Architecture of new technological worlds on the example of IT-parks

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Abstract. The article considers IT-parks as examples of the implementation of new technological worlds of the information post-COVID period on the example of large international and domestic IT companies. Modern trends and general principles of creating office spaces for IT organizations are revealed from the point of view of the influence of the environment on the physical, psychological and emotional well-being of employees. The study identified seven main trends: a healthy work environment, biophilic design, transformable spaces, hybrid workplaces, sustainable workplaces, contactless technologies, a unique interior that tells the story of the company. These trends were further implemented in the design: in the experimental graduation project of the IT-park in Samara and in the implemented building of the IT-park in Samara.

1 Introduction

Today, the construction industry is undergoing a large-scale transformation associated with the transition to the information society, which dictates new conditions for the development of architecture and the city as a whole. In the era of globalization, when the technological revolution dominates, there is an urgent need to rethink the connection between the city and the person.

Modern society sets before information technologies the tasks of increasing labor efficiency, saving time and resources in various spheres of life. Currently, the country's competitiveness depends on the level of development of innovative products and technologies, which is important to consider when making decisions on financing new projects. One of the criteria for investors is the number of successful innovative enterprises in a country or region.

The purpose of the study is to determine the main trends in the organization of office space for an IT specialist and to identify the optimal volumetric and planning structure of an IT-park using the examples of the city of Samara.

2 Methods

In the course of the study, domestic and foreign experience in designing objects of similar subjects was analyzed and the main trends in the organization of office spaces for IT

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organizations were identified. The results obtained were tested in the process of designing IT-parks in Samara [1-15].

The main research methods were: an integrated approach to the analysis of the material under study, systematization of the factual material, the theoretical component and applied methods for solving the problem of designing and building office spaces for IT specialists in the post-COVID period, and experimental development of the main provisions for designing IT-parks. This study is based on the scientific works of the following authors: Krasnov S.V., Nikulin D.Yu., Gulyi A.I., Kolosovskaya D.V., Rumyantsev A.A.

3 Discussion

Russian government actively supports the development of the IT sector. In Samara, the number of IT graduates is constantly growing, but this alone is not enough for the successful development of innovative companies and businessmen. Therefore it is necessary to create a favorable environment by organizing incubators, co-working spaces and other places where IT specialists can meet, exchange experiences and create new projects. It is also important to support start-ups and provide them with access to investment and expert assistance. At the same time, it is necessary to continue developing educational programs in the field of IT in order to train high-level specialists. All these tasks are solved by IT-parks.

Every year the demand for IT specialists is growing, which is confirmed by the increasing number of state-funded places for applicants. Table 1 presents data on the two largest universities that train IT specialists in Samara.

<table>
<thead>
<tr>
<th></th>
<th>2020-2021</th>
<th>2021-2022</th>
<th>2022-2023</th>
</tr>
</thead>
<tbody>
<tr>
<td>Samara State Technical University</td>
<td>234</td>
<td>290</td>
<td>294</td>
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<tr>
<td>Samara University</td>
<td>455</td>
<td>602</td>
<td>670</td>
</tr>
</tbody>
</table>

4 Discussion

The creation of IT-parks helps to stimulate innovation in companies and among people, providing the best conditions for the successful operation of large IT companies, effective IT developments and start-up projects at all stages - from idea to final product. This is a unique platform for the development of information technology and motivation for creative thinking. IT-parks are an integral part of the infrastructure aimed at the development of high-tech sectors of the economy. They create a modern infrastructure and high-quality jobs, attracting qualified specialists and forming a new vector of development. The IT-park provides companies with the necessary resources to focus on their main high-tech activities.

IT-parks solve the problem of employment for graduates of relevant specialties, as well as citizens who want to change their profession or improve their skills. The educational function included in the structure of the park allows students and specialists to be aware of current vacancies, as well as to choose enterprises for internships and practice. So employers can effectively select personnel. Due to this the interaction between these structures ensures the training of competent employees.
IT-parks are often formed around the headquarters of large IT companies. The functional planning organization of the headquarters is aimed at the convenience of employees and the maximum efficiency of business processes. In such buildings, areas for work and leisure are usually clearly separated, there are meeting rooms, conference rooms, kitchens and dining rooms. The architecture of the headquarters can be very different - from minimalist forms to complex volumetric and spatial compositions. Office space is often complemented by interior elements that create an atmosphere of creativity and inspiration. In general, the functional planning organization of the headquarters is a key factor in the success of the company as a whole.

As part of the study, an analysis was made of the functional and planning structure of the headquarters of large IT companies: Googleplex in Mountain View, California; Apple Park in Cupertino, California; Facebook headquarters in Menlo Park, California; Microsoft corporate headquarters, Redmond, Washington; Salesforce headquarters in San Francisco; Amazon headquarters located in Seattle; Yandex headquarters in Moscow. Table 2 presents the result of the analysis of the planning features of the organization of office buildings for IT organizations. The analysis showed that the functional organization of the headquarters of IT giants is much broader than the classical typology of office spaces. This is a new type of architectural environment, which includes several typologies in its structure: office premises of various types, educational classes, exhibition spaces, sports halls. The structure of the headquarters also includes housing for residents, medical care and various service functions. applicants. Table 2 presents data on the main functional zones in IT-parks.

**Table 2.** Analysis of the planning features of the organization of office buildings for IT organizations

<table>
<thead>
<tr>
<th></th>
<th>Google</th>
<th>Apple</th>
<th>Facebook</th>
<th>Microsoft</th>
<th>Salesforce</th>
<th>Amazon</th>
<th>Yandex</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gym</td>
<td>+</td>
<td>+</td>
<td></td>
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<td>+</td>
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<tr>
<td>Medical service</td>
<td>+</td>
<td></td>
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<td></td>
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<tr>
<td>Massage</td>
<td>+</td>
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<tr>
<td>Dry cleaning</td>
<td>+</td>
<td></td>
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<tr>
<td>Cafeteria / café / restaurant</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Kitchen</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
<td></td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Outdoor sports grounds</td>
<td></td>
<td>+</td>
<td>+</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Gardens/meadows/fields</td>
<td></td>
<td>+</td>
<td></td>
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<td>+</td>
</tr>
<tr>
<td>Use of renewable energy sources</td>
<td>+</td>
<td>+</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Rest rooms</td>
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<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Open conference rooms</td>
<td>+</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>+</td>
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<tr>
<td>Natural lighting of the workspace</td>
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<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
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<tr>
<td>Ergonomic furniture</td>
<td>+</td>
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<td></td>
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<tr>
<td>Meditation room</td>
<td>+</td>
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</tbody>
</table>

Information technology has dramatically changed where, when and how people work and learn. A number of trends have finally taken shape under the influence of the pandemic, especially in the organization of office spaces. IT companies are not afraid to experiment with workspaces, bringing a variety of research into their interiors, in order to increase the productivity of project processes and the satisfaction of their employees. Workspaces of an
IT company are also becoming content for social media, as it is through them that the search for new staff is carried out, who are attracted by the non-traditional office interior and workflow. As a result of the study, seven main trends in the organization of workspaces for IT companies were identified:

- The well-being of employees in the workplace includes the physical, psychological and emotional health of employees. It becomes one of the key factors influencing the layout, as it has a significant impact on the satisfaction, productivity and overall efficiency of the company's employees. To create a "safe" workplace, it is necessary: ergonomic organization of the office space; inclusion of functions for the physical activity of employees of the organization; providing natural lighting for workplaces; providing health functions; creating spaces for both collaboration and privacy.

- Biophilic design of workspaces involves the transfer of the external natural environment into the premises. Plants help absorb noise; create quiet, secluded spaces; create separate zones that help divide space in open-plan offices; improve the aesthetics of the office; improve the psychological health of employees; absorb CO2 and help detoxify stale office air. Green areas are a trend not only in the interior of offices, but also in the exterior. Some firms make the most of open spaces and rooftops.

- Transformable spaces that can be easily adapted to the needs of an ever-changing work environment. In the post-Covid period, a universal space for various interactions with colleagues will contribute to closer cooperation between colleagues. As employees increasingly choose to work outside of the office, there is a need for face-to-face meetings in the office, and such spaces can serve as social anchors.

- Creation of hybrid jobs advising all styles and types of work. Office workers are becoming less attached to stationary, sedentary work. The workplace has adapted to include spaces for concentration, collaboration, hybrid work and relaxation.

- Support for sustainable development programs, which includes not only certification for the overall environmental and energy efficiency of the building, but also compliance with standards such as the WELL Building Standard, which focuses on the well-being of building occupants.

- Use of contactless technologies to create a safe office environment. Implementing some of the technology trends that have made it possible to work during the pandemic is making it easier for employees and applicants to feel more at home in the office.

The main provisions that were formulated in this study, the identified space-planning solutions for IT-parks and the main trends in the organization of workspaces for IT specialists were tested as part of an experimental project of an IT-park in the city of Samara. The graduation project was completed by student Cherkashina Ksenia at the Department of Architecture of residential and public buildings in Academy of Architecture and Civil Engineering of Samara State Technical University. The head of the diploma is PhD in Architecture, Senior Lecturer Malysheva E.V.

5 Results

The territory chosen for the design of the IT-park is located in the Oktyabrsky administrative district in Samara within the boundaries of Lipetskaya and Novo-Sadovaya streets, between the North-Eastern highway and Lieutenant Schmidt street.

The site was chosen taking into account the active development of the territory, the convenience of transport infrastructure, including bus and tram stops and a metro station. Also, the IT-park will become an additional point of attraction for the new residential area being designed on the territory of the former plant named after Maslennikov. On the
The designed building is a cubic volume, from which smaller structures are distinguished, designed for various functions. The entire building is permeated by the atrium, which solves several problems at once: on the one hand, the creation of a green zone penetrated by natural light for informal meetings of employees, on the other hand, blocks of individual negotiation booths for online meetings and negotiations are included in the structure of the atrium. The underground floors will include: multi-level parking for employees and visited IT-parks; sports hall and technical rooms. The first floor is fully open to IT-park guests and includes a lobby with a coffee shop, an exhibition hall and a dining room. The educational center is located on the second and third floors. Above, there are workspaces of various types and scales for IT specialists: co-working spaces for startups, work rooms, open space offices, meeting rooms, conference rooms. The two upper floors, allocated in a separate volume, house offices for one large company. For these offices there is an exit to the landscaped exploited roof.

This functional structure of the IT-park building will allow not only creating spaces for accommodating various companies, but also attracting citizens who decide to change their
line of business or improve their skills in order to optimize their professional activities. The architectural design of the external appearance also reflects the modern trends of IT-parks, such as continuous glazing, open spaces, cantilevered elements of the building, and minimalist style.

![Fig. 3. The facades of the experimental project IT-park in Samara.](image1)

Also, some provisions formulated in this study were identified in the process of developing a space-planning solution for the Monte Rosa IT-park in Samara, developed in 2015-2020 by Graphics-Engineering LLC, architect Malysheva E.V. The territory of IT-park is located in the Oktyabrsky administrative district in Samara, between Moscow highway, Lunacharsky street and Michurin streets. This site is also actively developed, has good transport accessibility, includes bus, tram stops and a metro station. For the building of the IT-park, the territory of the former industrial zone was also chosen, which turned out to be in the structure of the city, which is also being developed for a new residential area being designed on the territory of the former 4GPZ plant. The completed 12-storey building is a class A business center, an intelligent business complex implemented using innovative technologies (BIM design, solid glazing, versatile spaces). At the moment, the building houses a restaurant, a coffee bar, a fitness club, a bank, a conference room, a coworking center, a car sharing center, and offices of IT companies.

![Fig. 4. The photo of the realization project IT-park in Samara.](image2)

6 Conclusion

As a result of the study, the following conclusions can be drawn:
1. IT-parks help to stimulate innovation in companies and among people, provide the best conditions for successful work and development, solve the problem of employment of IT graduates and improve the skills of specialists in other fields.
2. An analysis of the space-planning and functional structure of seven large IT companies made it possible to identify functional blocks: office space, educational classes, exhibition spaces, gyms, housing for residents, medical care and various service functions.
3. Summarizing the information received, it was possible to identify 7 main trends in the organization of office spaces: a prosperous working environment, biophilic design, transformable spaces, hybrid workplaces, sustainable workplaces, contactless technologies, a unique interior that tells the history of the company.
4. The identified space-planning solutions and the main trends were tested on the pilot project of the IT-park in Samara.

From the foregoing, it follows that information technology has already firmly entered our daily life and professional activities. The wide distribution of IT-parks, which are not only office buildings, but also include educational and popularizing functions, are truly new technological worlds that cover an ever wider range of the population, thereby reducing the negative impacts of the transition to a new technological order.

In conclusion, it should be noted that the conducted research can be useful in the educational process for bachelor students studying in the direction 07.03.01 "Architecture", or used in experimental design. Also, the conclusions of the study are significant for architects in their practical activities in the development of projects for office buildings and premises for IT companies.

Reference

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