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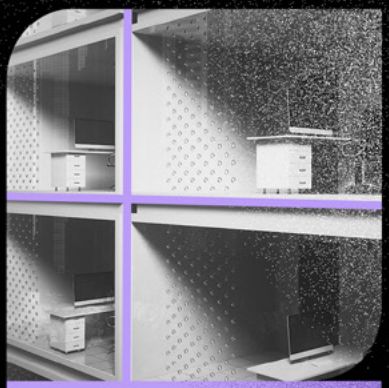
Wroclaw Agglomeration Development Agency



# Digital Co-creation and other scenarios for the future

ICT development
in the Wroclaw Agglomeration 2037

infuture institute

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# INTRODUCTION

In the modern world, each business is a technology company. The ICT industry, being a horizontal industry, can directly influence the solution of global problems.

However, branches do not operate in a void. To realize their full potential, cooperation is essential. That is why in this report we focus on the entire ecosystem, the elements of which (education, the city and the ICT industry) co-function and as a whole define the development of the industry in the Wroclaw Agglomeration. In addition, in the report you may find a model outlining the city's distinctive features relevant to the paradigm shifts - the transition from a city as a place to work to a city as a place to live.

While working on the report, we obtained knowledge from a variety of sources: entrepreneurs, representatives of NGOs, universities, investors and representatives of the administration of the Wroclaw Agglomeration. Valuable work with such a large group of specialists allowed us to operate in a T-shape model, combining expertise on challenges and prospects in the ICT industry with the foresight knowledge of the infuture.institute team. In preparing the report, we relied on data triangulation. This is a model that allows us to combine multiple methods and sources of knowledge.

Working with change factors was also a very important element in the process. Sixteen factors were defined, divided into factors inhibiting and supporting the development of the ICT industry in the Wroclaw Agglomeration. They represent a comprehensive analysis of the challenges facing not only the ICT industry, but also education and the city. Defining them helped set the direction of the industry's development. The result of the foresight process is four scenarios of the future.

However, they should not be regarded as self-fulfilling prophecies. They indicate what the future of the ICT industry in the Wroclaw Agglomeration may look like, and what steps should be taken today to enhance or inhibit specific changes. The report emphasizes the dimension of practicality. In the recommendations we pay particular attention to, among other things, cooperation, building a flexible strategy, openness to testing new solutions and possible failures, the essence of combining services, exchanging competencies between industries and closing the digital gap.

We hope that reading this report will be inspirational for you and will become a reason for building a smart and sustainable future.

**infuture.institute team**

Dear All,

I am pleased to present a new publication prepared by the Wroclaw Agglomeration Development Agency in cooperation with infuture.institute. Once again we have decided to take a closer look at one of the undoubted driving forces of the agglomeration - the information and communication technology industry - and try to predict its future in a 15-year perspective.

We are all aware of the important role played by the ICT industry in the reality around us and its impact on other sectors of the economy. At the same time, we are observing dynamic phenomena that are forcing this industry to constantly evolve and adapt to new realities. In 2019, when we carried out our last study of the sector, i.e. before the pandemic and the series of socio-economic changes, we were faced with completely different conditions than today, barely a few years later.

The question is how to maintain positive trends for the industry and build a resilient strategy. Where is the Wroclaw ICT sector today and what may await us in the years to come - these are the answers we try to provide in the report Digital Cocreation and other future scenarios. Development of the ICT industry in the Wroclaw Agglomeration 2037.

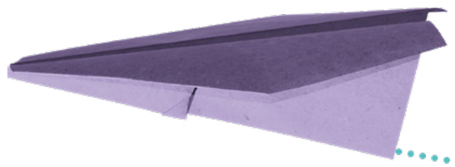
We have considered various possibilities - therefore our scenarios, based primarily on a debate with the broader ICT industry and its stakeholder community, assume both the preservation of the sector's position as well as its collapse, growth or transformation. We have focused on the relationship between the ICT sector, education and quality of life in the Wroclaw Agglomeration.

The work on the report has allowed us to identify many important factors that affect the sector and structure our thinking about it. I hope that this publication will become a pretext for further discussions about the ICT industry and new initiatives at the interface between business, Wroclaw and science. I would like to take this opportunity to thank all those who have contributed to this report, especially the strategic partners: CBRE, Michael Page, SoftServe, and Wiewiórski Legal and I wish you an enjoyable reading.

**Magdalena Okulowska, Ph.D.**
*President of the Board,*
*Wroclaw Agglomeration*
*Development Agency*

# METHODOLOGY

**As part of its work on the project, infuture.institute has conducted an analysis of historical signals of change (in-depth analysis of the existing data, reports, articles and other sources on the future of ICT) and the following qualitative and quantitative studies:**



- **A cycle of three research workshops**

  Representatives of the ICT industry, universities, non-governmental organisations, investors and representatives of the administration of the Wroclaw Agglomeration participated in the workshops.

- **6 interviews with experts**

  The purpose of the conversations was to recognise change factors influencing the development of individual ICT areas in the Wroclaw Agglomeration. Participants:

  - Anna Maruszewska, HR Manager GSC Poland, 3M
  - Katarzyna Szklarska, Manager, Michael Page
  - Sebastian Drzewiecki, VP, Country Manager SoftServe Poland;
  - Monika Bieniek, Talent Operations Director;
  - Jagoda Klonowska, HR Marketing Lead;
  - Anna Złocka, SoftServe Academy Manager
  - Małgorzata Golak, Director of the Economic Development Office of Wroclaw City Council
  - Tomasz Popów, an investor in charge of the VC Venture For Earth fund
  - Paweł Tkaczyk, founder of midea.pl

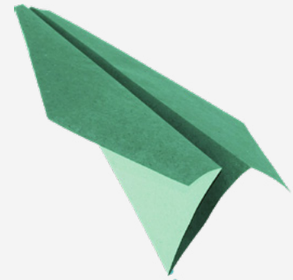
- **A cycle of quantitative research**

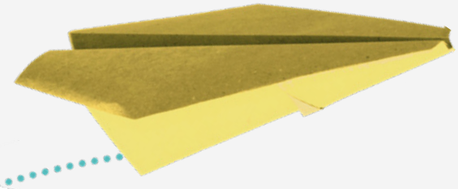
  The first study covered ICT companies in the Wroclaw Agglomeration. It was conducted with the use of the Computer-Assisted Web Interview (CAWI) method. The purpose was to learn about the characteristics of companies operating in the Wroclaw Agglomeration. Responses were collected between September and October 2022. 101 answers were used in the analysis.

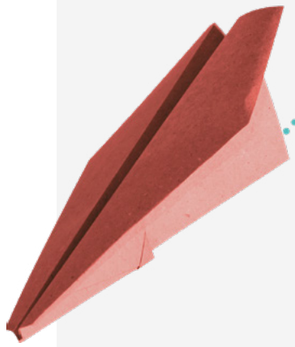
The second study was related to the perspectives of ARAW employees in the context of the cooperation between representatives of the city and the business. The purpose was to clarify the challenges as well as to find out the perspectives of individual representatives of the industry and organisations working at the interface between the city and the industry.

Six ARAW employees participated in the online survey.

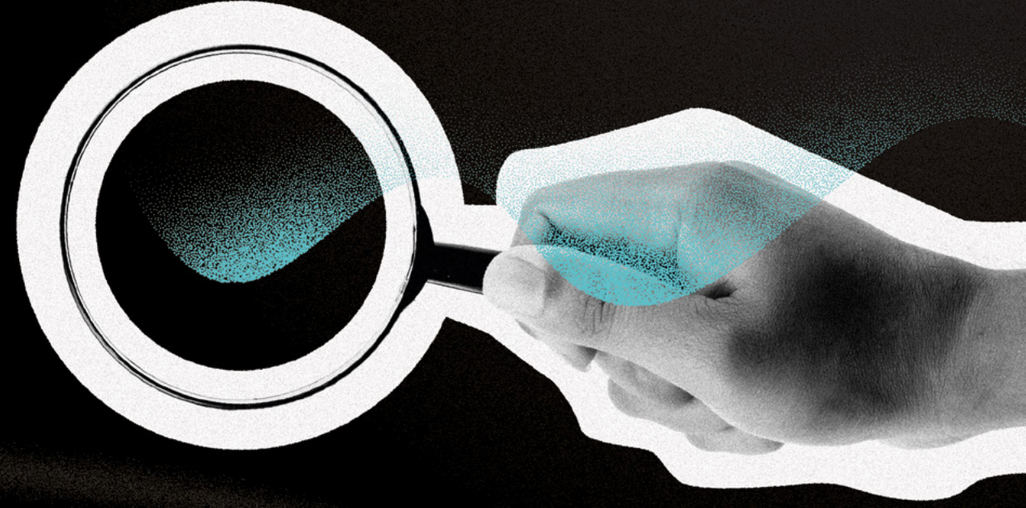
The third study was concerned with the assessment of the drivers of change relevant to the construction of scenarios for the future of the ICT industry. The purpose of the study in the form of a CAWI survey was to assess the factors impeding and supporting the development of the ICT sector in the Wroclaw Agglomeration. 23 experts participating in the research workshop and available for interviews took part in the research.







# RESEARCH PROCESS



**The analysis of results of all the studies made it possible to develop four scenarios for the future of the ICT industry in the Wroclaw Agglomeration in 2037.**

1. Analysis of historical signs of change
2. CAWI surveys among ICT employees in the Wroclaw Agglomeration and ARAW employees
3. Individual interviews with experts
4. CAWI survey among professionals on the evaluation of the impact of signs of change on the future of the ICT sector in the Wroclaw Agglomeration
5. Research workshops with representatives of the ICT industry, investors and the administration
6. Development of future scenarios

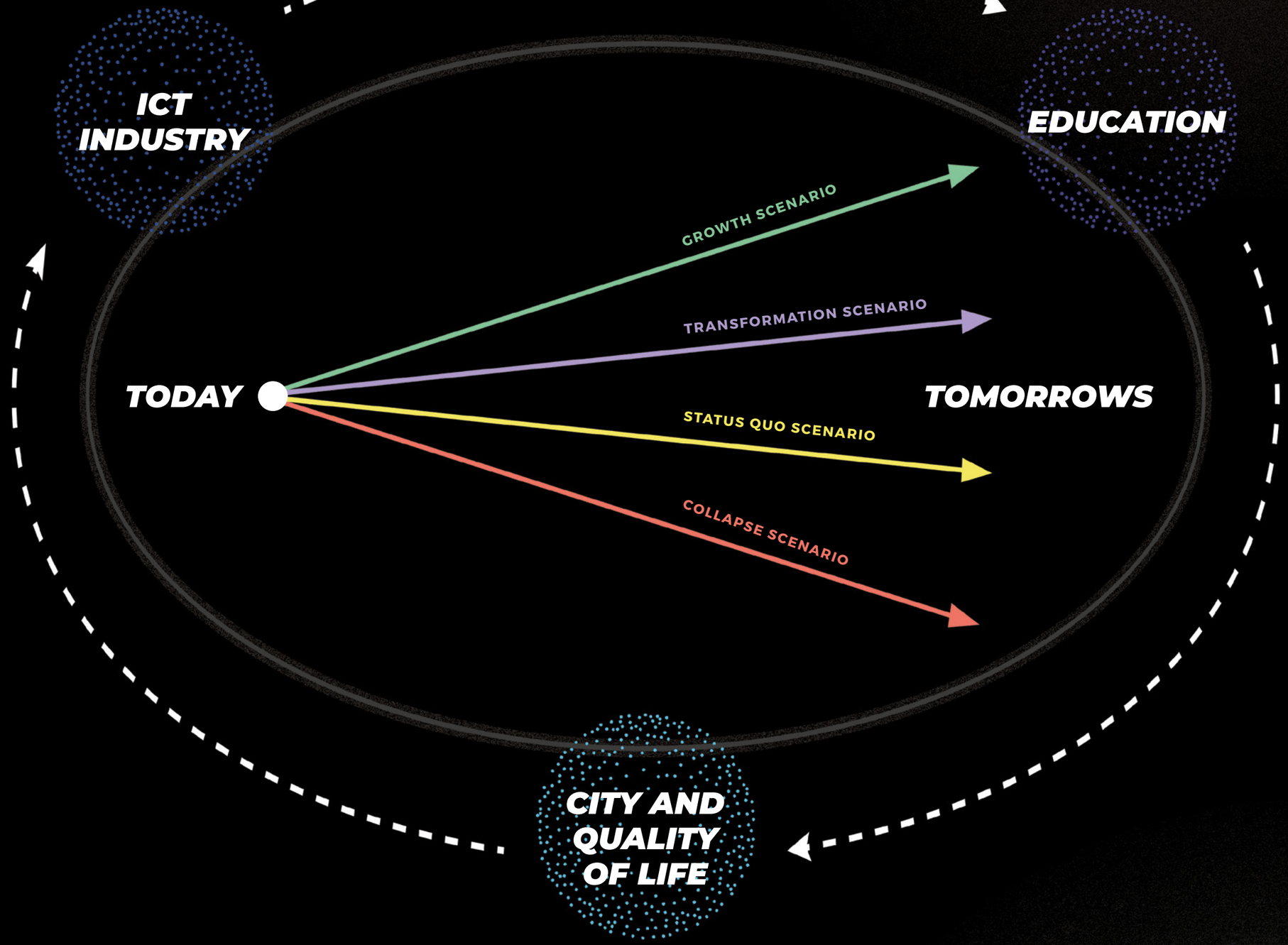
***SOURCE:***
**Diagram of the research process, own work by infuture.institute, November 2022**

# REPORT STRUCTURE

The report consists of two main parts. Part I (Today) points to changes and the current situation of the ICT industry.

Part II (Tomorrows) is a description of four future scenarios (growth, transformation, status quo and breakdown) that are also potential paths from point A (today) to point B (tomorrow).

Development of the ICT industry in the Wroclaw Agglomeration (discussed in the Today and Tomorrows sections) also depends on the functioning of the ecosystem of the ICT industry, education and the city. These three elements also form the lens of the analysis in this report.




**SOURCE:**
Report structure, own work by infuture.institute, December 2022.

# TODAY





# Economy powered by the ICT industry

**The ICT industry is the driving force behind economies. We live in a world where almost every firm is a technological company and where sustainable digital transformation is one of the priorities for the major global companies.**

The ICT industry also influences all business sectors directly. Therefore, it is a horizontal industry[1].
It can have an impact on addressing social, health, environmental and economic issues, as evidenced by the development of categories such as: HealthTech, MedTech, EdTech, AgriTech, GreenTech, CleanTech, AgeTech and FemTech.

- Global expenditure for ICT technologies reached 4.9 trillion dollars in 2020 and are estimated to increase to 5.8 trillion dollars in 2023[2].
- The value of the ICT area increased by 19% in Poland in 2021, i.e., from 75 billion to 89 billion PLN[3].
- According to PARP reports, the IT industry accounts for approximately 8% of the Polish GDP with a workforce of 430,000 people[4].
- According to Eurostat data, nearly 9 million people in EU countries worked as IT specialists in 2021. The number of IT specialists in Poland increased by about 50% between 2012 and 2021, an increase almost 8 times greater than the total employment increase in other industries[5].

Such rapid industry growth entails a huge demand for employees. According to estimates of the Polish Economic Institute, there is a shortage of as many as 150,000 specialists on the Polish market at the moment[6].

> *The labour market has a shortage of highly experienced IT professionals and will probably lack them for a long time to come. And the demand is growing all the time. Today, each recruitment of a specialist with some experience (even three or four years of experience) entails transferring that person from one company to another. A vacancy is then created in the former company, which is very challenging to fill as there are no available and willing specialists on the market. This, again, ends up with an employee being transferred from one company to another and creating another vacancy. It is a vicious circle and a great problem for the IT industry.*
>
> **Katarzyna Szklarska,**
> *Manager, Michael Page Technology.*

With too little focus on STEM[7] education and the redefinition of the role of cities (they are no longer primarily a place to work but rather a place to live), it is important for strategic actions leading to the development of the ICT industry to be taken by a wide range of stakeholders (business, administration and local government and education).

[1] ICT (information and communication technologies) also called data communication technologies or information techniques. Information technologies (IT) are a narrower concept.

[2] Sava, Justina A. Total information communication technology (ICT) market spending worldwide from 2016 to 2023. Statista, 2022. https://www.statista.com/statistics/946785/worldwide-ict-spending/ (accessed on 11.01.2023).

[3] Computerworld, IDG. Polski rynek teleinformatyczny. Top 200, 2022.

[4] Polska Agencja Inwestycji i Handlu, Grupa Polskiego Funduszu Rozwoju. Poland.ICT – Succeed With Poland. 2021.

[5] Eurostat. ICT specialists in employment. 2022. https://ec.europa.eu/eurostat/statistics-explained/index.php?title=ICT_specialists_in_employment#Number_of_ICT_specialists (accessed on 11.01.2023).

[6] Łukasik, K., Strzelecki, J., Śliwowski, P., Święcicki, I. (2022). Ilu specjalistów IT brakuje w Polsce?. Polski Instytut Ekonomiczny, Warszawa.

[7] STEM – Science, Technology, Engineering, Mathematics.

There is huge potential in the ICT industry to create innovations in response to the problems of the modern world. Thanks to new technologies, we are able to develop modern digital tools that can change our reality for the better, and we have already done so at the local level of our cities.

For example, they allow to monitor the major sources of CO2 emissions or the streamlining of administrative processes thanks to making it possible for residents to conveniently propose changes.

Technological knowledge opens the door to create many other necessary solutions. This is why we are also willing to share it with others for free. In 2019, we established Open Tech, a platform that connects NGOs and our IT experts and makes it possible to solve global problems together. We cooperate with the Paso Pacifico organisation, among others, by preparing a business case for it, a proposal for a technological solution to combat global warming and its implementation. We also support initiatives aimed at the creation of innovations; one of the most recent ones was a project to develop solutions using data analytics to improve the city's operations.

The work on technological novelties requires professionals to continuously improve their skills. As the demand for modern IT solutions is huge, the demand for expert services in this sector will grow rapidly. However, the shortage of such experts on the market will oblige them to work for companies from all parts of the world in the coming years. Therefore, not only will they need fresh, up-to-date knowledge, they will also need highly developed soft skills and the ability to adapt quickly to new conditions and projects.

**Sebastian Drzewiecki**
*VP, Country Manager*
*SoftServe Poland*

– is a manager with more than 20 years of IT experience. In his career so far, he has handled responsibility for the development of technological centres of companies such as GSK, HP and Sabre. After hours, he runs a blog and a podcast titled Nowoczesny Lider (A Modern Leader). He is also a mentor active in his support for women's development in business, for which the Sukces Pisany Szminką Foundation awarded him the title of Male Champion of Change.

**Monika Bieniek**
*Talent Operations Director.*

Responsible for recruitment and talent management teams in all the polish locations of SoftServe. She supports managers in building recruitment strategies and implementing them according to market standards in her daily work. She spends her time off in the mountains or scuba diving.

**Michalina Gołąb**
*Senior Communication and CSR Specialist.*

Michalina has gained professional experience in technology companies, working in the areas of trade marketing and communications. At SoftServe she helps to develop CSR strategy and creates initiatives involving employees in ESG activities. She spends her free time hiking and climbing.

softserve





# State of the industry in the Wroclaw Agglomeration

**The growth of the ICT industry also determines the development of urban technology ecosystems. The largest cities have been competing for the title of Poland's Silicon Valley (the place of the most dynamic development of start-ups) for years.**

According to the GUS data, in December 2022 in the Wroclaw Agglomeration nearly 12,000 IT companies were registered, including over 9,000 companies in Wroclaw itself. In 2022 only, IT activities in the Wroclaw Agglomeration were launched by nearly 2,000 companies. This is an increase of 26 pts. compared to 2021. According to the research[8], the largest number of registered start-ups (21%) are currently based in the Lower Silesia voivodeship. This is the result of many different initiatives. For years, Wroclaw, the capital city of the region, has been unrelenting in its quest to be an attractive place for the ICT industry. The city occupied the third place in Poland in terms of the number of documented IT job offers in early 2022[9].

In order to take a broader look at the development of the industry in the Wroclaw Agglomeration, local ICT companies were invited to participate in the survey[10] in October and November 2022. The infuture.institute team compared the results of this survey with those of a similar one conducted in 2019. As in 2019, more than 100 entities took part in this year's survey: large enterprises employing more than 250 people as well as small and medium enterprises and microenterprises[11].

More than a half of the companies that took part in the survey (like in 2019) describe themselves as software houses / IT consulting, which is the business profile most frequently mentioned by companies. The companies further declared themselves as software producers, start-ups and BPO/SSC/ITO[12].

The five most-frequently mentioned business profiles of Wroclaw companies are IT Consulting, Other Software Development, Mobile App Development, Web Development and Software Maintenance[13]. The comparison of research results (in 2019 and 2022) led to the identification of the following directions:

[8] Startup Poland. Polskie Startupy 2022. 2022.

[9] Inhire.io. IT Market Snapshot Q2. 2022.

[10] An online survey (CAWI) conducted in September and November 2022 by infuture.institute in cooperation with ARAW on a target group of representatives of ICT companies operating in the Wroclaw Agglomeration (n = 101). Participants in the research were companies rendering IT services for businesses, dealing with the creation and development of software and delivery of IT-based solutions/innovative products.

[11] An online survey (CAWI) conducted in September and November 2022 by infuture.institute in cooperation with ARAW on a target group of representatives of ICT companies operating in the Wroclaw Agglomeration (n = 101). Based on the single-choice question: 'What is the size of your enterprise?'.

[12] An online survey (CAWI) conducted in September and November 2022 by infuture.institute in cooperation with ARAW on a target group of representatives of ICT companies operating in the Wroclaw Agglomeration (n = 101). Based on the single-choice question: 'Which model is most characteristic for your enterprise?'.

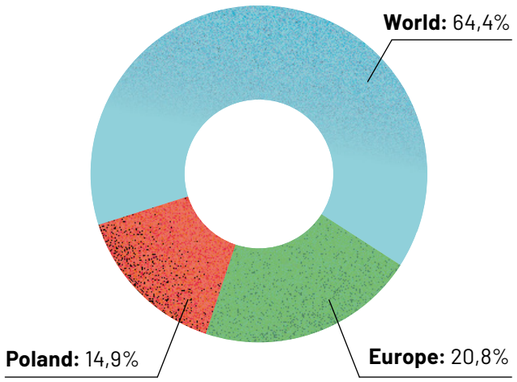
[13] An online survey (CAWI) conducted in September and November 2022 by infuture.institute in cooperation with ARAW on a target group of representatives of ICT companies operating in the Wroclaw Agglomeration (n = 101). Based on the multiple-choice question: 'What is the business profile of your company? Please select max. 5 most important categories of services'.

## A TURN TO GLOBALISATION

Ever-greater numbers of Wroclaw companies operate on a global scale. The majority of them (64%) declare that their clients come from all parts of the world[14], 21% have clients throughout Europe and only 15% have clients in Poland only. A clear change can be seen here in relation to 2019. At that time, only 25% of the companies surveyed stated that they worked for global clients, 41% declared that they worked for European clients and as many as 37% served only domestic Polish clients.

*Chart 1.*

### Location of clients of Wroclaw's IT firms (2022)




Source: Online study (CAWI) carried out in September and November 2022 by infuture.institute in cooperation with ARAW on a targeted sample of representatives of ICT companies operating in the Wroclaw Agglomeration (n = 101) on the basis of a single-choice question: 'Where are your clients from?'

## POLISH CAPITAL DECLINE

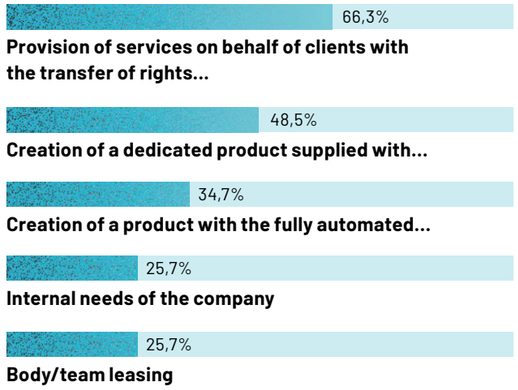
The dominance of Polish capital is also declining. When it comes to the ownership structure, 68% of companies reported having Polish capital in 2019 while the 2022 figure was 59%[15].

## CHANGES IN PROCESSES

Changes can also be seen in the structure of the activities of the studied companies. As many as 66% of the entities indicate that currently they provide services on behalf of clients with the transfer of copyright to the client, whereas in 2019, the figure was 35%. The option to create a dedicated product delivered with a specialised service has also grown in popularity (49% in 2022, up from 17% in 2019) along with the option to create products with a fully automated distribution process (from 19% to 35%[16]).

*Chart 2.*

### Structure of IT solutions offered by Wroclaw's entities (2022)




Source: online study (CAWI) carried out in September and November 2022 by infuture.institute in cooperation with ARAW on a targeted sample of representatives of ICT companies operating in the Wroclaw Agglomeration (n = 101) on the basis of the question: 'What is your IT business activity structure?'

[14] An online survey (CAWI) conducted in September and November 2022 by infuture.institute in cooperation with ARAW on a target group of representatives of ICT companies operating in the Wroclaw Agglomeration (n = 101). Based on the single-choice question: 'Where are your clients from?'

[15] An online survey (CAWI) conducted in September and November 2022 by infuture.institute in cooperation with ARAW on a target group of representatives of ICT companies operating in the Wroclaw Agglomeration (n = 101). Based on the single-choice question: 'What type of capital predominates in your enterprise?"

[16] An online survey (CAWI) conducted in September and November 2022 by infuture.institute in cooperation with ARAW on a target group of representatives of ICT companies operating in the Wroclaw Agglomeration (n = 101). Based on the multiple-choice question: 'What is your IT business activity structure?'





## INCREASED IMPORTANCE OF MEDICAL SERVICES

Client sectors most frequently mentioned in 2022: finance (40%); IT (37%); production (37%); medical services (30%); commerce, transport and logistics (26% each); telecommunication (20%) and the media (15%[17]). No significant differences can be seen in the three most frequently indicated industries over the last three years. However, the role of medical services increased significantly in comparison with 2019. They moved from seventh to fourth place (an increase of 12 pts). This fact is probably related to the outbreak of the COVID-19 pandemic.

*Chart 3.*

### Recipients of solutions offered by Wroclaw's IT firms by industry (2022)




Source: online study (CAWI) carried out in September and November 2022 by infuture.institute in cooperation with ARAW on a targeted sample of representatives of ICT companies operating in the Wroclaw Agglomeration (n = 101) on the basis of the question: 'In which sectors do your customers most often operate?'

## EMPLOYEE OUTSOURCING

The surveyed companies' openness to hiring foreign employees remains unchanged from 2019. As was the case three years ago, almost half of the companies (48%) declared that they employ people from outside of Poland. Such cooperation takes place remotely in almost 70% of cases. The years-long persistence of the model strongly reinforces the hybridisation of work/collaboration and the changing role of offices.

[17] An online survey (CAWI) conducted in September and November 2022 by infuture.institute in cooperation with ARAW on a target group of representatives of ICT companies operating in the Wroclaw Agglomeration (n = 101). Based on the multiple-choice question: 'In which sectors do your clients most often operate? Please list max. 5 sectors'.

# Drivers and inhibitors of ICT development in the Wroclaw Agglomeration

**On the basis of an analysis of historical signs of change, results of the quantitative study and conclusions of research workshops, infuture.institute defined 16 factors impacting the ICT industry in the Wroclaw Agglomeration.**

They range from areas related to this widely understood industry (including recruitment challenges or employment diversity issues) and education (including issues such as preparing the education system for upcoming changes and new workforce competencies) to the city (including building social and business relationships, fostering innovation, and nurturing a high quality of life).

Change factors impacting ICT development in the Wroclaw Agglomeration:

- Diversification of education paths and models. The possibility to use various sources of knowledge relating to ICT technologies.
- A widening gap between what the education system offers and the needs of the ICT industry. Systematic education (kindergartens, schools, universities) does not build competencies required of employees in the ICT sector today (e.g., knowledge and skills relating to the application of current technologies, design work in diverse teams).
- Outflow of local capital from the Wroclaw Agglomeration. The lack of adequate action and tools supporting local business drives businesses and investors away to other centres.
- Development of local enterprises, investors and employees, thanks to end-to-end support models. The Wroclaw Agglomeration is building a good growth environment for enterprises and implementing a strategy responding to the needs of residents.
- Exclusion of ICT workers on the basis of age, origin, cultural and worldview differences, among others. A high threshold for entry into the industry for people with diverse experience and demographic profiles.
- Creating programs and initiatives supporting various employees in their ICT career. Systemic solutions responding to challenges of employing people with different backgrounds, genders or demographic profiles support the building of diverse teams in the ICT industry.



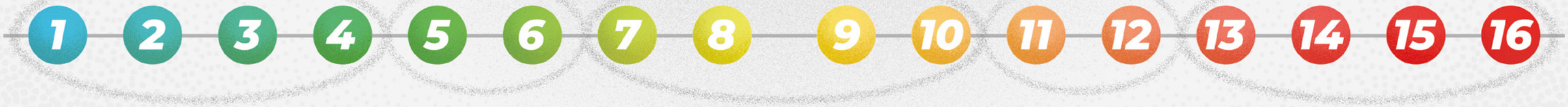


- The lack of jointly defined goals supporting the development of the Wroclaw Agglomeration in areas such as business, administration and education. The silo approach to business, administration and education inhibits the building of distinctive features of the Wroclaw Agglomeration as an innovative ecosystem.
- Committed and inclusive ICT community operating at the interface between business, education and administration. The focus on the cooperation, openness and exchange of competencies influences the development of innovativeness in the Wroclaw Agglomeration.
- Attractive support instruments for investors considering the growth of the Wroclaw Agglomeration. The public administration creating improvements for business investments in the Wroclaw Agglomeration to respond to business needs and to benefit the agglomeration and its residents.
- The lack of a value proposition and support tools the city would offer to businesses and investors. The city does not cooperate with investors to build common values that make Wroclaw stand out as an advantageous location for investments.
- Creating technology solutions that have a positive impact and meet the needs of diverse audiences. The implementation of the technology developed in the Wroclaw Agglomeration for the benefit of local interested parties (e.g., using innovative technology solutions in the administration, hospitals and schools in the agglomeration).
- A widening digital gap between technology developers and technologically skilled people and 'non-technological' people. The lack of solutions and offers addressed to diverse groups in order to support digital competencies.
- Building a flexible Wroclaw Agglomeration that supports the city's resilience (e.g., climate, technology and energy resilience) and helps it to respond quickly to unexpected external factors.
- Short-term activities focused on dealing with current challenges. The focus of business, administration and education on responding to day-to-day challenges while neglecting to consider the broad and long-term perspective.
- Designing integrated, complete and friendly urban spaces (including workspaces) in the Wroclaw Agglomeration in such a way that it can satisfy the needs of various groups of residents and workers.
- No supportive urban ecosystem responsive to varied needs of workers and various forms of work. Outflow of talent from the Wroclaw Agglomeration.

In order to determine the nature of the defined factors' impact on the industry, a survey was conducted on a target group of professionals from the sectors such as public administration, education and business operating in the Wroclaw Agglomeration, who assessed the defined factors. The graph below presents results of the research grouped into factors that support, inhibit and are neutral for ICT development in the agglomeration.

## *FACTORS SUPPORTIVE* of ICT industry development in the Wroclaw Agglomeration

## *FACTORS INHIBITING* ICT industry development in the Wroclaw Agglomeration




**1** Committed and inclusive ICT community operating at the interface of business, education, and administration. Focus on cooperation, openness and exchange of competencies helps build innovativeness in the Wroclaw Agglomeration.

**2** Designing the integrated, complete and friendly urban space in the Wroclaw Agglomeration to satisfy the needs of diverse groups of residents and workers.

**3** Creating programmes and initiatives supportive of careers in the ICT industry for a diverse workforce. Systemic solutions addressing challenges related to the employment of people with different backgrounds, genders and demographic profiles support the building of diverse teams in the ICT sector.

**4** Development of local enterprises, investors and workers thanks to end-to-end support models. The Wroclaw Agglomeration builds a good growth environment for enterprises and implements the strategy based on the needs of residents and enterprises.

**5** Building a flexible strategy of the Wroclaw Agglomeration, supportive of urban resilience and helping to respond quickly to unexpected external factors.

**6** Diversification of educational paths and models. The possibility to use various sources of knowledge in the area of ICT industry technologies.

**7** Creation of technology solutions positively impacting and responding to the needs of various recipients. Implementation of the technology created in the Wroclaw Agglomeration for the benefit of local interested parties.

**8** Attractive support instruments for investors, considering the development of the Wroclaw Agglomeration. The public administration builds facilities so that investing in business in the Wroclaw Agglomeration both supports the needs of businesses and benefits the agglomeration and its residents.

**9** Outflow of local capital from the Wroclaw Agglomeration. The lack of adequate activities and tools supportive of local businesses make businesses and investors move to other centres.

**10** High entry threshold to the industry for people with various types of experience and demographic profiles. Exclusion of employees (also potential ones) in the ICT sector due to their age, origins, cultural and philosophical differences among other things.

**11** The widening digital gap between creators of technologies and people with high technology competencies and non-technological people. No solutions nor offers of support for digital competencies addressed to diverse groups of recipients.

**12** No value proposals and support tools offered by the city to businesses and investors. The city not cooperating with investors to build common values distinguishing Wroclaw as a good location for investments.

**13** No supportive urban ecosystem responding to various needs of employees and forms of work. Talent outflow from the Wroclaw Agglomeration.

**14** Short-term activities focused around facing current challenges. The focus of businesses, administration and education on addressing daily challenges while not considering a broader and long-term perspective.

**15** No jointly defined goals supportive of the development of the agglomeration among businesses, administrations and education. The silo approach inhibits the building of distinguishing features of the agglomeration as an innovative ecosystem.

**16** Widening gap between what systemic education offers and the needs of the ICT industry. Systemic education does not build competencies currently required of employees in the ICT industry.

***SOURCE:***

**Factors driving and inhibiting ICT growth in the Wroclaw Agglomeration, own work by infuture.institute based on results of the online survey (CAWI) carried out by infuture.institute in November 2022 on a group of public administration, education and business professionals operating in the Wroclaw Agglomeration (n = 23), November 2022.**

The factors with the greatest supportive impact on the ICT industry in the Wroclaw Agglomeration are those addressing the need for collaboration, building an engaged community (Factor No. 1) and building diversity in the industry (Factor No. 3).

The importance of designing inclusive cities (Factor No. 2) and the development of local entrepreneurs and investors, e.g., through comprehensive support models (Factor No. 4) were also pointed out. Those related to the diversification of educational models (Factor No. 6) and the building of urban resilience (Factor No. 5) were considered moderately supportive factors.

A group of neutral factors defined by the respondents consists of factors related to the implementation of technological solutions in the Wroclaw Agglomeration (Factor No. 7); the building of attractive support instruments for investors (Factor No. 8); the outflow of local capital from the agglomeration (Factor No. 9); and the high entry threshold into the industry for people with diverse experience and demographic profiles (Factor No. 10). Factors moderately hindering the development of the ICT industry in the Wroclaw Agglomeration according to respondents include the widening digital gap between people who are technologically competent, such as technology developers, and, people who are 'non-technological' (Factor No. 11) and the lack of value proposition and support tools offered by the city to business and investors (Factor No. 12).

The last group of factors consists of those most inhibiting the development of the industry in the agglomeration. According to the respondents, these factors are: the lack of a supportive urban ecosystem responding to varied needs of employees and forms of work (Factor No. 13); the focus of business, administration and education on responding to daily challenges while neglecting to consider the broad and long-term perspective (Factor No. 14), and the lack of jointly defined goals supporting the development of the Wroclaw Agglomeration in areas such as business, administration and education (Factor No. 15). The widening gap between what the systemic education offers and the needs of the ICT industry (Factor No. 16)[18] was considered the most inhibiting factor.

[18] An online survey (CAWI) conducted by infuture.institute in November 2022 on a group of public administration, education and business professionals operating in the Warsaw Agglomeration (n = 23).





# Elements of the ecosystem

**In the process of analysing the historical signals of change and the results of the quantitative studies, the infuture.institute team defined elements of the ecosystem whose co-functioning can define the development of the Wroclaw Agglomeration.**

These are:

- the city and the quality of life,
- education,
- the ICT industry.

It is not possible to forecast the future of the ICT industry without the parallel analysis of the education and quality of life available in the city. These elements influence one another directly, which is why their holistic treatment is so important – they are an ecosystem rather than separate parts.


***SOURCE:***
**Elements of the ecosystem, own work by infuture.institute, November 2022**





# Areas of influence

Each element of the ecosystem (see the graph: Elements of the ecosystem) was subjected to an analysis on the basis of which were defined key areas of influence. They are the starting point for the discussion about the ICT industry development in the Wroclaw Agglomeration and make it possible to better recognise the challenges posed by the surrounding reality.

These are:

# Alternative forms of work

**The outbreak of the COVID-19 pandemic significantly accelerated the work digitisation process (understood here as the possibility to work remotely).**

While before the pandemic, in the first quarter of 2020, the percentage of job offers with the possibility to work fully remotely in the IT industry was 14%, it rose to 76% in the second quarter of 2022[19]. At present, approximately 60% of IT professionals work remotely in Poland, and two thirds of them started such work during the pandemic. The research demonstrates that as many as 96% of industry representatives want to work fully remotely or in a hybrid manner. The issue of remote working opportunities is so important today that it often determines the choice of employer. More than half (56%) of industry employees declare that they will start looking for a new job if they are unable to work in this way[20].

This entails changes not only in the management but also in recruitment and onboarding, which often takes place exclusively online. It is not impossible to build team spirit or motivation in teams working remotely, but the tools and actions required of managers are different than in the case of on-site work. The experience of the pandemic showed that the best performing teams were those that had previously built relationships and were able to take advantage of them to respond to change more effectively.

The lack of relations between employees or of attachment to the company may contribute to a reduction of productivity and increased staff turnover in the longer perspective. This fact necessitates the development of new competences among employees and managers and the building of differentiators within the organisation to manage online teams effectively.

> *The progress of digitisation and increased telecommunications bandwidths will enable far-reaching virtualisation of operations. The opportunities for collaboration with the use of solutions such as those offered by the metaverse will result in companies employing workers wherever they can do so legally. I hope that the EU will respond quickly enough and that we will have a free employee market in its area. As a consequence, the workers' decisions on where to live will be dictated by the area's local offer rather than by which employers are based there.*
>
> *For the Polish agglomerations to be able to win over other European metropolises, we need to be able to adapt labour laws to the changing conditions efficiently and quickly. The amendment of the Labour Code to address the issue of remote work after COVID-19 has shown that we still have a lot to improve.*
>
> **Maciej Borkowski**,
> *Vice-President ABSL Wroclaw*

[19] Inhire.io. IT Market Snapshot Q2. 2022.

[20] No Fluff Jobs. Praca zdalna i hybrydowa w IT. 2022.





There has been an upward trend in the number of one-person IT companies in recent years. The 2021 data show that the greatest percentage of all one-person IT companies can be found in the Mazowieckie voivodeship (27.1%). Second place belongs to the Lesser Poland voivodeship (11.9%), while the third and fourth places are occupied by Lower Silesia (10.2%) and Silesia (almost 10%) respectively. The number of one-person IT companies increased by 18% in comparison with the same time frame in 2020. This trend will continue in the coming years, and not only because companies worldwide have opened up to the possibility to work remotely and thus have expanded the opportunities available to IT professionals. The research shows that Z and Alpha generations do not want to work in state jobs, and a quarter of the Always On representatives declare a 'desire to start their own business'.

The Alpha generation are young people, many of whom still have no specific career plans; however, when asked about their dream employer, they point to those companies that offer faster promotions, an improvement of professional qualifications of their employees and a good atmosphere. Because of this, companies will continue to develop and build HR policies that are 'friendly and attractive' to new employees. The recognition of the professional potential and experience of 50+ people will be a trend that will become visible on the market in the context of the negative birth rates resulting in difficulties in employee recruitment. Both employers and national policy systems will focus on individual development programs addressed to this group.

The IT market in Poland (including Lower Silesia) still contains employers used to having 'an abundance of labour resources one can choose from'. This trend has already disappeared from the IT industry; the lifecycle of a candidate on the IT market is very short, about one week. If we add the unfavourable demographic trends, the ever-increasing demand for IT specialists, foreign markets open to Polish specialists and offering them salaries in currencies stronger than the Polish zloty to the characteristics of the conditions in which generations X, Y, Z and Alpha live and work, it is certain that the trend of high pace of work in IT recruitment departments will continue in the years to come. Continuous adaptation of recruitment processes (e.g., their speed and decision-making) to the shortening lifecycle of a candidate on the IT market will be a challenge for companies. The growing demand for IT professionals also has other consequences for the IT market. Among other things, it has influenced an increase in the demand for recruiters specialising in IT recruitment and a significant increase in salaries for this professional group. Not only the recruitment of IT professionals but also the acquisition of IT recruiters is currently a challenge for many companies. Departments having their own recruitment teams face challenges related to their maintenance and to the development of implementation policies for such positions.

Over the past year, the growing demand on the IT market has brought about a large increase in investment by companies in Poland and Lower Silesia in cooperation with companies specialising in the acquisition of experienced IT specialists by external companies. Such activities will maintain the upward trend in the context of demographic changes and the demand on the IT market. They will not only allow IT resources to be supplemented but also free up the capacity for HR activities focused on being closer to employees, building and implementing a corporate culture that supports work in distributed teams or in developing HR policies that attract employees in the face of the coming demographic crisis.

Michael Page

**Justyna Ostropolska,**
*Head of IT Contracting*

A manager of effective recruitment and sales teams, involved with the IT market and recruitment in this market since 2005. Privately a fan of high peaks, via ferratas and hortensias.

# Redefinition of office spaces

**The ability of ICT professionals to work remotely is redefining the functions performed by offices. With the popularisation of hybrid and remote work modes, office spaces are transformed from places where one sits behind a desk for 8 hours into locations for more or less formal meetings.**

They are multifunctional spaces, making it possible to have quiet work on the one hand and more creative teamwork on the other hand. Ever-greater numbers of 'domesticated' offices become places of communal activity in the evenings with events, conferences or other additional activities held there. Offices are becoming increasingly modular and flexible. They have to adapt to the individual needs of the employees.

*CASE STUDY:* Apple will have an office in the Battersea power plant (historically a very important place in London). The building no longer operates as a power plant and is being transformed into a usable area. In addition to the Apple office, the power plant is supposed to house shops, a food hall and private flats, among other things[21]. It is an example of how, instead of building new offices, it is possible to adapt existing buildings to the needs of companies and local communities.

*CASE STUDY:* the redefinition of office space is also about sustainable design. Ten Square Games (a mobile game developer from Wroclaw) monitored the carbon footprint of the investment while arranging a new area of its office in cooperation with Fruit Orchard and InstalOne. The carbon footprint figure that was eliminated amounted to approximately 38.8 tons of $CO_2$. Some of the emissions were prevented thanks to the reuse of some building materials.

[21] Dobijańska, I. Apple urządzi swoją siedzibę w legendarnej elektrowni węglowej Battersea. 'Geekweek'. 29.09.2022.





**Change does not come easy to everyone, yet it is inherent in development, progress, and the future. The ICT market that changes continually and displays an adaptability not encountered in other industries can be considered a litmus test for what lies ahead for the office space market in 2037.**

Due to long-term leases, office space has to date not been changing rapidly, while the high percentage of renegotiated contracts (40% on average in Wroclaw in the last five years) shows that companies like to stay in their current premises and, therefore, market realities may not require large and/or rapid space arrangement changes.

We see the office of the future mostly as a 'chameleon' place, flexible enough to adapt to the needs of employees. We can see it as a centre for experiments, a space supportive of community-building and making creative work possible, for individuals and for teams. An office will not be anthropocentric but rather focused on interactions. Instead of a row of desks, there will be spaces for teamwork, brainstorming and conceptual work supported by tools that will allow content to be displayed on screens or enable interactions in the metaverse in an unobtrusive way.

Offices will also no longer be called offices; this concept no longer seems to encompass the possibilities that such an area can offer. An office will be a common area, a meeting place, and perhaps we will find a new term to cover the multitude of experiences that the space will make available. Whatever its name, however, it has to be a place we will want to be in, an inspiring place that will support a healthy lifestyle or at least an ergonomic posture. Thanks to it, Emma, a mannequin created by Fellowes as a warning that she could be every other employee in the ICT sector, will remain just an unrealised vision.

CBRE

**Katarzyna Gajewska,**
*Deputy Director in the CBRE Market Research and Consulting Department*

She is responsible for consultation related to the office space market. During her 11 years in the sector, she worked both in an agency and on the investor side, where she managed a portfolio of retail and office properties. She co-authored publications such as How we want to work, Prime Properties and MOSP 2020.

**Paweł Boczar,**
*Director and Head of the CBRE office in Wroclaw*

Paweł has been involved in Wroclaw's commercial real estate market for over 15 years and has been employed in CBRE for the last nine years. He deals mainly with office leases, representing both tenants and landlords. CBRE in Wroclaw brokers and advises clients on leases totalling 30,000-40,000 square metres of office space per year.

## Inclusivity and diversity of the industry

**The research shows that diverse teams are the driving force of innovativeness[22]. However, diversity needs to be understood broadly, not only as different genders, backgrounds or ages but also opinions held by employees, cultures they come from or experience acquired.**

The clash of such different perspectives when working on joint projects (assuming that there is openness to other points of view within the organisation) most often results in new and fresh ideas.

However, the biggest challenge in the context of inclusivity and diversity is to move from the level of plans and strategies to real action[23], which is particularly visible in the ICT industry. Despite the efforts of various organisations, foundations and businesses, Poland still occupies one of the lowest positions in the European Union in terms of the percentage of women among IT professionals. Only 15.5% of working IT professionals are women, whereas the average figure for the EU is 19.1%[24]. For the sake of comparison, Bulgaria has a similar share of IT professionals in total employment as Poland, yet in Bulgaria nearly every third person working in this industry is a woman.

Additionally, a relatively high entry threshold to the industry for people with no experience (the industry demand is currently focused on people with at least two years of experience) does not support this area's growth. Teams can also be made more diverse by groups of employees who are only just beginning their career in the industry, both junior employees (the perspective of people only just entering the corporate structure) and those who have changed career paths. Junior employees are still treated as an investment that requires an investment in money and time. However, it is worth remembering that digital solutions reach many industries. This is why, in order to create products responding to the needs of various people (various genders, age, different values), diverse teams need to be onboarded to them.

> *What will help employers be successful on the labour market is their organisational culture. How the employers will create the sense of belonging to the company, how they will make employees proud of working for them will be an important thing. It will be important and will make a difference. At a time when people usually work from home, office space is of minimum importance and the same applies to access to the office. However, something has to make the employer stand out. I believe that the organisational culture and values promoted by the company will be just such a characteristic.*
>
> **Anna Maruszewska,**
> *HR Manager GSC Poland, 3M*

[22] Regarding the internal operation of a company, Gallup polls of 2021 demonstrated that the return on investments increased by more than 66% and the return on the sales increased by 42% when the teams in companies from the Fortune 500 list included at least three female directors.

[23] PwC. Diversity & Inclusion Benchmarking Survey. European Sheet. 2021.

[24] Eurostat. ICT specialists in employment. 2022.





## Employee recruitment

**In the 2022/2023 academic year, information technology was the most popular field of study in Poland. More than 44,000 young people expressed interest in it[25].**

The number of applicants interested in being admitted to an IT program is also a sign of the faculty's popularity. There were 10 applicants per place in the recruitment process for applied information technology at the Wroclaw University of Science and Technology in 2022[26].
However, the number of graduates of faculties that fit into the STEM area as a whole is still decreasing in Poland. According to the GUS data, there were more than 100,000 graduates in 2017/2018 and only 71,779 in 2020/2021[27]. This phenomenon can be due to the general decrease in the number of students (and graduates as a consequence) on the one hand or, on the other hand, it can result from the decrease in the total percentage of people graduating from STEM faculties.

According to the estimates of the Polish Economic Institute, 3.5 times as many STEM graduates are needed to fill the worker shortage on the Polish IT market[28].

The number of job offers for IT professionals increased by 236% from 2020 to 2021[29]. The data suggests the immediate necessity of more extensive changes and educational actions in STEM areas. Education has to be viewed from a broad perspective for such actions to be effective. It is necessary not only to support the development of interest in STEM competencies at the earliest stages of education but also to implement activities in areas such as reskilling or upskilling.

In a 2022 study carried out among representatives of ICT companies from Wroclaw, as many as 80% of the respondents declared that they had issues with employee recruitment (this is 21 percentage points greater than the figure in an equivalent study from 2019)[30]. An increase in the employment of outsourced employees may result from this situation. In 2022, 62% of companies declared that they employed outsourced workers while only 36% of the respondents declared having done so in 2019. As many as 91%[31] of companies stated that they had problems with the acquisition of senior professionals, making it clear that it was the most difficult problem. The second position belongs to architects (84% of companies find it difficult to recruit them) and mid-level employees (70%).

[25] The Ministry of Education and Science. Informacja o wynikach rekrutacji na studia na rok akademicki 2022/2023 w uczelniach nadzorowanych przez Ministra Edukacji i Nauki. Warszawa, 24.10.2022. https://www.gov.pl/web/edukacja-i-nauka/informacja-o-wynikach-rekrutacji-na-studia-na-rok-akademicki-20222023-w-uczelniach-nadzorowanych-przez-ministra-edukacji-i-nauki (accessed on 9.01.2023).

[26] Wroclaw University of Science and Technology, Informatyka wciąż najpopularniejsza wśród kandydatów na studia, 8.07.2022. Accessed on 01.09.2023: https://pwr.edu.pl/uczelnia/aktualnosci/informatyka-wciaz-najpopularniejsza-wsrod-kandydatow-na-studia-12539.html (accessed on 9.01.2023).

[27] GUS. Szkolnictwo wyższe w roku akademickim 2021/2022. 2022.

[28] Łukasik, K., Strzelecki, J., Śliwowski, P., Święcicki, I. (2022). Ilu specjalistów IT brakuje w Polsce?. Polski Instytut Ekonomiczny, Warszawa.

[29] No Fluff Jobs. Rynek pracy IT w Polsce w 2021 roku. 2022.

[30] An online survey (CAWI) conducted in September and November 2022 by infuture.institute in cooperation with ARAW on a target group of representatives of ICT companies operating in the Wroclaw Agglomeration (n = 101). Based on the question: 'To what extent do you agree with the statement: we have no problems with the acquisition of new employees?'

[31] An online survey (CAWI) conducted in September and November 2022 by infuture.institute in cooperation with ARAW on a target group of representatives of ICT companies operating in the Wroclaw Agglomeration (n = 101). Based on the question: 'How do you assess the difficulty in acquiring employees depending on their experience?'

The only employee group that the companies participating in the research considered readily available were juniors (68%[32]). One-fifth of all companies declared that they do not look for juniors at all (19%[33]). This is because first-time workers are the group that require investment of time and money and not every company has the necessary resources. However, the research shows a certain shift towards that group, probably due to staff shortages. Three years ago, almost every third company declared that they were not searching for juniors (28%), which means that the percentage was reduced by 9 percentage points this year.

In the face of the growing demand for specialists, the shortage of ICT employees continues to be a major challenge not only in this sector. Digital transformation of many other areas becomes less attainable without bridging this gap.

*More and more often it is being debated whether academic centres have appropriate conditions to prepare and build specialist competencies of young information technology professionals. Despite their level of education, people fresh out of universities (i.e., juniors) are usually not too independent and require the support of more experienced colleagues to make daily technological decisions in their work. Such training takes at least a year in a company and young professionals are only ready to work independently with clients after that time. The lack of academic staff able to train future programmers is another noticeable problem. What can help the enterprises? One of the ideas is to create a refund programme involving the distribution of costs of employment between the state and the employer in the form of a subsidy or tax relief.*

*When it comes to education in the IT sector, more attention should be paid to cooperation between businesses and academic centres. Making it possible for entrepreneurs to conduct certain types of classes as part of the university education would be mutually beneficial. Businesses are open to such solutions.*

**Konrad Weiske,**
*Vice President of SoDA*

*The global demand for IT services has made location less important for technology companies. However, activities aimed at increasing and strengthening the employees' sense of belonging to the organisation became more important because the employees need to know that their work matters, for whom and with whom they work, which helps them stay in the organisation for as long as possible. This approach is effective for an organisation with a dispersed structure, and it positively impacts retention indicators.*

**Sebastian Drzewiecki,**
*VP, Country Manager SoftServe Poland*

[32] Ibid.

[33] An online survey (CAWI) conducted in September and November 2022 by infuture.institute in cooperation with ARAW on a target group of representatives of ICT companies operating in the Wroclaw Agglomeration (n = 101). Based on the question: 'How to you assess the difficulty in acquiring employees depending on their experience?' Junior (0–2 years of experience). Based on the following answers: 'Easy to acquire'; 'Not searching'; 'Difficult to acquire'.





**The labour law regulations in force do not keep up with the needs of the ICT industry and lag far behind the economic realities. The number of employment contracts is decreasing in the sector as a result, as they are replaced with alternative forms of employment.**

There is no doubt that the trend will intensify in the absence of a thorough reform of the labour law. As a reminder: the essence of the employment relationship is the performance of a specific type of work in a designated place and time under the direction of the employer.

However, the ICT industry creates hitherto unknown jobs, engages employees in a task-oriented manner and encourages independence and creativity instead of strict supervision in solving project tasks. At the same time, employees expect to be able to work flexibly both when it comes to working hours and the place of work, preferably according to the work-from-anywhere model.

Provisions on remote work currently being introduced to the Labour Code are a harbinger of change in this area. Remote work combined with the task-based working hours offers quite a flexible employment framework that is likely to become a rule in the future. However, the fulfilment of employee expectations to work from any location in the world is hindered by, among other things, the tax regulations in force, social security and health insurance regulations as well as rules for legalising the stay and work abroad. Regulations on the provision of work from abroad also include standards enforcing the application more beneficial labour law regulations of the country in which the employee works. As a result, legal employment of an ICT professional in the work from abroad regime entails the need to comply with many additional requirements, i.e., further costs and considerable administrative effort.
The employment contract also makes it impossible to hire workers on a project basis. As a result, employers bear the risk of downtime and, if they want to retain an employee, they have to incur labour costs also in those periods when they have no orders from clients. This is because the Polish law does not provide for solutions such as the zero hours contract. The use of outsourcing companies or employing ICT professionals as contractors are viable solutions. When tax burdens and social security premiums are added to the mix, one can hardly be surprised that the B2B cooperation model has been increasingly popular in the ICT sector for many years. B2B contracts not only offer both parties more attractive financial terms but also significant flexibility relating to the place and time of service, project-based employment mode and the possibility for ICT professionals to provide services on behalf of various clients.

However, this solution is not without some risks in the current legal reality. Carelessly constructed B2B contracts are constantly under the threat of being reclassified as employment contracts. This fact entails not just consequences for the relationship between the employer and the employee but also, above all, negative tax and social security consequences. Therefore, steps minimising such risks have to be taken before the B2B solution is implemented. Another issue involves the transfer of proprietary copyrights and data security that have to be taken care of in the contract defining the terms of cooperation with the contractor. Particular care is required in the case of concluding B2B contracts with individuals who were previously employees of the party requesting the service.

The demand for ICT professionals is forecast to continue to grow in the longer term. It is possible that the national labour market will not be able to meet such requirements and hiring foreign professionals may be necessary. However, laws regulating the legalisation of the stay and employment of foreigners and the long duration of related proceedings stand in the way. There is no doubt that the Polish Business Harbour programme that provides for a simpler path of relocation to Poland of IT professionals, start-ups and enterprises from specific countries is helpful in this area. B2B cooperation with foreign professionals can also be a solution.

We have no doubt that the future of employment conditions in the ICT industry is about the broadly understood flexibility. However, how such flexibility will be implemented is up to the legislature. If the labour law is not brought into line with reality for the ICT sector, the market will probably marginalise employment contracts on the ICT market in favour of corporate cooperation and of B2B in particular.

WIEWIORSKI
LEGAL

**Magdalena Szeptycka,**
*legal counsel, Partner and Labour Law Head in Wiewiórski Legal*

She is a law graduate from Adam Mickiewicz University in Poznan and has also completed post-graduate studies in Intellectual Property Law at Jagiellonian University in Krakow. She has been providing end-to-end legal services to corporate clients and support related to training on employee issues for more than 15 years.

**Alex Miśko,**
*a lawyer, member of the financial law and real property law practice team in Wiewiórski Legal*

A PhD student at the Doctoral School of Wroclaw University in the field of financial law. An enthusiast of the implementation of design thinking and simple language rules in legal services. He cooperates with the labour law practice on projects related to employment taxation.





## The value of competencies from beyond the industry

**Good employment conditions and the growing demand for ICT employees encourage those with no technical education to change their career path. The growing number of courses and training helps them decide to change their professional path.**

According to the research[34], candidates for jobs in the industry mentioned humanities among their previously completed studies, e.g., psychology, cognitive science, philology, cultural studies, political science, marketing, and management.

Additionally, the report[35] on women in the IT industry shows that 53% of the current workers in the sector have undertaken no relevant studies at all.

If put to good use, the competencies and skills of those employees who have changed their career path may bring new perspectives, fresh ideas and valuable experience from other areas to companies and teams. Such an investment in people with lower industry competencies may eventually result in the acquisition of new competence at the interface of humanities and technology (e.g., consulting, research or design services).

[34] No Fluff Jobs, Uniwersytet SWPS. Kompetencje w IT. Perspektywy kandydatów, specjalistów i rekruterów. 2022.

[35] No Fluff Jobs. Kobiety w IT 2022. Szanse oraz możliwości rozpoczęcia i rozwoju kariery. 2022.

## Competencies of the future

Technologies can depreciate and grow old within one or two years. Requirements of the market grow with the appearance of new solutions and the blurring of boundaries between the offline and the online worlds. Employees in the ICT sector are able (and even have to) continually update their knowledge and training to respond to rapid market changes. The concept of lifelong learning, i.e., the society that learns continuously becomes, to a degree, an overarching concept in education, especially in the STEM area.

Today, those with soft skills are increasingly gaining an edge among ICT employees. 'If you are an excellent programmer you will get a job [today]. But for the company to be able to retain you until 2030, you need more soft skills', Amar Kumar from McKinsey's Education said. Among other things, the combination of technical and soft skills translates into the ability to solve problems with the use of technology, the ability to have a comprehensive view of an entire project, innovativeness and a proactive attitude.

The demand for independent thinkers and creative employees who can create concepts and find unique solutions is on the increase. Interpersonal skills such as the communication method, teamwork, the ability to listen carefully and to adapt, accepting and offering feedback, and taking the initiative make it possible to accelerate and optimise processes, which can offer a competitive edge to the company (especially in the longer term). Even more so because professionals in expert positions do not need to be the best programmers in the team. According to the research[36], only 25% of experts deal with coding. They spent most of their time managing teams, creating product development strategies or building relations with clients.

*Proactive thinking and courage are necessary in education today so that the future employees and entrepreneurs can understand markets that are taking shape. There is a need for classes and lectures that will introduce the thinking about the future and encourage attempts to understand what it will be like. For example, there are no such lectures in Wroclaw University of Science and Technology at the moment. We are still at the stage of training engineers.*

*We are in the world of focusing on mediocre things. Will universities of technology train engineers in the years to come? They will. Are they doing it well? Acceptably. However, if we want to be focused on the future we need to be innovative, proactive and unconventional. This is still missing on a wider scale. Innovation requires not only new technology but also its understanding and the identification of markets. But we are still reactive. We are waiting for what will happen.*

**Tomasz Popów,**
*Investor, VC Fund Manager*

[36] No Fluff Jobs, Uniwersytet SWPS. Kompetencje w IT. Perspektywy kandydatów, specjalistów i rekruterów. 2022.





## A city to live in

*A good city is like a good party – people stay longer than really necessary, because they are enjoying themselves.*

**Jan Gehl**

Based on the functions of dominant cities it is possible to define their most important characteristics and what it is that attracts residents to them.

Administrative, industrial and commercial functions were the predominant functions of large European cities until not so long ago. However, rapid digitisation allowed people to make seamless digital migrations (remote learning, businesses, etc.) that break the direct link between specific aspects of life and the place of residence.

*Today, we choose the city in which we will live rather than the city in which we will work. If an appropriate infrastructure is provided (currently understood mostly as Internet access) the employees will be able to work from anywhere.*

**Paweł Tkaczyk,**
*Founder of the Midea agency, midea.pl*

# FEATURES OF THE CITY

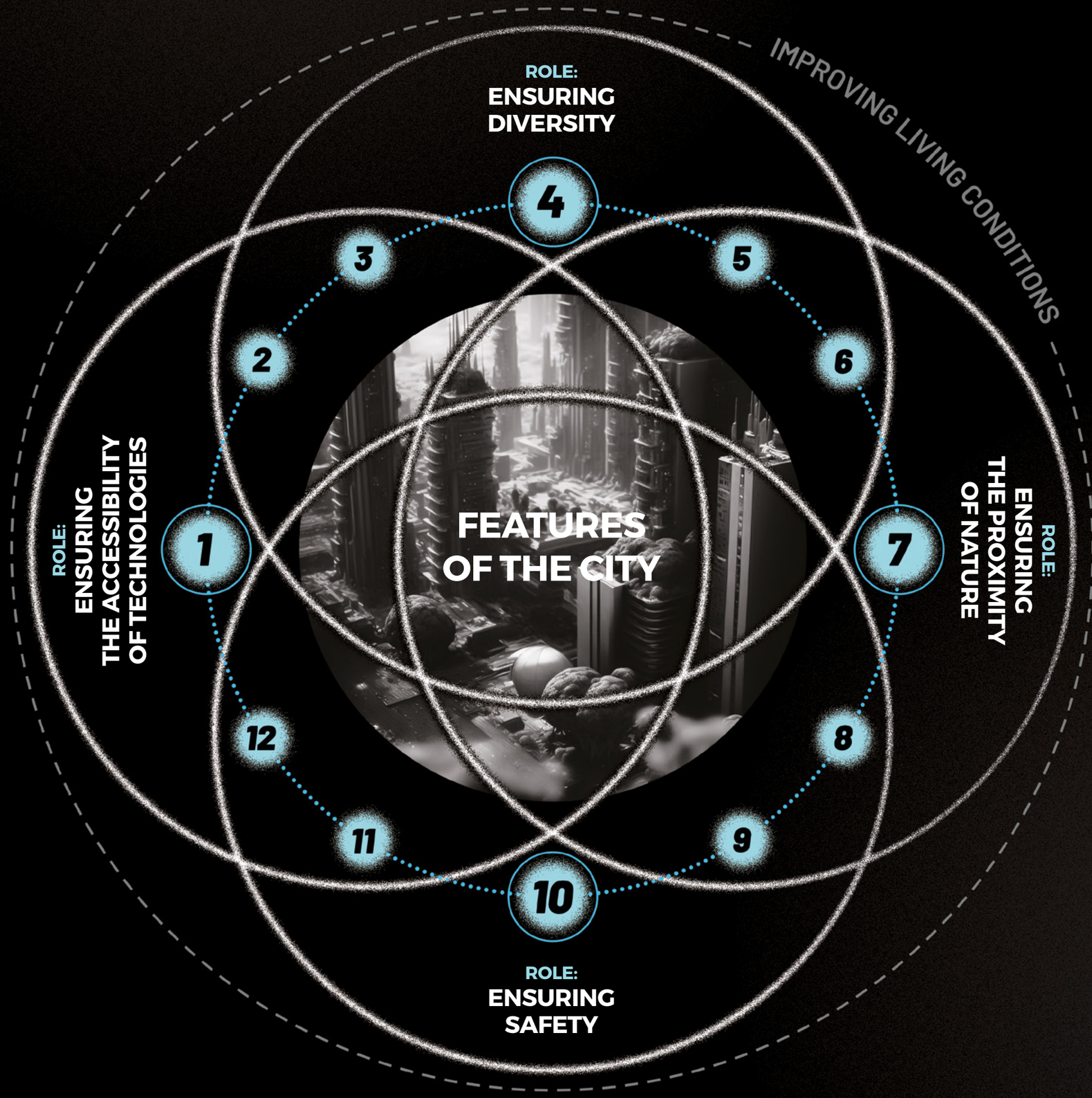
Such a paradigm change (building cities as places to live rather than places of work) is driven by technological development and socioeconomic changes. They, in turn, lead to the redefinition of the role and distinguishing features of cities.

The model below points to four groups of new roles of a city.

These are:

- **availability of technologies;**
- **diversity;**
- **proximity to nature;**
- **safety.**

1. No-latency, accessible Internet
2. Technologies supportive of urban self-sufficiency and wise city
3. Intermodal transport
4. Extensive cultural and service offer for diversity
5. Inclusive spaces and services (1-100 city)
6. Democratic and accessible education
7. Green 15-minute cities
8. Clean air
9. Affordable large flats or houses for rent
10. Programmes for safety and cybersecurity
11. Developing innovativeness and entrepreneurship among young people and adults
12. Programmes of adaptation to climate change




***SOURCE:***
**Distinguishing features of a city, own work by infuture.institute, December 2022**

These roles are the basis for the construction of safe, inclusive and sustainable cities.
The graph also presents examples of activities whose implementation supports a specific function. The end-to-end approach (considering all the four roles in its strategy) can make it possible to build new distinguishing features of a city.

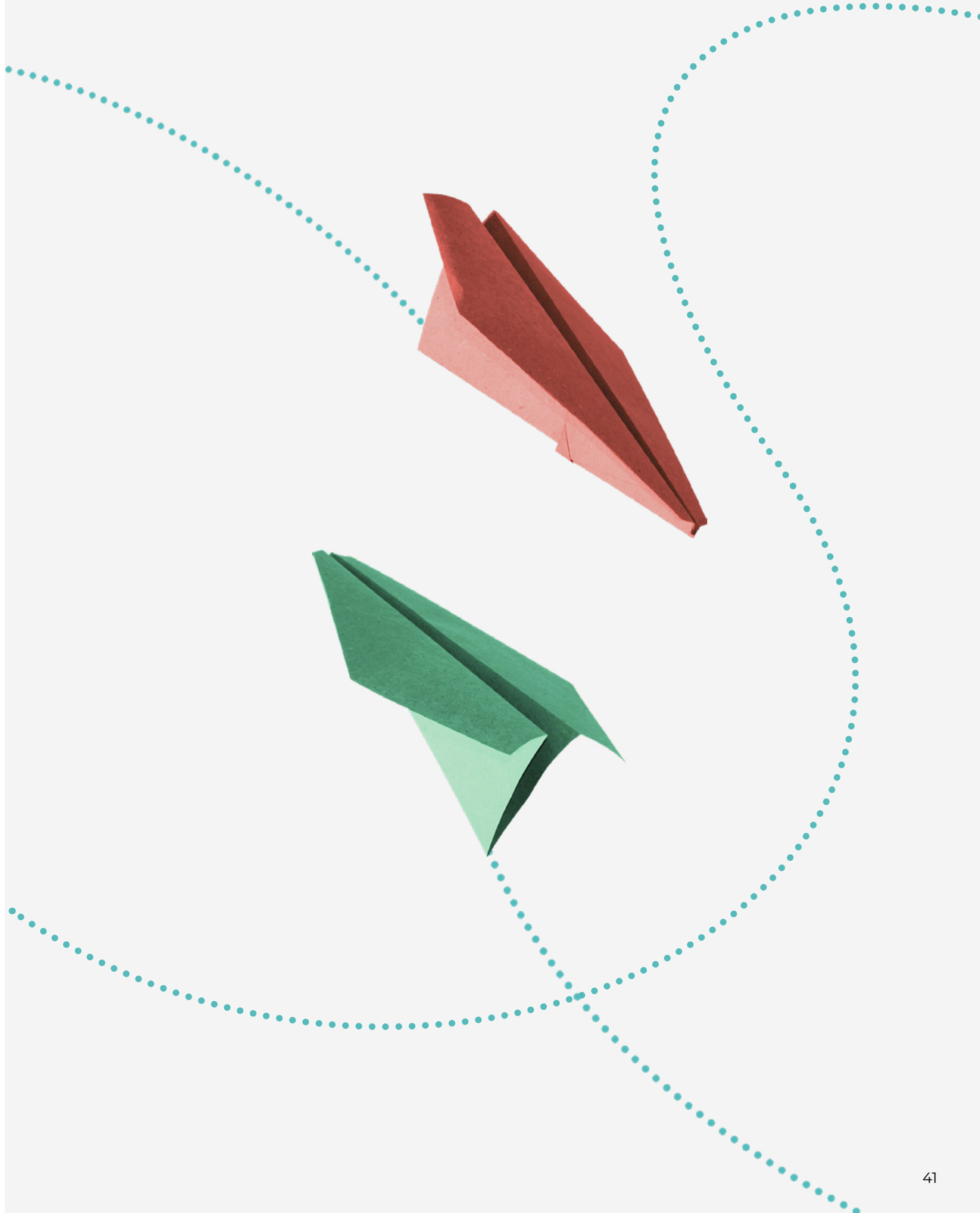
*Wroclaw and the agglomeration should develop technologically but an important thing is for such development to be in the service of people, their health and their safety. Even today, we are implementing a complete housing project in Wroclaw. It means a housing estate where we have everything in close proximity to the place of residence. We would like the whole range of services to be available in such estates. As a city, we create conditions supportive of the development of enterprises in Wroclaw housing estates. We can see the potential for technology companies at the level of the implementation of innovative solutions, opening of dispersed offices and cooperation with the local community.*

**Małgorzata Golak,**
*Director of the Economic Development Office of the Wroclaw City Council*

An important thing when it comes to such constructions is that the focus is more on the activities relating to diversity and safety in all aspects of life (e.g., air quality, public transport or flats for rent). Decentralisation of cities is also important. Among other things, it is about the dispersal of corporate offices or workplaces (co-working areas, innovativeness hubs) and designing space in such a way that guarantees randomness of contacts to all residents.

*Distinguishing features of Wroclaw include, for sure, the openness and diversity in many aspects of this city. Wroclaw is a large city that still feels private. A person does not feel lost here. The city also has a good location. The condensation of space by itself promotes meetings and broadly understood cooperation. Wroclaw also has great academic facilities and I think they are of key importance.*

**Anna Maruszewska,**
*HR Manager GSC Poland, 3M*



# Cooperation for the future

**The future is the direct consequence of actions taken here and now. Such actions currently focus on the short term and current activities. Their long-term consequences are rarely assessed (within the next few years, more than a decade or even a few decades).**

Additionally, such initiatives are still too rare despite the growing awareness that joint actions and the cooperation between various entities (industries, education, administrations) brings about most measurable effects.

When thinking about strategic activities influencing the lives of many generations, especially in the context of building a place to live, one should adopt a broad and long-term perspective considering all dependencies between various elements of the urban ecosystem. Proactivity is also necessary in addition to cooperation. Those who act, not waiting for what will happen but rather shaping a desirable future and knowing the goal they pursue, always have an edge.

Factors such as the city location or infrastructure can be mentioned in the context of building a thriving urban ecosystem that attracts talent and is a good place to live. However, business incubators and corporate technological facilities also have a huge impact on business support. Less tangible aspects such as space for the exchange of experience, learning from one another, openness and willingness to take joint action as well as being aware that the developed solutions may benefit all residents and constitute their joint advantage are also important.

*Wroclaw has a special place in my life. I was born and raised here. I find it very satisfying to observe the growth of our city, its strong position in Poland and its growing recognisability abroad. Wroclaw's appeal allows it to attract both talented university graduates and very experienced workers. Thanks to wide access to talents, companies such as mine can continue to grow rapidly and create new jobs in the hi-tech sector. All this would have been impossible without the good cooperation with the academic circles and city authorities. It is mostly thanks to the coherent long-term policy of the city focusing on growth based on knowledge and innovations that Wroclaw is at the forefront of Polish metropolises when it comes to investment attractiveness and the quality of life. I deeply believe that the best years are still to come and I look to the future with great optimism.*

**Witold Wójtowicz,**
*Head of Google Wroclaw Office*

*Wroclaw, a city with a multicultural and entrepreneurial spirit, grew more and more rapidly with the support of the authorities in recent years. Such support includes aid programmes and the organisation of conferences on knowledge sharing such as Made in Wroclaw, as well as discussions on the current condition of the innovation market. Such activities of the Wroclaw authorities translate into the growth of entrepreneurship and make the labour market more attractive. We at Infor Polska are very happy that we can be a part of this rapidly developing community that offers unlimited inspiration and opportunities.*

**Marcin Piaskowski,**
*Director of the Centre of Excellence Wroclaw, Infor Polska*

*Wroclaw is more and more often called the Polish Silicon Valley. A great concentration of technology companies and renowned technical universities, and a well-developed infrastructure, are factors thanks to which it became a city that supports innovativeness and work on new technologies.*

**Taras Lukaniuk,**
*Head of Nokia Wroclaw Technology Centre, Head of BOAM Productization*

*CASE STUDY:* Venice has started the Venywhere project. The project is supposed to respond to the problem of the aging society, city depopulation and increasing costs of living. It is to attract those willing to get involved in city life in the longer term and to encourage young remote workers, freelancers and digital nomads to settle in Venice. The programme also has an offer for companies willing to organise integration trips for their teams. The package will include help in finding accommodation and adapting to life in Venice. The city is investing in the best Internet connection to guarantee the comfort of remote work.

*The basic purpose of ICT companies is to support clients in their business transformation and development, followed by the digital development of the society. Animators are important at the local level: business associations, NGOs and institutions related to the city. These entities integrate the environment by combining individual initiatives into a coherent development vector. They implement common objectives important for companies and residents of Wroclaw. The best effects are possible thanks to the cooperation between entities that know each other, have space for discussions and know challenges inherent to the region. In order to maximise the results of such cooperation, they have to be organised and directed so that they generate competitive distinguishing features. This is why the role of the ICT strategy in the development of the Wroclaw Agglomeration is so important.*

**Grzegorz Rudno-Rudziński,**
*Member of The Board of Advisors, ITCorner*

# TOMORROWS

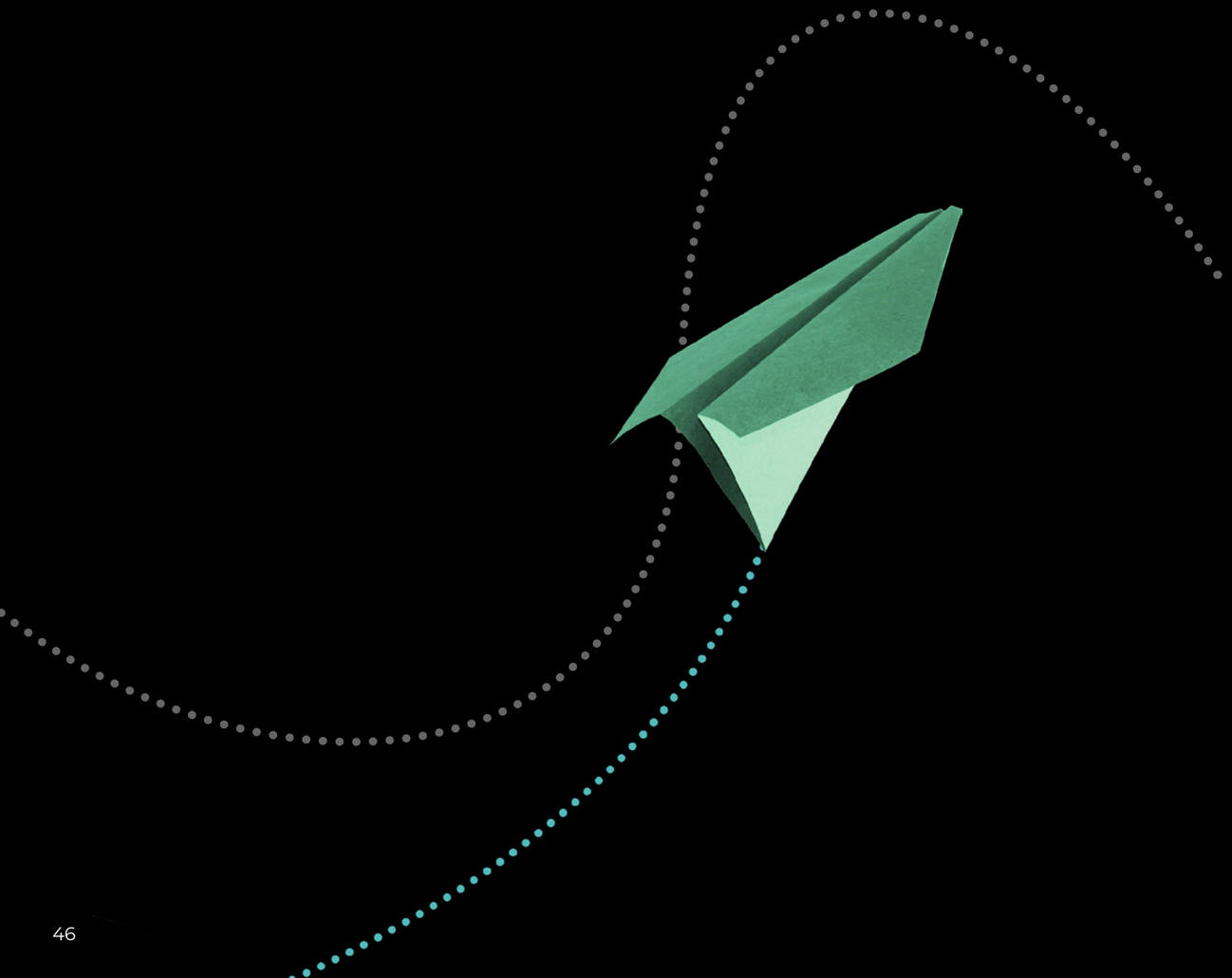
# Assumptions of future scenarios

**Elements of the ecosystem (see Part I: Today, Elements of the Ecosystem): the city and its quality of life, education and the ICT industry, are also three lenses fundamental to each of the four scenarios for the future of the ICT sector in the Wroclaw Agglomeration in 2037.**

The extent to which individual areas (elements of the ecosystem) are developed and the strength of their interdependencies determines the type of future scenario (status quo, collapse, transformation, growth).

Future scenarios are a tool used in strategic management that makes it possible to understand better how to function in a specific reality. Scenarios are not to be considered prophecies to be fulfilled but rather as certain visions of the future, a strategic exercise thanks to which one can identify potential opportunities and threats and answer questions about what to implement, what steps to take and which technologies to apply to take responsibility for building a sustainable future. In other words, the scenarios point to the need for a discussion about how to prepare for potential changes, especially if these are discontinuous changes (i.e., not being a continuation of the phenomena and processes taking place in the past), how to develop the best action strategy and how to reach a consensus in the event of a divergence of opinions. The role of future scenarios is also to indicate the joint responsibility of various interested parties for their support or inhibition.

Based on the analyses and conclusions of the research process, four future scenarios were developed for the ICT industry in the Wroclaw Agglomeration. The time perspective adopted for the scenarios is the year 2037.







# Scenario matrix

**One of the methods of generating future scenarios provides for two main variables of key importance to the topic of the analysis. In this case, these variables are: people and technologies.**

## The Digital Co-creation scenario

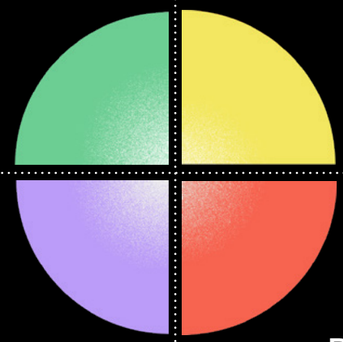
(*growth scenario*)

is the resultant of the people variable (+) and the technologies variable (+).

## The Crisis-Driven Gap scenario

(*status quo scenario*)

is the resultant of the people variable (-) and the technologies variable (+).



## The Skill Revival scenario

(*transformation scenario*)

is the resultant of the people variable (+) and the technologies variable (-).

## The Big-Tech Dominion scenario

(*collapse scenario*)

is the resultant of the people variable (-) and the technologies variable (-).

DIGITAL CO-CREATION

## GROWTH SCENARIO

variable:
**TECHNOLOGIES**

(+)

***EDUCATION***

Interdisciplinarity, human-tech approach, building educational partnerships, T-shape model in STEM.

***CITY AND QUALITY OF LIFE***

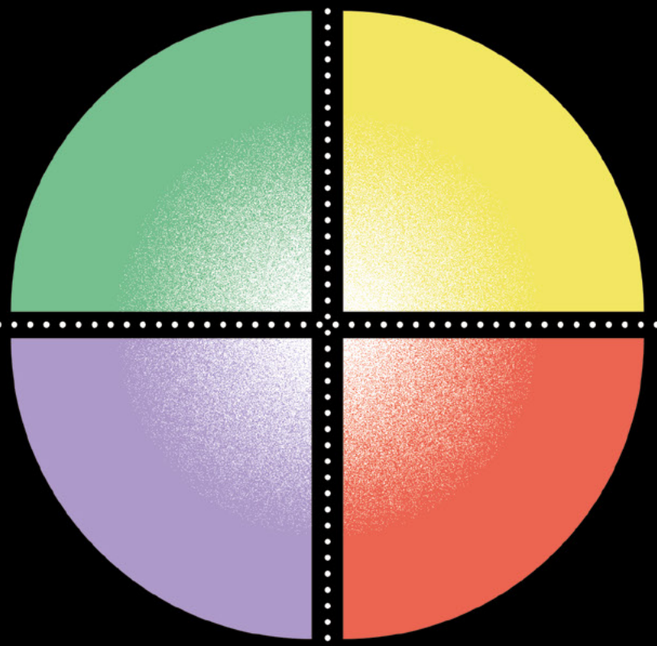
Tech For Good, Technological Civic Budget, wise city, Wroclaw Agglomeration as a blue zone.

***ICT INDUSTRY***

Talent Pool, Digital Literacy, automation of certain tasks.

(+)

variable:
**PEOPLE**



CRISIS DRIVEN-GAP

## STATUS QUO SCENARIO

***EDUCATION***

Short-sightedness, superficial knowledge of technology, educational techno-colonialism.

***CITY AND QUALITY OF LIFE***

The sprawling, chaotic city, three segments of residents (affluent, preppers, silent majority).

***ICT INDUSTRY***

No replaceability of skills, competence gap, employees as service providers.

variable:
**PEOPLE**

(-)

***ICT INDUSTRY***

Talent Lab, skill hubs, horizontal importance of the industry.

***EDUCATION***

Diversification of educational paths, upskilling, reskilling, humanised STEM education.

***CITY AND QUALITY OF LIFE***

Social polarisation, the growth of groups of techno-optimists and invisibles, smart city, building the creative class.

SKILL REVIVAL

## TRANSFORMATION SCENARIO

(-)

***ICT INDUSTRY***

Competition for talents, the model approximating techno-feudalism.

***EDUCATION***

Silo and exclusive, a threat to the acquisition of soft skills.

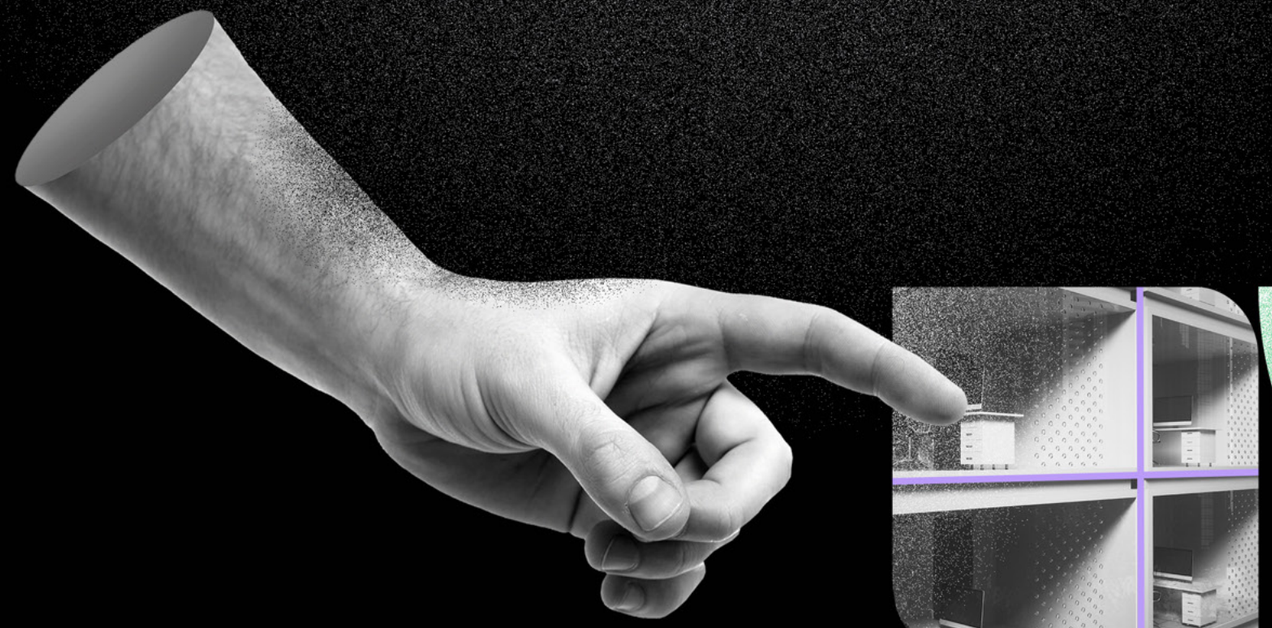
***CITY AND QUALITY OF LIFE***

The implementation of a digital twin of the Wroclaw Agglomeration, digital and cultural gap, low quality of life.

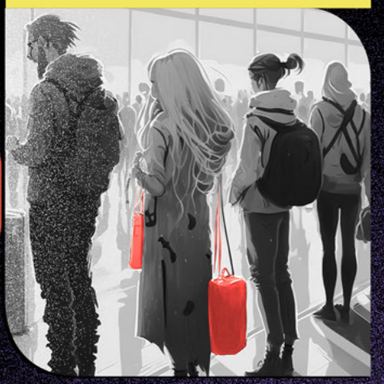
variable:
**TECHNOLOGIES**

BIG-TECH DOMINION

## COLLAPSE SCENARIO







# FUTURE SCENARIOS

# CRISIS-DRIVEN GAP

## The status quo maintenance scenario

**This is the year 2037. Residents of the agglomeration face the consequences of the economic, climate and health crises. However, technologies are still developed very rapidly. This disproportion directly influences the quality of life in Wroclaw.**

Life in the city is very expensive. Urban areas and suburbs are a chaotic, sprawling space. Residents can be divided into three segments. The first segment consists of affluent people who create wealth enclaves; they can afford to purchase and service technologies purifying the air, supporting hydroponic crop cultivation and autonomous transport. The second segment consists of people able to withstand crises thanks to building self-sufficiency in small groups. The third segment is the silent majority. Inequalities and social unrest are intensifying due to such a clear division.

One of the greatest challenges facing the agglomeration is the archaic education system that has not been adapted to the speed of technological development. Technical university graduates have only a superficial knowledge that is often out of date when compared with competencies required by industries. Local governments have been unable to increase subsidies for education for the last few years and the education system has been almost entirely privatised in Poland. Private institutions and non-public universities (attended by people with high economic capital) offer broad but basic knowledge. This is why it becomes a silo, formatting education available for the selected few. Representatives of the public education system accuse business of moving towards educational techno-colonialism. However, graduates from a few years'-long studies at a private or state-owned university still need to complete courses lasting many months before entering the ICT sector in order to gain competencies necessary in the work for the technology industry.

With the departure of older and more experienced employees, the industry faces huge shortages of mid- and senior-level professionals who can be entrusted with a complete project and who can act as mentors for less experienced employees and candidates. Due to the scale of costs associated with the specialisation of a candidate for a job, ICT companies are no longer able to employ graduates and internally invest in their upskilling

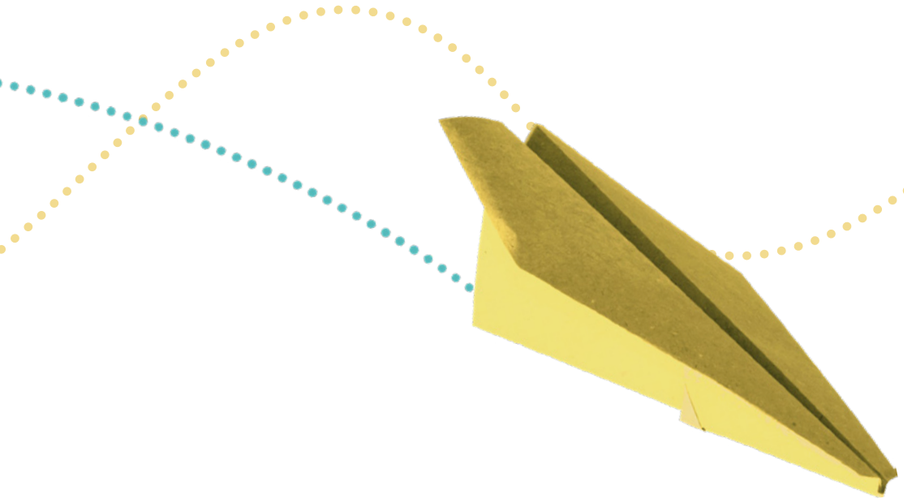
and specialisation. Due to the inability to substitute competencies, ICT companies face a huge competence gap. The situation on the market starts to look like a fight for the last remaining resources. Local companies recruit the majority of specialists beyond Wroclaw and Poland. Teams are groups of service providers whose only connection is completing individual tasks in a project. Employees are not connected to any specific company or organisational culture. They often do not know one another and have never met in real life.

Thanks to benefits being part of the Home as an Office programme, they work from a home office. Offices understood as corporate seats are practically non-existent in Wroclaw. Those few that have survived are locations for rare employee meetings. The rest were transformed into service locations and housing, and some are empty because no tenants could be found. A crisis ensues in the agglomeration's ICT industry.

## KEY PROOF POINTS:

- Seven universities and three programming companies (Salesforce, Amazon Web Services and Pega) cooperating with the training company SkillStorm have launched the UpskillTogether programme aimed at improving the accessibility of online courses for students of technical subjects. 'The technology industry has been treating widespread shortages of talent and funds as unrelated phenomena for too long. They are actually two sides of the same coin', Joe Mitchell, SkillStorm Director said.

- As a result of the pandemic and employees' transfer to remote work, the centre of Los Angeles rapidly emptied out. 72,000 abandoned offices in the city centre are to be repurposed as housing and service buildings.



# BIG-TECH DOMINION

## The collapse scenario

**In 2037, the society is dependent on the decisions made by technology giants present in virtually all areas of people's lives. The Wroclaw Agglomeration is testing its digital twin as the first one in Poland.**

By investing a significant part of resources in digital solutions, the local government and businesses want to develop Wroclaw's competitive edge. However, this move means that city services are not developed properly (new investments in the infrastructure, renewal, and the fight against air pollution are on hold). One of the consequences of these actions is that the quality of life in the city visibly deteriorates. The digital and cultural gap is widening. Some solutions in the digital twin of the agglomeration are not inclusive; they are discriminatory and do not respond to the needs of various groups. This is why residents are divided into two silos. There are people with high digital competencies and economic and cultural capital and a willingness to try new solutions. There are also 'non-technological' people who often remain on the margins of social life and do not trust such innovations. The society starts functioning in a model that resembles techno-feudalism.

Education is an exclusive silo. It is conducted mostly online thanks to big tech. Educational institutions in the real world are being closed. What and how people learn is decided by the biggest technology corporations. International organisations warn that further steps in this direction put the acquisition of soft skills at risk.

The industry continuously competes for talents who work for global brands that are retreating from ICT work in the agglomeration. Consequently, ICT companies from Wroclaw are becoming less innovative. Most sought-after candidates in the sector are people who combine high competence and technology experience with knowledge of ethics, morality and social interactions. After the first positive experience in the recruitment of such people, a coalition of ICT companies launches an exclusive education program focused on digital anthropology, aimed at educating experts in the anthropology of technology and human-machine relations.



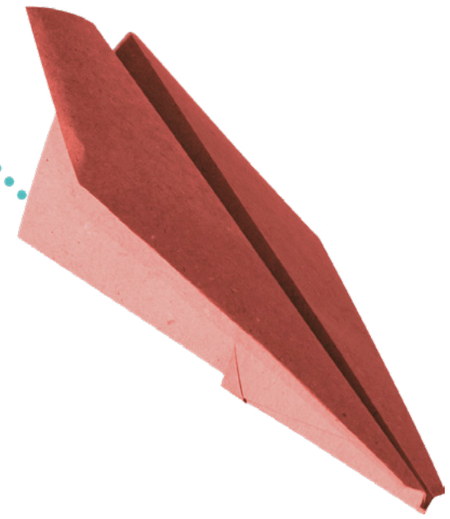


## KEY PROOF POINTS:

- 70% of 10-year-olds worldwide do not understand simple written texts. COVID-19 and remote education have made the situation even worse. If nothing changes, this generation is at risk of losing 21 billion dollars of potential earnings in its lifetime. To avoid this outcome, the World Bank has created the RAPID programme that shows which practices countries should implement to restore the effectiveness of the learning process.

- In 2022, the Seoul city council conducted the Metaverse Seoul pilot programme that involved the transfer of Seoul's city hall to the metaverse.

- The largest American law firms (e.g., McDermott Will & Emery) create positions in their structures for people able to deal with the information and data in order to present them in an accessible and engaging manner. The company established such a unit in 2022 after hiring an anthropologist and former head of the KPMG innovation laboratory, Madeline Boyer.



# SKILL REVIVAL

## The transformation scenario

**Building the creative class is the city's strategic axis in 2037. It is not only supposed to be the driving force of economic growth but is also expected to create a new value chain of the agglomeration, based on the quality of life indicators.**

Smart city technologies are developed by local ICT players and tested in the agglomeration. The digital gap is widening and social polarisation is growing. Those who do are unwilling or unable to use digital facilities (e.g., a virtual visit to an administrative office or a digital signature) are marginalised. The group of invisibles is growing and consists of people who do not use technologies and are critical of the implemented innovations. However, a group of techno-optimists enthusiastically adopt new solutions that make life in the city easier. Lobbying by non-governmental organisations related to education and development of competencies of the future led to the diversification of educational paths. Education follows a very individual and practical path and becomes a set of specific activities corroborated by completed projects. There is a boom in humanised STEM education. It is free, democratic and accessible. Local governments support the establishment and funding of skill hubs, i.e., places where people with various profiles and competencies can change careers (reskilling) or improve their technical skills (upskilling). Educational programmes supportive of careers in the ICT sector are one of the distinguishing features of the agglomeration in the context of the integration of migrants and social inclusion programmes.

The phenomenon of talent labs is a result of the lobbying for investments in humanised STEM education. It means that the industry intensely invests in the education of talents able to become specialists in the short term. The fact that ICT companies in a sense took over the role of specialist education allowed offices to regenerate. Office campuses are full of people. Employees mingle with participants in talent labs.  Office spaces are flexible and can change in any way necessary depending on their function. However, their multifunctionality does not mean the expansion of space but its modular nature. Depending on the time of day and the group of users, the same space can have the function of a place of quiet work, networking space or a skill hub. Each sector of the economy globally uses services offered by the ICT industry. The industry starts generating new professions even though it still faces an imbalance between the number of graduates and the number of specialists



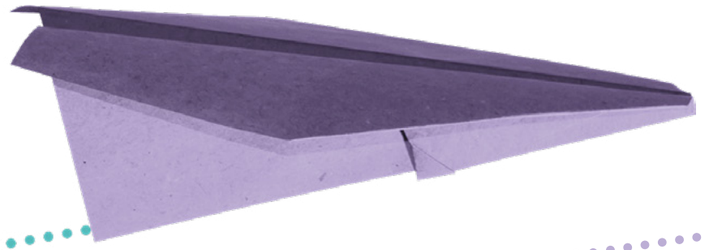




in the Wroclaw Agglomeration. This phenomenon causes a temporary stagnation of the industry in the agglomeration. The most sought-after employee profile is a person with technology experience and great technical knowledge who is also open and quickly adapts to new requirements of the work on specific projects. The industry acknowledges the fact that the lack of an appropriate number of specialists on the ICT market and focusing the efforts on the education of the target group will slow down the expected growth of the industry for a while.

## KEY PROOF POINTS:

- The three-year long Humanising Online STEM project emerged to improve education on online courses at the level of STEM baccalaureate studies. It is based on a new model of humanised online learning and the design of an online career development program, Humanised Online STEM Academy.
- Los Angeles uses data from 40,000 sensors on 4500 intersections in the city. The solution is to shorten travel time by 10% for road users and generate annual savings amounting to 3 million dollars thanks to the conversion of more than 165,000 street lamps into LED lamps. However, the creation of this plan would not have been possible without the Los Angeles Open Data project. It is the result of more than seven years of collection, standardisation, centralisation and subsequent analysis of huge amounts of data relating to transportation, sanitary facilities, public safety (crime statistics), housing, infrastructure, and health (mostly relating to COVID-19 infectivity).



# DIGITAL CO-CREATION

## The growth scenario

**This is the year 2037. The Wroclaw Agglomeration is developing rapidly in the direction of a wise city. It is a smart, inclusive city that is resistant to crises and responds to the needs of human and non-human residents.**

It performs the function of a carer who knows the needs of residents and places them at the centre. The Wroclaw Agglomeration is the first blue zone in Poland, i.e., an area where the goal is the longevity of residents and taking care of their health and well-being in all areas of life. It is also one of the reasons why depopulation is not an issue in the agglomeration.

After a few years in operation, the working team for future education established in the Wroclaw Agglomeration implemented the STEM education recovery programme. Universities and schools become science and information hubs supported by ICT experts. STEM education is built according to the T-shape model. It combines horizontal knowledge with specialist knowledge chosen by the student from among a few subject paths. In addition to technical subjects, the curriculum includes a large technology and humanities block educating people who will manage people and technology teams in the future. Individual subject paths and blocks are supervised by professors, academic staff and ICT industry practitioners as well as artificial intelligence. Education mostly takes place in an immersive digital world. Additionally, local hubs and campuses play an important role as places of prototyping and first tests of new technological solutions in the Wroclaw Agglomeration. Analogue spaces for co-creation are equally important to support innovativeness and to build value in companies operating in the agglomeration. ICT companies open concept work spaces, i.e., their flag spaces where teams meet for the purpose of generative, creative work. They also perform the function of future labs, i.e., educational and creative spaces open to all residents of the metropolis. They are also the first place of testing the concepts submitted by residents to the Technological Civic Budget where innovations are generated in interdisciplinary teams of residents and ICT experts on the basis of the Tech for Good concept.

A redefinition of processes, models and forms of work has occurred in the ICT sector. Geographical location of offices is of no consequence when





searching for jobs. Most teams operate in the digital world. Thanks to the technology (i.e., deep learning and advanced robotics), some of the tasks previously entrusted to people have been automated. Digital literacy (including digital ethics and cybersecurity literacy) is the most valuable competence of human employees in the ICT industry. They combine deep technical knowledge with the search for innovative solutions in the social, regulatory and environmental areas and the creation and implementation of new knowledge in an organisation. In the light of the complex change of educational models, the talent pool phenomenon exists in the Wroclaw Agglomeration.

## KEY PROOF POINTS:

- Curriculums using hackathons or the VR technology offer more opportunities to deliver knowledge to larger numbers of students. The cooperation between IBM and 20 Historically Black Colleges and Universities (HBCUs) is one of the examples of such a new STEM teaching method. Lecturers and students have free access to IBM SkillsBuild courses, lectures, cloud programming and professional development. Immersive training simulations called Capture the Flag are also conducted in these centres.
- 54 families living in the city of Busan in South Korea make the data on their lives available to help developers create a city of the future from scratch. The data is acquired from sensors installed in flats that track people's sleep patterns and frequency of garbage disposal among other things. The Eco Delta Smart Village Busan project is currently in its experiment phase and evaluates not only the lifestyles of residents in South Korea but also the ways in which the local government and the private sector can build a more efficient city infrastructure.

# RECOMMENDED RESPONSE SCHEME

**Future scenarios include factors to which we as stakeholders can respond actively or passively.**

The recommended response scheme below presents actions selected from the four future scenarios where we can adopt an active attitude.
Actions are presented chronologically, in the order in which they should be taken. They are additionally divided into four action categories: support, inhibit, be inspired, and observe.

## TOMORROWS

### GROWTH SCENARIO

- establishing the working team for future education
- implementation of the STEM education recovery programme
- including the T-shape model in STEM education
- opening the first co-creation spaces as Concept Work Spaces and Future Labs
- implementing the first edition of the Technological Civic Budget
- launching the programme for teaching digital literacy skills
- announcing that the Wroclaw Agglomeration has become the first blue zone in Poland

### TRANSFORMATION SCENARIO

- steps aimed at the implementation of the human-tech faculty in education
- diversification of educational paths
- establishment of the interdisciplinary team for creative class development in the Wroclaw Agglomeration
- launching the Talent Lab project in the agglomeration
- opening skill hubs

### STATUS QUO SCENARIO

- the outflow of ICT professionals from the Wroclaw Agglomeration
- office spaces rearranged to become service facilities
- privatisation of education
- widening competence gap
- stratification of the society

### COLLAPSE SCENARIO

- opening digital education programmes managed by technology corporations
- brick-and-mortar educational institutions closed
- testing the first digital twin of the Wroclaw Agglomeration in Poland
- launching an educational programme on digital anthropology
- widening digital and cultural gap

## TODAY

**SUPPORT** these activities
**INHABIT** these activities
**BE INSPIRED** by these activities
**OBSERVE** these activities

***SOURCE:***
**Recommended reaction scheme, own work by infuture.institute, December 2022**

# GLOSSARY

**Hydroponic crop cultivation** – soilless crop cultivation based mostly on water mixtures

**Silent majority** – a social group not publicly expressing their opinions on various subjects

**Techno-colonialism** – a phenomenon whereby groups with greater economic capital use technologies to exploit groups with smaller economic capital

**Upskilling** – the process of improving one's skills

**Reskilling** – the process of acquiring skills in a new area/specialisation

**Competence gap** – the lack of competencies and behaviour necessary for development and for the attainment of goals set by an organisation

**Creative class** – a group of people with specific skills whose main economic function is to create new ideas, new technologies and creative contents; it consists of scientists and engineers, designers, educators, artists, musicians and entertainers, among others

**Smart city** – an intelligent city using ICT technologies to improve the well-being of residents and the efficiency of its infrastructure

**Digital gap** – a gap resulting from differences in the access to the technology and the use of the Internet

**Social polarisation** – the deepening of strong differences, inequalities and tensions in the attitudes of citizens to important social and political matters

**The invisibles** – people who do not use technologies and are critical of the implemented innovations

**Skill hub** – a place of career change and improvement of competencies for people with various specialisations

**Talent lab** – a place of training talents and specialised workers

**Wise city** – a more complex stage in the development of a smart city; an intelligent, inclusive city resistant to crises and responding to the needs of human and non-human residents

**Blue zone** – the city development concept according to which the main goal is the longevity of residents and taking care of their health and well-being in all areas of life

**T-shape model** – a model assuming the simultaneous development of specialist knowledge and skills in a specific area and general knowledge related to many disciplines

**Immersive digital world** – digital reality allowing for a complete multi-sensory immersion/involvement in an experience

**Concept work spaces** – spaces for co-creation where ICT teams meet for the purpose of generative or creative work

**Future lab** – educational and creative space open to all residents of the metropolis

**Technological Civic Budget** – the process of creating innovations in interdisciplinary teams consisting of residents of the agglomeration and ICT experts

**Tech for Good** – the use of technology to solve social, environmental and economic problems; technology is a tool for improving the quality of life of the society

**Deep learning** – a type of machine learning wherein a computer learns to improve processes by analysing algorithms

**Digital literacy** – a set of skills and behaviours necessary to function in an increasingly hi-tech society

**Talent pool** – an HR term referring to a set of profiles of potential clients

**Digital twin** – a digital copy, a replica of physical objects, systems and processes

**Cultural gap** – a material difference between members of different cultures or representatives of the same culture that hinders communications and the establishment and maintenance of relations

**Techno-feudalism** – the transformation of capitalism by technology companies and platforms

**Soft skills** – skills determining the ways in which we behave, how we organise our work and how we interact with others, among other things

**Digital anthropology** – the study of the relationship between people and technologies

# RECOMMEN-DATIONS

## COOPERATION

Wroclaw is focused on cooperation (also in cultural and historical terms). This advantage is worth strengthening. It is necessary to constantly develop more and more effective forms of cooperation at the intersection of education, administration and business. They should be based on open dialogue and mutual understanding. For example, businesses should consider the realities in which the administration operates (procedures), education should learn from business experience (the ability to react quickly and implement new solutions) while education should support both education and business. The mutual network of connections and support may become an even more noticeable distinguishing feature of the Wroclaw Agglomeration at a time when the world is becoming less and less predictable and the role of cities is being redefined.

## EXPERIMENTATION AND FAILURE

For the agglomeration to grow rapidly, it is necessary to not only follow the known trends but also to act courageously, and to allow experimentation and failure. Such an approach requires a change of thinking about management and the organisation of activities or investments in the city (e.g., cooperation with start-ups and ICT companies that might test and implement their solutions in the city, cooperation with education at every level, and including the youngest generations in the building of and responsibility for the city).

## FLEXIBLE STRATEGY

It is necessary to build a flexible strategy for the Wroclaw Agglomeration that will support urban resilience (e.g., climate, technological, and energy resilience) and help to quickly respond to unexpected external factors as well as allow for the creation of innovations at the interface of business, education, and the city.

## SCIENTIFIC CENTRES AND EDUCATIONAL

It is necessary for the public administration to build such facilities that would both support business needs and benefit residents of the Wroclaw Agglomeration. The cooperation with scientific centres and educational organisations is also important. There is a reason why global innovation centres are located close to universities.

## SOFT SKILLS

In order to build and strengthen talents, one needs to include the teaching of soft skills in STEM education. The combination of digital and soft skills is becoming an increasingly evident need in the industry.

## CONVERGENCE

The idea of convergence (also of city services) is gaining momentum. This fact means that there is a growing demand for cooperation and partnerships sometimes to the surprise of entities. It is important for the administration to not only notice the needs of such partnerships but also to finance and support them (by establishing special think tanks or spaces for co-creation), which will contribute to the growth of innovativeness in the agglomeration.

## REDUCTION OF DIGITAL GAP

The digital gap between the generation of digital nomads and those born and raised in the world with no permanent access to technologies will continue to widen. The reduction of digital inequalities should be one of the main strategic activities of business, local government, and education.

## SUPPORT FOR LOCAL COMMUNITIES

Support for local communities and local businesses in terms of technology development can drive the development of the agglomeration and help create the image of the agglomeration as a modern urban ecosystem. Therefore, it is important to create a development environment for enterprises and activities at the interface of education, administration, and business that is supportive of the development of necessary (for smaller enterprises) technologies and smart solutions.

## EQUAL OPPORTUNITY POLICY

An active equal opportunity policy is necessary to support diversity and inclusivity in the ICT sector, both in terms of gender (women are still underrepresented in the ICT sector) and industry experience (support for people at the stage of career change or people with no experience) and in terms of an active inclusion of people from different cultural backgrounds and nationalities (administrative support and a fast-track entry into the labour market).

## ROLE OF CITIES

A paradigm change of the role of cities (departing from treating the city as a place of work) requires work to redefine the concept of an agglomeration while considering new distinguishing features.



This report has been published by ARAW and Invest in Wroclaw in cooperation with the City of Wroclaw within the "Przedsiębiorczy Wroclaw" project.

Wroclaw Agglomeration Development Agency

Invest in Wroclaw

Wrocław the meeting place

Przedsiębiorczy Wrocław 2030

infuture.institute is a forecasting institute that defines the most important trends, better describes them, and indicates the consequences for the economy, market categories or specific brands. The institute was established by Natalia Hatalska, one of the most influential and recognised experts in the field of analysis, forecasting, and research of trends in relations between the market, brand, technology, and consumer.

The institute monitors and analyses all factors, especially the technological and social ones, which can cause fundamental changes in particular categories in a given time perspective (short, medium, and long term). On this basis, it defines trends, describes them, and indicates the consequences for the economy, market categories or specific brands. It answers the what-can-happen question, thereby providing companies and organisations with the basis for strategic planning. It helps to prepare for change, make better decisions, look for opportunities, and discover new directions of development.

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The project has been supported by strategic partners – CBRE, Michael Page, SoftServe, Wiewiórski Legal.

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# Invest in **Wroclaw**

We provide top quality support for foreign and Polish businesses not only during the investment process but also long after the entity has established its activity in the region. Our knowledge, experience, and network are at your service.

1

### Knowledge

ARAW continuously monitors, collects and delivers data about the economy and business in Poland and Wroclaw.

2

### Networking

The agency connects investors with local authorities, companies, service providers, universities, and other relevant organisations.

3

### Individual approach

Each FDI project is different and thus receives an accountable PM who coordinates all related work, streamlines procedures and paperwork.

4

### Reports & Analysis

ARAW regularly distributes relevant business data and news to all partners, but also prepares and publishes reports.

5

### Visits

Investors receive all necessary support in scheduling and organising their visits in and around Wroclaw.

Welcome

Decision

6

### Business set up

Investors receive help with establishing their business in Wroclaw.

7

### PR & Branding

ARAW also advises on and provides support in initial public relations and employer branding activities of recently launched investments.

8

### Ongoing business support

Investors can count on comprehensive, ongoing support – even 80% of Investment Support Team work is dedicated to post-investment assistance.

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