact that mastering the required amount of knowledge requires a significant amount of time and is supported by an increasing variety of educational materials. The education system aims to maintain this trend [7].

4. Environment degradation. The production development, environment pollution, a consumer approach to resources leads to environmental degradation. It leads to the climate changes. Such challenges negatively affect the general state of resources and land, and can lead to catastrophic consequences, the first signs of which are already manifested by an increase in the Earth's temperature, more frequent hurricanes, storms, volcanic eruptions, and melting of glaciers. It is need urgent to change the approach to the resources use and learn to foresee possible natural disasters. For this purpose, in recent years, the interest in specialists in climate services and their knowledge application in climate-dependent economic areas has increased. Such specialists training and advanced training of existing ones is in the sphere of education system influence.

Coupled with the above, it can be noted that the education system is becoming one of the strategically important ones, helping in the training and advanced training of specialists, whose basic knowledge should be aimed at reducing the impact of major global trends and challenges.

3. Distance (on-line) education

Until 2020, the education system used knowledge dissemination approaches, mainly based on face-to-face training with the introduction of curricula distributed through communication networks. Education provided with the communication technologies use, often without a physical attendance in the learning classroom, was called "distance education", and the process itself was called distance learning. This education approaches have been applied for a long time, changing their forms and service delivery channels.

The first distance courses began its appearance from the printed materials using delivered through the mail. The influence of hardware and software development has made it possible to change both the delivery and presentation forms of educational materials. Since the 80s - 90s of the last century, it has been actively talking about the distance learning introduction and use in the educational process.

There are many distance learning definitions. In general, they have descriptive character and reflect one or another aspect of this multifaceted phenomenon. The education itself is different from the traditional one. Here are some of the differences:

- the teacher has a limited ability to see the student's reaction to his/her words and actions;
- the effectiveness of teaching largely depends on how competently the teacher uses modern technologies (both information and communication, and pedagogical);
- the teacher should pay much more attention to students' motivation;
- the teacher should actively stimulate the interest of students to seek their own way of solving the problem.

Often technical tools such as computers, information networks and multimedia are being connected with the main reason for the dissemination and quality of distance education. They are visible part of the information society. At the same time, the importance of equipping with computers and the need for highly qualified service personnel to use the information technologies and produce the media content are underlined.

However, the experience shows that excessive technification of the process does not increase the quality level. The lack of the pedagogical architecture of a technical solution is one of the main obstacles to the effectiveness of such education. It is necessary to pay special attention to the information and communication infrastructure development as a "student's living space". Any student must be taught not skills adapted for a particular age, but active creative activity within the framework of the modern information society. It is necessary to take into account the deep qualitative changes in the job's culture, the knowledge acquisition, the competence requirements, which became available in the information society, and which began to be felt most strongly in 2020 during the COVID-19 pandemic. Modern technologies in education should support the processes of searching and extracting knowledge, as well as provide opportunities for students to independently construct new knowledge based on available information resources.

The information and communication technologies introduction into the educational process can occur within one of two main models: horizontal or vertical [8].

The horizontal model [8] considers the information and communication technologies implementation in education as a long-term (continuous) process, during which the education system or a separate educational organization determines (chooses) for itself the stage (method) of the informational and communicational technologies implementation, taking into account the peculiarities of the new educational paradigm, which is based on a personality -oriented approach, constructivism and problematic. The main stages of passing the education system according to this model are: (1) acquaintance with the informational and communicational technologies; (2) the informational and communicational technologies use in various subjects studying; (3) the informational and communicational technologies use in project work to achieve learning goals; (4) an educational organization transformation through the of the informational and communicational technologies tools use.

The second model (vertical) [8] suggests the availability of a stage of the information and communication technologies implementation, depending on who and how use the informational and communicational technologies in their professional activities - the education/learning phases with and through the informational and communicational technologies using. In this model, the informational and communicational technologies introduction into the education system moves vertically deeper through learning and/or teaching. It also includes stages: (1) the informational and communicational technologies tools discovery, their general functions and using ways; (2) study of the informational and communicational technologies tools using examples; (3) understanding how and where the informational and communicational technologies tools can be used; (4) professional the informational and communicational technologies tools using.

The distance learning is often addressed not as an alternative to the traditional one, but as complementing the latter with new opportunities:

- provides an unsurpassed rate of updating knowledge that are selected from the world's information resources;
- expands the teacher's audience, while ignoring geographical boundaries;
- as close as possible to the special needs of people with disabilities and other categories of students with special needs.

As noted above, the distance education quality depends on not only on the technological side, but also on the pedagogical one. The combination of these components takes place in a specific educational environment, which should support the following functions:

- conducting distance learning (the trainees' knowledge, skills and abilities are produced);
- support for a constantly existing, problem-oriented, online community (community members information resources and knowledge are produced);
- joint problem solving, an example is temporary project groups (new knowledge is produced);
- information and educational resources creation, support and saving (available information and educational resources are produced).

In [8], an educational environment with the above functions is called a telecommunications information and educational environment. This is a virtual environment that provides its participants with information, educational and methodological resources, as well as educational, training and joint activities means based on global computer communications. The system solves the next tasks: teaching; training; information search; information analysis; joint projects implementation; knowledge improvement; ensuring awareness of available resources and services.

The COVID-19 pandemic in 2020 has given the strongest push to the widespread and overall dissemination of distance education around the world. In certain periods, distance education has become from a "additional" form in main one, which required a change of an approach for such service providing. In addition, the technological support of the learning process has been improved due to the widespread software use that provides support for online interaction.

4. Agile-approach for educational projects management

Rapidly creating of the quality distance learning courses is not easy task. These are always long-term projects that require a lot of time and resources. In addition, taking into account that distance learning by itself will not be effective (even if the distance courses are developed with the state-of-the-art technological approaches) if the learning environment is absent. moreover, as any educational process, the distance learning quality is based on active feedback from the learner. The effectiveness of the new approaches' introduction, the new applications development, the new technologies introduction should be confirmed by the learners' opinion. All this leads us to the fact that the use of standard methodologies, approaches and methods for managing educational projects with a rigidly defined architecture is impossible. In this case, flexible approaches look more effective, which should satisfy the following trends [9]:

- to take into account the project life cycle reducing (one distance course can "live" only one or two learner groups, and then requires changes based on feedback and the new technological / pedagogical opportunities appearance);
- digitalization of society in all areas;
- globalization of markets (2020 showed that the globalization of education can be effectively carried out on the basis of the living space digitalization of the individual);
- innovative development based on internationalization and the best practices using;
- close cooperation between teachers, technical and sociological specialists (the correct application of pedagogical strategies based on a modern technical basis, taking into account the changing social role and psychological characteristics of the individual).

These trends support is best provided by a family of flexible methods of software development - Agile, defined by Agile Manifesto. The main ideas of Agile Manifesto are: (1) people and interaction are more important than processes and tools; (2) a working product is more important than

comprehensive documentation; (3) cooperation with the customer is more important than the contract terms agreeing; (4) change readiness is more important than going through the original plan [10].

Agile Manifesto defines and explains the next principles [10]:

- customer satisfaction through early and uninterrupted valuable software delivery;
- supporting changes in requirements even at the development finishing if it can increase the product competitiveness;
- working software supplying;
- close, daily communication of the customer with developers throughout the project;
- motivated individuals implement the project. They are provided the necessary job conditions, support and trust;
- a personal conversation is recommended method of information transfer;
- working software is the best progress measure;
- constant attention to technical skills improving and convenient design;
- simplicity is the art no unnecessary work doing;
- the best technical requirements, design and architecture realize by self-organized team;
- constant adaptation to circumstances changing (the team should systematically analyze possible ways to improve efficiency and adjust their work style accordingly).

Such techniques provide flexibility in content creation, service delivery, and the ability to improve both presentation and delivery based on ongoing feedback. In addition, Agile focuses on teams and leadership. Stable teams that independently make all decisions on the way of implementation and are responsible for the result [9]. Support for this approach is very important during development, since any distance course is, first of all, creativity that various specialists bring together, and also clear algorithmic approaches that provide control, accounting, movement trajectory, assessing the effectiveness and training results.

Studies of the competencies field development in project and program management in product creation showed slight fluctuations in the employees' competence who projects manage and an IT product creating according to the Agile methodology.

Key competencies for creating intelligent program support and stakeholder engagement in case for "Infodemic vs. Panicdemic vs. Pandemic" COVOD-19 project critical influence are Strategic Thinking, Integral Thinking, Leadership, Coordination, Communication Skills (provided by information systems, databases and knowledge), as well as motivated, professional initiatives.

The chart of changes in the managers' level competence of innovative projects (Figure 1) shows significant drop incompetence in the context of the influence of negative emotions. In this case, the coefficient calculated as K = (Score 2) / (Score 1) in this case is equal to 1.55, which indicates the negative impact of infection on the application of the competence of the project manager.

Figure 1: Spider diagram of competency assessment by key competency indicators by competency element "Governance, structures and processes" [11]

Project managers working in industries with high communication skills may lose interest and motivation to work after a while, which leads to a decrease in personal efficiency and productivity.

For project managers who manage teams where employees mostly work in a human-to-human system, this is an everyday problem. High communication ability is a strong stress factor, especially if a person's work is associated with a competitive environment and high customer expectations. In these conditions, the study of the symptoms of emotional burnout, cognitive dissonance and their prevention becomes especially important for the project manager [11].

In addition, modern information technologies, communication means, increasing the availability of information and increasing the rate of its accumulation allow to quickly adapt the developed methodologies to solve various practical problems, not always taking into account the specifics of different industries and system characteristics of different management objects, including infrastructure projects and programs.

On the other hand, with the scientifically sound, methodologies and methods systematic use of different subject areas, new opportunities appear to develop new approaches to project decision-making in order to ensure the project success. Also, when implementing different methodological approaches, it is necessary to clearly define the criteria for evaluating the success of their application. Such criteria should take into account the basic principles of evaluating the effectiveness of different systems, which constitute a single information space for project and program management and determine the overall project success.

Also, today, in the conditions of constant fast changes and transformations, the task for the project manager becomes definition and coordination of requirements of participants of the project from which initial data for acceptance of administrative decisions during its planning and realization are formed. In solving such problems, the project manager must not only identify all stakeholders and take into account their requirements, but also calculate the optimal parameters of their interaction to achieve success. In this process, project participants invest and receive from the project different values and influence the project, based on their interests, competencies and the degree of involvement in the project. Project management can be significantly complicated by changes in such requirements and values during project implementation. This necessitates the improvement of existing and development of new methods and models and information technologies for project decision-making while agreeing on the project main parameters, taking into account the limitations and assumptions of the main project participants using convergence methods.

Under the pattern of the project manager behavior is understood the model application of behavioral competencies in management processes. The model of competence groups in the format "Leadership-Intelligence-Emotions" is offered [12].

5. Case ViMaCs Project

The ViMaCs project is being implemented within the framework of German-Ukrainian partnership in the context of shaping the digital future together under the program to support for the internationalization of Ukrainian universities [13]. The project is implemented with the support of the German Academic Exchange Service (DAAD) [14], in cooperation with three Ukrainian universities and one German university: Kyiv National University of Construction and Architecture (hereinafter - KNUCA) (Kyiv, Ukraine) [15], National University "Zaporizhzhya Polytechnic" (hereafter - NUZP) (Zaporizhzhya, Ukraine) [16], Western Ukrainian National University (hereinafter - WUNU) (Ternopil, Ukraine) [17] and Dortmund University of Applied Sciences and Arts (hereinafter - FH Dortmund) (Dortmund, Germany) [18].

The project's aim is to build a virtual training and laboratory infrastructure for distance learning in the field of "Data Science". The three partner universities KNUCA, NUZP and WUNU should become part of the virtual master network with FH Dortmund and its European partners.

One of the project's results is developing 4 distance modules: "Business Intelligence and Information and Decision Making" (KNUCA is responsible for it), "Data Acquisition and Processing" (WUNU is responsible for it), "Artificial Intelligence and Data Analytics" (NUZP is responsible for it) and "Cloud Based Data Processing Systems"(FH Dortmund is responsible for it), which will be introduced into the Master Curricula of partner universities. Each partner develops a 6 ETCS distance

module and makes it available in the consortium. Teaching content in the frame of the project is presented on the Figure 2.
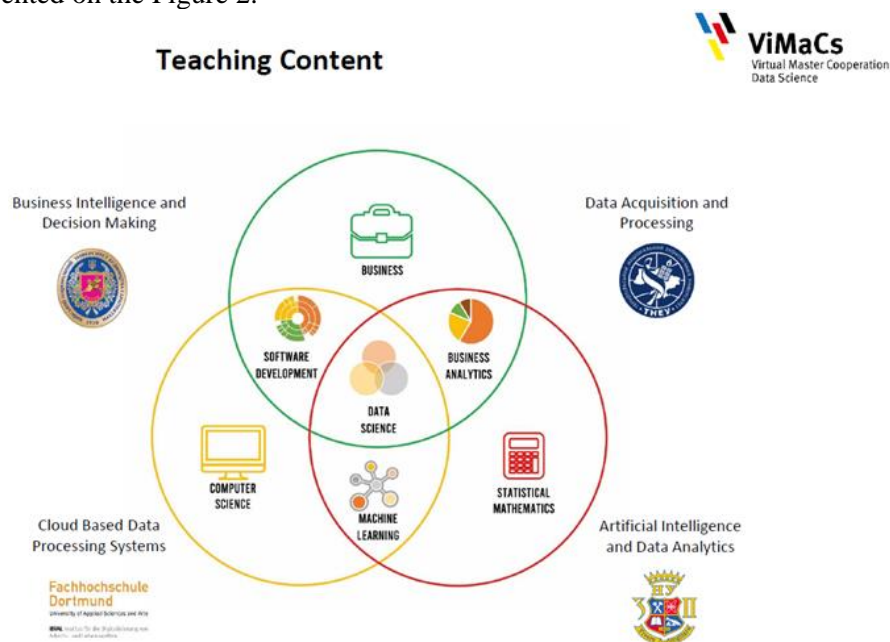
Figure 2: Teaching content, created in the frame of the project ViMaCs

Pilot teaching of the developed distance modules was planned within the framework of spring, summer, autumn and winter schools defined in the academic calendar. However, the World Pandemic has made some adjustments to the project implementation process. The pilot teaching took place in the distance mode. Learners during the pilot teaching were students from partner-universities, as well as students from other universities who expressed a desire and registered. Information about the pilot teaching was disseminated through university websites, the project website and social networks (such as Facebook). Note, more than 50 people took an interest in the latest training, which took place from 7 to 11 December 2020. The result of each teaching was the developed educational materials and tasks testing in order to further improve them and upload to a single common virtual learning environment. However, distance modules require technical support. For this achievement, it is planned to build a virtualized IT infrastructure (server, special equipment and software), which will perform tasks, practices and experiments as part of the module and will be supported by the appropriate module developer. For this purpose, it was planned to buy needed equipment for each university depending on the needs. Now, each university bought a special server that will support the future learning process based on the using the modules of each university both distance and replicate mode. The distance education effectiveness and motivation are based on the students' collaboration organization. Such collaboration in the project is planned to be realized by creating a community of practice (CoP) around the module. Moreover, such communities assist developers in developing modules during the project implementation phase. Such virtualization allows the infrastructure to be available online by other partners. The IT infrastructure also serves and will serve to create an improved e-learning environment, collaboration and digital audiences. Important elements of ViMaC are the development of a digital counseling service ("Mobility Planner" and "Student Journey Configurator") for students. The modules using in the Master Curricula of partners-university, as well as the further coordination of curricula create the way for more dissemination of the double degrees programmes between different universities. The learning environment develops is the next project's goal. It integrates Ukraine into the educational environment of European countries. This will be ensured by signing partnership agreements that are outside the existing Memoranda and planned double degrees. These agreements will also regulate how new partners can join ViMaCs and what contribution they will provide. Thus, ViMaC establishes a new model of "Digital Educational Ecosystem" (DEE) for Ukraine and can serve as a basis for future ecosystems in other areas. ViMaCs expands the digital network connecting to the EuroPIM network and, as a result, international cooperation in a structured format, which is supplemented for students in the form of various

consulting services. In general, Ukrainian partners are creating a state-of-the-art curriculum, which leads to the strengthening of international cooperation and is the basis for in-depth scientific cooperation with Europe through Germany. Stephan Recker, Professor from FH Dortmund, presented an example of such educational environment in the frame of the XVII International Scientific and Practical Conference "Project Management in Society Development" (Figure 3). The topic of the conference was "Project Management in the digitalization of society". It was held from 15 till 16 of May, 2020 at KNUCA. The Project Management Department of KNUCA was responsible of it. The Digital Educational Ecosystem description was the topic of the presentation by Professor Carsten Wolf from the FH Dortmund in the frame of the same conference. One of the important problems that led to the ViMaCs project initiation and implementation was that the partnership educational system management and university management systems[19,20] are still isolated solutions in each university, although the same IT tools (Moodle and ILIAS) are used. Student life cycle systems are difficult to connect, at least for reasons of data protection. However, a digital exchange platform needs to be created. This platform is able to provide services and give possibilities for downloading for HEIs. In the frame of the project, Ukrainian universities are receiving the necessary equipment. The main element of the project is creating solutions, integrating into a comprehensive digital infrastructure of virtual, cross-border curricula and supporting of a sustainable model maintaining of resources. Each partner must set up an "IT Technology Steward", ie a person who provides advice as an expert and develops decision concepts, trains and accompanies people as a coach and shapes the transformation process as a change agent.
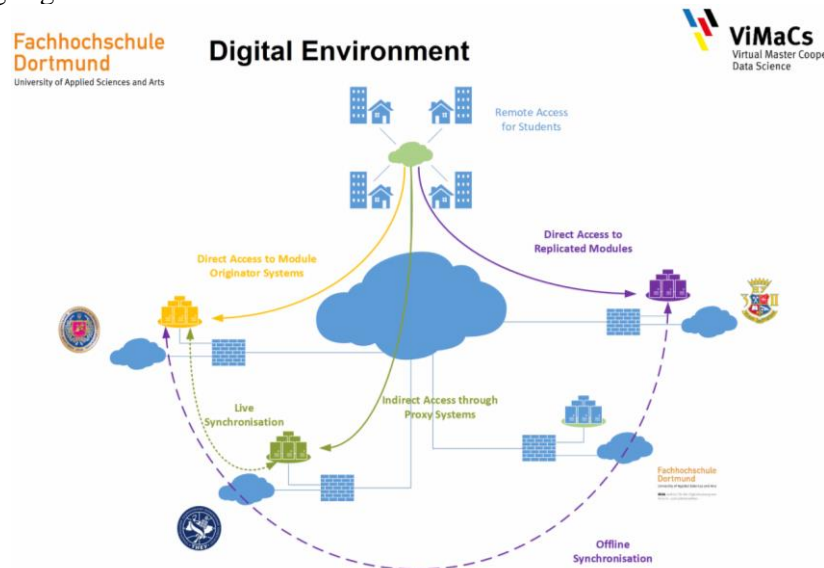

Figure 3: Digital Environment, created in the frame of the project ViMaCs

6. Conclusion

As a result of the research the assessment principles and epy competence approach application to the development of project management systems, programs and project portfolios are analyzed. Proactive approaches to the specialists training and their competence development based on the convergence of global trends and cooperation between different universities based on the Bologna Process are proposed. The main trends are related to the digitalization of countries, the transition to a behavioral and circular economy, the competency-based approach application in HEIs and educational standards, accelerating development through the flexible methodologies using. The studied patterns of students' behavior allow not only to assess the level of competence according to the IPMA Agile Leadership model, but also to identify weaknesses in key indicators of competencies in the formation of programs for further development of project manager competencies. Information and communication technologies have changed our world, expanding it significantly, and the 2020 pandemic has made it possible to understand how these open spaces can be used to increase human potential. The Digital Education Ecosystems creation can be seen as the next step in the globalization

and society digitalization that will allow the full implementation of the lifelong learning concept in any part of the world.

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