Yumed Text
OPEN ACCESS JOURNALS

Computer Science Journal: Open Access

Research | Vol 1 Iss 1

The Consolidation of the Fully Remote Software Development Practice in Europe: Study of 2023

Pashchenko Denis*

Ph.D., MBA, Independent Consultant in Software Production Improvement, Moscow, Russia

***Corresponding author:** Pashchenko Denis, Ph.D., MBA, Independent Consultant in Software Production Improvement, Moscow, Russia, Tel: +007-926-1567495; E-mail: denpas@rambler.ru

Received: March 11, 2023; **Accepted:** March 02, 2023; **Published:** April 10, 2023

Abstract

The pandemic and the formation of COVID economics continue to have a significant impact on the development of the industries of the "new economy", which is observed in the acceleration of digitalization, virtualization of work processes, and the predominance of communications in digital channels. The transition to a Fully Remote Mode (FRM) paradigm in software and IT-services development under the influence of the COVID factor not only changed the IT industry but marked the emergence of a new industry standard in the IT domain. This article provides the results of a study by 2022-23, covering various aspects of fully remote software development in European technological companies from Kazakhstan and Russia (Yandex, Sberbank, VTB, etc.) to Germany and France (Deutsche Bank, ATOS IT, Finastra, etc). There is a summary of earlier author's research about FRM paradigm in software development (2020-2021); and the results of the last one (2022-2023). In the following one 48 experts are representing their team's experience in long-term adaptation to fully remote working in software and IT-services development. The goal of the research is to learn and to analyze the process of the consolidation of the FRM paradigm in software development as a new industry standard. Learned in study process includes current situation in production teams, typical risks and its management, IT company's investments in a new working model, the real performance of adaptation and mid-term impact on the future of IT domain in 2023-2024.

The main result is the clear confirmation that FRM paradigm became the powerful trend and competitive advantage on IT labor market, shift to "hybrid" \ fully remote mode type of working changed the main production processes in software development. Study shows that all corresponding changes in processes and in IT company's goals settings are done and mostly even before 2022: so best European engineers wouldn't come back to the offices.

Keywords: ***Remote work; Software development; COVID; FRM paradigm***

Citation: Denis P. The Consolidation of the Fully Remote Software Development Practice in Europe: Study of 2023. Comput Sci J Open Access. 2023;1(1):102.

1. Introduction

Software production paradigms have the major impact on the all main parameters of the software delivery: from the long-term quality and engineer's involvement to "time-to-market parameter" in product development. IT industry has a strong background in remote working and geographically distributed software development (GDD). GDD has some specific features, automation tools and own history of continues improvement [1]. Moreover, from 2015 there are some huge and successful out-staffing and outsourcing companies that are presenting only remote software development services and made this service in best-of-the-breed manner [2].

COVID factor in the Spring of 2020 forced IT teams to switch on "Fully Remote Mode" (FRM) in all types of the businesses. Lockdown, self-isolation, new state regulation in labor area dramatically changed traditional communications, task management and zones of responsibility for team leads, project managers and engineers. From the other hand – some companies were more than ready for "fully remote" software development. In previous studies in 2020-2022 [3,4] were learned – how IT-leaders world-wide made the early adaptation to FRM and how they resolved the critical problems of engineer's motivation, education, and promotion in FRM paradigm.

As we may see now in the beginning of 2023 – a lot of leading IT companies didn't get back into offices and present FRM as a new industry standard. But this complicated issue needs to be analyzed in different aspects and from the time-long perspective: positive and negative features, evolution of process, forecast for 2024. In the center of this new analysis should be placed the consolidation of FRM in software development in experience of modern and huge enterprises that are presenting IT industry and maintain the main world-wide software services. During the last 3 years FRM is the one of the major points of IT-domain science and its consolidation in 2022-2023 is a key point in new high-tech labor organization. Previous author's studies [2,3] about early stages of shift in labor and team's working to fully remote in software development covered almost all regions in the world: USA, Europe, Russia and more than 100 software teams. Main summary that might be useful in understanding of this problem in 2023-24 is located in next chapter.

2. Summary of Studies in 2020-22

First adaptation processes to FRM in software development due to COVID-factor in 2020 were based on the previous engineer's experience in GDD. Most of the world leaders organized special programs of projects and led their teams to the new production practices in centralized manner. Experts confirmed [3], that this factor of presence of corresponding centralized policies and projects in organizations is minor, software development teams did understand "remote working" without any top-management regulation. Early adaptation took from several days to few weeks and for majority of teams in research the process is clear and has no serious problems in realization.

This Study demonstrated that high tech companies and their software development teams without significant problems had done the transformation to "hybrid" or fully remote mode of working. The main reason of this simplicity is in their mental and technical readiness for it, based on experience of GDD and advanced practices of using automation tools in day-to-day operations: from group communications to product quality management. Interesting that software teams were sure in their ready-status in transfer to fully remote mode of working despite of type of organization: bank, fintech or software company.

Made review of working model in software development, based on results of studies in 2020-2021 during the COVID pandemic might be described on the following figure [3]:

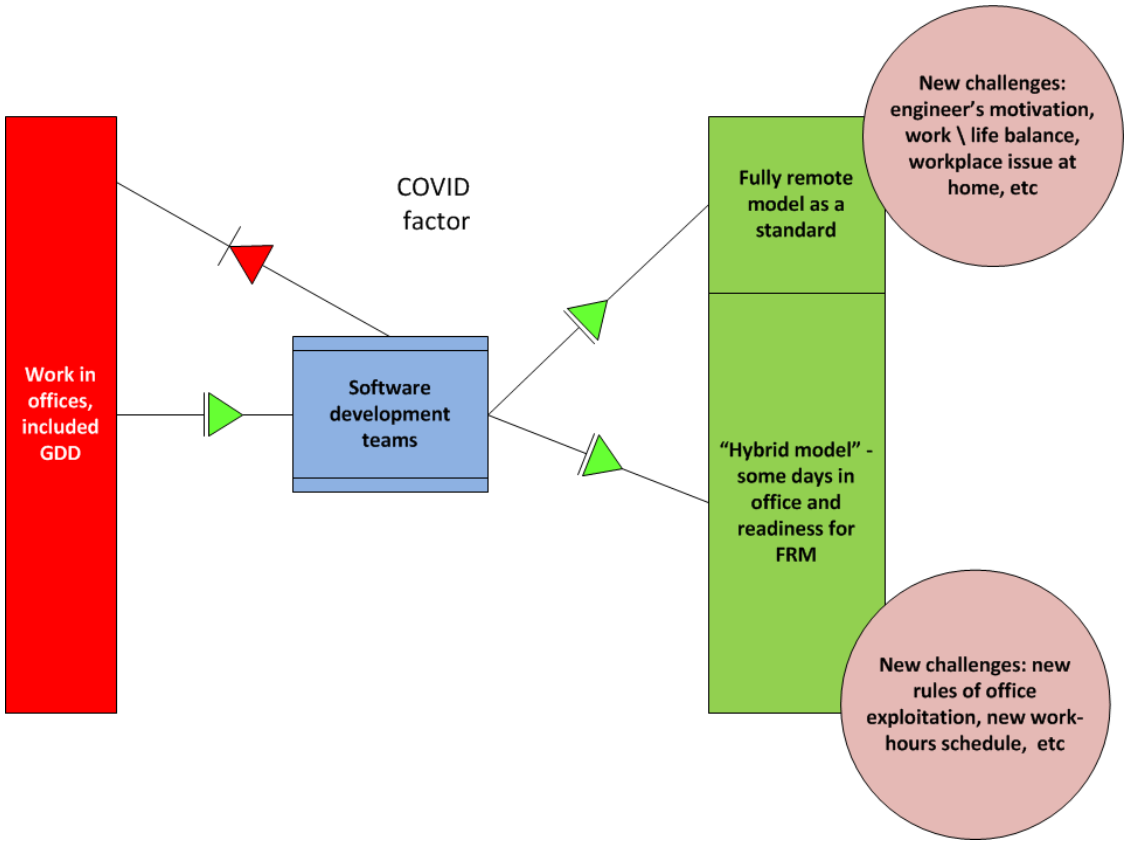

FIG. 1. **Shift in labor and team working situation due to COVID-factor impact.**

According to FIG. 1 it's easy to track the shift in software development from standard work in offices with geographical distributed development to new forms of team work. Two new types – "hybrid model" with few days a week or some months a year in office and fully remote mode without personal meetings and common offices. Every new type means overcoming new challenges in project organization, engineers' motivation, and other issues. By FIG. 1 is clear, that in case of pandemic situation aggravation companies in "hybrid model" [5] might easily switch-on the fully remote model. During second wave of COVID-19 in autumn of 2020 it's happened in EU and USA.

In mid-term perspective teams found more positive than negative in FRM in software development. Despite some negative aspect like slowdown of professional growth of novice engineers and losing the business integrity of enterprises the experts were motivated with new standards in working**.** This Study showed that teams and their leaders are monitoring new negative factors and sometimes are presenting correction actions in corresponding directions.

So, high tech companies in IT domain started to build the new reality in software development and excellence the FRM in working [3]. Modern teams were ignoring any ideas of getting back to office in 8h \ 5d mode. Firstly, in 2020 was confirmed that FRM paradigm might be the strong factor in headhunting in software domain.

Next studies demonstrated, that fully remote software development has become the de-facto the new standard in the industry: from 31% of teams in 2020 to 58% of teams in 2022-23 used it as a major paradigm. Moreover, most of the teams by the end of 2021 have already identified effective mechanisms to work in conditions of completely remote software development. However, despite the end of the isolation issues of pandemic big share of the IT companies forever changed the models of teamwork, hiring and firing, and long-term organizational development.

In the studies, experts highlighted the obvious advantages of this approach (for employees), which will remain significant in the long-term conditions:

- saving money and time when working from home;
- the ability to make the work schedule more flexible and convenient [4].

At the same time, experts confirmed the need to analyze the current success in organizing completely remote development and associate its prospects with overcoming certain problems. The study identified the most problematic factors of remote development:

- rigid dependence of the engineer's productivity on the provision of working conditions (family is a stress factor and a support factor, the possibility of comfortable work from home is noise, light, workplace, etc.).
- a decrease in the social activity of employees, both forced quarantine issues and after the pandemic (while maintaining remote jobs).
- for each employee and members of his family - a mixture of working time and space with personal (maintaining the work \ life balance in time and space in home–office organization).

These problems are not specific to the IT industry; however, it is technology companies that have sufficient resources and experience in organizing distributed development teams [4] to smooth or even resolve these difficulties. Obviously, the FRM paradigm in organization of production already impacted on the development of software tools. On the one hand, IT companies made the highest possible demands on the technological solutions of any suppliers, on the other hand, they themselves are starting the production of the new technologies aimed at solving the urgent problems of the IT industry. The experts in the study identified the following technology perspectives:

1. excellence of the communication technologies (video, 3D, integrations);
2. new generation of distance learning technologies;
3. customization of software development support tools (CI\CD, Task and SDE Automation) [4].

The number of remote communication tools continues to increase, the requirements and expectations of consumers are growing, both the tools themselves and their integration with other information systems are becoming more complicated. Similar processes are observed in the field of distance learning technologies. Software development support tools (SDLM - Software Development Lifecycle Management) began to develop even faster in 2020-2021 - it is obvious that completely remote development, as a format of work, will be reflected in the automation of production processes of IT companies in next years.

Experts demonstrated the growth in the expectations of engineers and managers, associated with the necessary growth in the managerial competencies of managers “in the new conditions”. Obviously, all participants understand the temporary non-optimality of processes and expect their companies to update their process and employee management models.

Prospects for changes in the organization and methodology of project and team work aroused a high level of interest in discussions with experts. The summary list of the most general prospects was made in the following:

1. strengthening the formalization of communication processes in IT companies at various levels;
2. strengthening the formalization of the processes of interaction with business customers (from the demo of new functions to the analysis of defects);
3. increasing the role and importance of socializing events in teams and collectives - team building, joint hobbies, corporate culture;
4. rising of the need to improve the skills of company leaders in managing distributed and remote teams (setting tasks, motivation, control, quality of products and technological processes, etc.);
5. future formalization of the synchronized schedules of employees working remotely (in teams, units, virtual offices, etc.);
6. rising of the need for managers to be even more immersed in the details of their tasks - especially when working with new members of their teams.

In 2021-2022 the weakest adaptation in mid-term perspective in comparing with Western Europe and USA had the region of Central and Eastern Europe (CEE – Serbia, Hungary, Poland, Belarus, Ukraine, Russia, Kazakhstan) [4]. The regional part of studies demonstrated that despite the efforts of individual managers and team leaders, regional technology companies pay insufficient attention, spend a minimum of effort and investment to better adapt teams to work in remote conditions. In the future development of this form of organization of software production as a new and dominant industry standard, the CEE IT industry will be even more inferior in competition (hiring and retaining talent, software development efficiency, development of teams and employees, etc.). Now in 2022-2023 this affect is doubled by Russian-Ukrainian war. Although the study confirmed that at the team level in CEE companies there was a search for approaches to adapt employees, but the scarcity of resources and opportunities at the team level leaves these attempts only minimally sufficient to maintain the current performance of engineers. Understanding the need for consistent work with the motivation, engagement, and professional development of engineers in the context of the COVID-economy in CEE companies was not the dominant motive for corporate investment in human capital [4]. A similar conclusion was done about the need to solve the problems of socialization of engineers in a completely remote development environment: regional companies were demanded to spend more efforts in this direction.

As a summary: in 2020 easy transition to completely remote software development was supported by engineers and managers, had a positive motivational effect and was considered by all participants in the process as a new organizational initiative with great perspective. In 2021-22 studies confirmed that FRM became more and more popular [4] and corresponding problems met the solutions and investments in most advanced regions and by the world IT leaders. Following study presents the observing of the current situation in the long-term adaptation of FRM paradigm in IT domain in Europe.

3. Goals, Method, and Details of the Study

The consolidation of this paradigm in 2022 has been learned in the new research in Europe region: from Kazakhstan to France. It has been conducted in December of 2022 - January of 2023 and covers the experience of 48 software development and IT support teams in companies with HQ in European countries from Kazakhstan and Russia (Yandex, Sberbank, VTB, etc) to

Germany and France (Deutsche Bank, ATOS IT, Finastra, etc). Some of the corporations are pure IT companies with long successful track in industry, some of them has a strong in-house software development practice, included thousands of engineers in Europe and millions of customers, who is using their software every day.

The main goal of the research is to learn and analyze the process of the consolidation of the FRM paradigm in software development as a new industry standard. The learning process includes current situation in production teams, met expectations of last years in FRM working and IT company's investments, the real performance of adaptation and mid-term impact on the future of IT domain.

Applied methods of research: questioning with Google.Form tool and personal remote interviews. The study contains two main sections:

- consolidation of remote software development without personal meetings after transition to FRM \ "hybrid model" with overcoming the main problems and risks;
- common forecasts and ideas about impact of this industry standard on the corporate culture of IT-companies and on the project management and production processes in terms of 2023-2024.

Every team has been presented in this study by 1-2 experts with roles of project manager, team lead, software developer, support engineer or analyst. The majority of the experts (63%) got 8 and more years in software \ IT-services development, and a group of experts (25%) has 3-7 years of professional experience in IT domain. Group of experts (33%) presented in-house development (mostly huge European banks and fintech like Freedom Finance and Exness Cyprus, and another majority of experts (38%) presented out-sourcing companies (mostly international – Epam, Auriga, etc.). Also, several vendors were presented - Yandex, Finastra, etc.

All answers were provided in Google. Form tool in one-round study. Also, participants (88%) added some basic ideas into their forecast on 2023-24 within corporate culture and business efficiency of the consolidation of FRM paradigm as a new industry standard. And after the presenting of the results to participants the group of experts (23%) added the study's feed-back that also impacted on the final results described in this article in next chapter.

4. The Consolidation of Fully Remote Mode in Software Development

The following author's study demonstrated the current status of the software development transformation and its main results might be grouped in three areas:

1) Current level of consolidation of new paradigm as a new industry standard;
2) FRM impact on all main software production and product parameters;
3) The level of social impact of FRM paradigm on the IT business and people.

Rising of the demand of FRM in software and IT-services development is clear: about 58% of the surveyed teams in 2022 are working without offices and personal meetings at all. The popularity of "hybrid" model is also raised up to 29% of the surveyed teams in 2022 and the share of "office-based" IT companies significantly decreased even despite of decision of few huge European and Russian banks to get back their engineers to the offices in 2023.

A new study of 2022 demonstrated: in companies that have adopted the paradigm of completely remote software development, these processes are basically consolidated, and all the necessary changes and technologies are implemented. This study showed that in two-thirds of the surveyed teams, all improvements have already been made before 2022, and today only some details and changes are being finalized by the teams at their own level. However, the practical author's experience shows that the top management of IT companies should continue to support organizational efforts and investments in remote working technologies: the layer of unresolved problems remains significant, and the opportunities for improving production processes in the new paradigm are economically attractive.

In retrospective model of thinking experts in 2022 defined two main factors that helped their organization to make the smooth and quick shift from office-based software development to FRM:

1) Experience of engineers and managers in remote working even before COVID-19 pandemic;
2) Rapid and consolidated changes in production process in first months of pandemic;

Also, experts shared their vision about anti-patterns in software production's transfer to FRM. Two most popular anti-patterns:

1) Ignoring the clear needs of changing in corresponding processes – from people and project management to new approaches in communications and team work;
2) Overconfidence in internet stability, remote working technologies and software tools - home-based offices, used tools and technologies weren't good enough as it was expected during early adaptation to FRM in software development.

New study of 2022 presented the finalized view - how completely remote software development triggered the major changes in all set of production processes in IT-companies and what's the real long-term impact on the main software product parameters. This study confirmed that FRM has practically no significant effect on the quality management of developed software products: from 93% in 2020 to 62,5% in 2022 experts said, that fully remote processes don't have the impact on the quality of software. Indeed, modern high tech software enterprises already have automated their quality assurance processes and almost excluded the "human factor" from this issue [6].

At the same time, according to the study FRM in software delivery suitable as a base for modern software project management frameworks like Scrum, Kanban and even RUP. All changes in software project management related to FRM \ "Hybrid" work organization had been done in 2020-2021 and more fits to "agile" shift in software industry than "fully remote working" shift happened later. So, the project management transformation due to FRM in software development is over.

Shift to FRM \ "hybrid" working coincided with the rapid (since 2017) growth in the popularity of DevOps and CI\CD practices world-wide and it partially catalyzed this process [7]. New level of automation in software production (CI\CD including integrated auto-testing and code analysis, features in SDE, polices of release management) made the software production more impersonal and it's following virtualization doesn't need personal meetings in offices and decreased the common team efforts in every project. Howbeit, information security processes in FRM paradigm have become more complex and more variable. This is partly due to the subjective perception of information security by individual managers (for example, in large banks), and partly due to objective fears of a quick loss of employee loyalty and involvement in the transition to completely remote software development. However, this model had a serious impact on the formalization of communications: in 2020, 2021 and

even in 2022, a significant part of the teams continued to increase the formalization and manufacturability of communication processes: both within the company and with external customers and partners. A separate issue is the combination of a new production model with SCRUM development processes - the very spirit of Agile and project practice says: the team should work together and as close as possible to each other [8]. In a recent study, by the end of 2022, more than 70% of teams were able to overcome the traditional problem of having engineers work together in the SCRUM teams, combined with completely remote software development "without physical offices". Engineers continue to work closely together, but in a virtual space used modern communication and project management tools. Moreover, very important doubt in the future of FRM in IT-branch is an issue of teammates motivation and involvement in projects and corporate life of IT company. Current study shows that in over 70% teams the company and leaders are spending time, money and efforts for additional motivation of teams in FRM software development. In half of the cases all investments in FRM of working are done and work well.

So, according to the study of 2022 the complex impact of FRM in software development on the parameters of software and delivery process is not so strong as in 2020 or even in 2021: main problems are overcome. The next part of research is dedicated to the social impact of FRM on the software engineer's life and career. COVID-19 factor and corresponding self-isolations, restrictions in travelling and shift to "hybrid" or FRM in team working have a long-term effect in HR management [9]. In current study were learned some aspects of this problem relevant to IT companies:

1. the shift in the balance of personal and workable time and space for engineers;
2. the change in typical learning processes;
3. the ways of exchange of experience and continued career growth;
4. the need to increase the socialization of employees in IT companies.

From year to year, the experts who participated in the author's studies confirmed that the mixing of personal and working time and space in this profession is not a difficult task to regulate: by the end of 2022, less than 20% of teams regulated this aspect with special instructions and regulations, since 2020 seriously has grown the share of teams in which this aspect is solved at the individual level, by the employees themselves. Typical processes of learning, exchange of experience and career growth have also become virtualized, and their transparency has noticeably decreased: neither in 2021 nor in 2022 did expert panels offer consolidated solutions to overcome these problems, and in CEE region experts noted an extremely low level of corporate investment in this direction. Similarly, experts worldwide confirm that regardless of the status of the pandemic and the measures to combat it, companies should invest more money and attention in the socialization and involvement of engineers in corporate life.

Also study of 2022 gathered the forecasts about future development of IT market and software delivery processes in terms of future standardization of FRM paradigm, that are in aligning with some other expert's assumptions [10]. Most interesting ideas from the author's study about IT domain in 2023-2024 are listed below:

1) Further formalization of people worktime management in IT-company (polices, tools, connections with career and bonuses, personal and team success tracking);
2) Strong need of investments in offline socialization for software engineers in different aspects: from professional events to special corporate programs;

3) Further excellence of software development tools that makes FRM more useful: from self-hosting to software products to automation of the production processes;
4) World-wide rising of part-time work demand by employers and part time offers by companies in IT-industry.

5. Conclusion

Research of 2022 convincingly confirmed that world-wide completely remote work processes have already become part of the global corporate culture of the IT industry and de facto standard for most of the world IT leaders. Despite getting back staff in the offices in some huge European banks this trend is in the high demand and the FRM makes now the millions of software engineers happy [11].

All corresponding changes in processes and in IT company's goals settings are done and mostly even before 2022: FRM and "hybrid" became the clear standard in the industry. Problems of quality assurance, project management, HR processes, information security, technology support are almost solved. More complex issues like transparent corporate learning, exchange of engineering experience, career development still need more investments and efforts from IT companies. The FRM in the organization of projects and commercial communications is still under construction: at least it requires a more formal and technology's supported approach and more time to be finished.

Starting more than ten years ago from GDD the shift to FRM in software development is not over, but already has become one of the key advantages in professional headhunting [12]. As the systemic problems of this paradigm are overcome, this advantage will become more and more significant. Moreover, not all regions are in the same conditions in 2023, while USA and global corporations are building "hybrid" European offices in warm-climate Spain and Portugal to gather the talents world-wide, the IT-companies of CEE region (Serbia, Hungary, Poland, Belarus, Ukraine, Russia, Kazakhstan) almost lost all competitive advantages in this transformation by the end of 2022 with low level of investments in FRM and in corresponding problems. Current forecast for this region: the best Russian, Ukrainian and CEE-developers will move to companies that will offer them completely remote development in the next years even if it means the relocation from the country.

In mid-term perspective of 2023-2024 teams also are found more positive than negative in FRM in software development. Study shows that change management in adaptation to FRM / "hybrid" teams is affordable and regular: team's leaders are monitoring new negative factors and sometimes are presenting correction actions in corresponding directions. So, high tech companies in IT domain are building the new "remote" reality in software development and excellence the FRM in working. Modern teams are ignoring any ideas of getting back to office in 8h \ 5d mode.

The long-term motivation of software engineers in FRM of working is still the main problem in mentioned aspects (education, career development, company's, and project's business integration, etc.). It requires a specific solution in each case and for each IT company and would be also the strong competitive advantage in future. The common recommendation here is simple: formalize the problem of long-term motivation problem and start it solving in individual manner for every team, software product or unit.

REFERENCES

1. Espinosa A, Slaughter SA, Kraut RE, et al. Team Knowledge and Coordination in Geographically Distributed Software Development. J Manag Inf Syst. 2007;24(1):135-69.
2. Pashchenko D. The specific features of a geographically distributed software development. On the example of the CIS-region (in Russian) // Svobodnaya mysl. 2017;5.
3. Pashchenko D. Fully Remote Software Development Due to COVID Factor: Results of Industry Research. Int J Softw Sci Comput Intell. 2021;13(3):64-70.
4. Pashchenko D. Russian experience in organizing fully remote software development: an industry study of 2021. Softw Eng. 2021;6:311-8.
5. Sunita Narain. Post COVID-19 pandemic: Hybrid-work model in the new-normal. 2020. Access: https://www.downtoearth.org.in/blog/governance/post-covid-19-pandemic-hybrid-work-model-in-the-new-normal-73313
6. Zhai J, Yang Q, Yang Y, et al. Automated Process Quality Assurance for Distributed Software Development. In: Berkling K, Joseph M, Meyer B, editors. Software Engineering Approaches for Offshore and Outsourced Development. SEAFOOD 2008. Lecture Notes in Business Information Processing, vol 16. Springer, Berlin, Heidelberg. 2009.
7. Zeller M. Towards Continuous Safety Assessment in Context of DevOps. Comput Saf Reliab Secur. 2021;12853:145-57.
8. Moreira M. The Agile Enterprise: Building and Running Agile Organizations. 1st ed. Berkeley, CA: Apress, USA; 2017.
9. Sunil P. How COVID-19 is impacting HR practices in APAC: Pay freezes, cautious hiring, and more. 2020. Access: https://www.humanresourcesonline.net/how-covid-19-is-impacting-hr-practices-in-apac-pay-freezes-cautious-hiring-and-more
10. Gilbert N. 17 Remote Work Trends for 2023: Current Forecasts You Should Know. 2022. Access: https://financesonline.com/remote-work-trends/
11. Robinson B. Remote Work Increases Employee Happiness By 20%, New Study Finds. 2022. Access: https://www.forbes.com/sites/bryanrobinson/2022/05/05/remote-work-increases-employee-happiness-by-20-new-study-finds/?sh=45dced763183
12. Simovic D. The Ultimate List of Remote Work Statistics: The 2023 Edition. 2022. Access: https://www.smallbizgenius.net/by-the-numbers/remote-work-statistics/