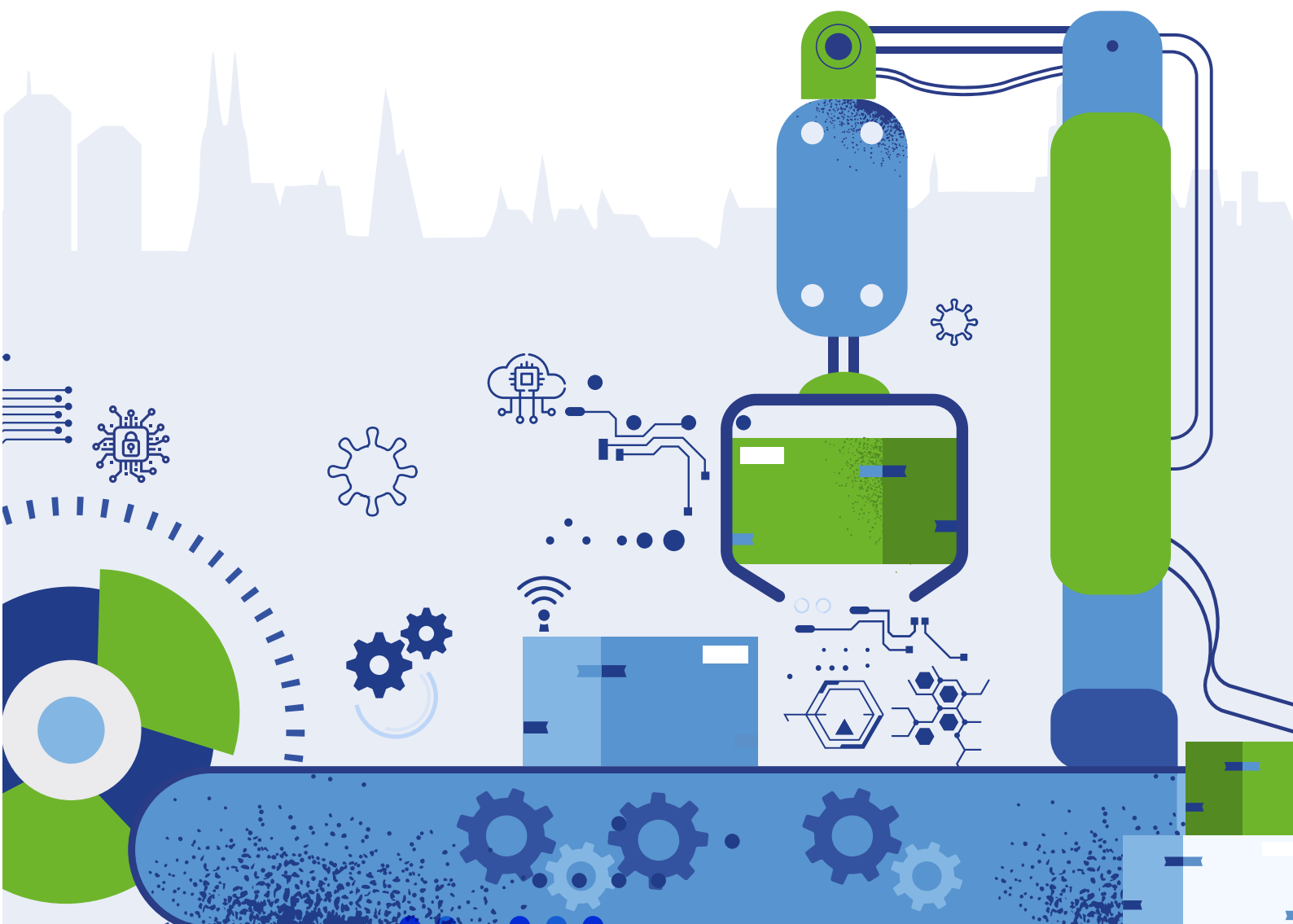




Perspectives on Investing in Industry 4.0 in Wrocław:

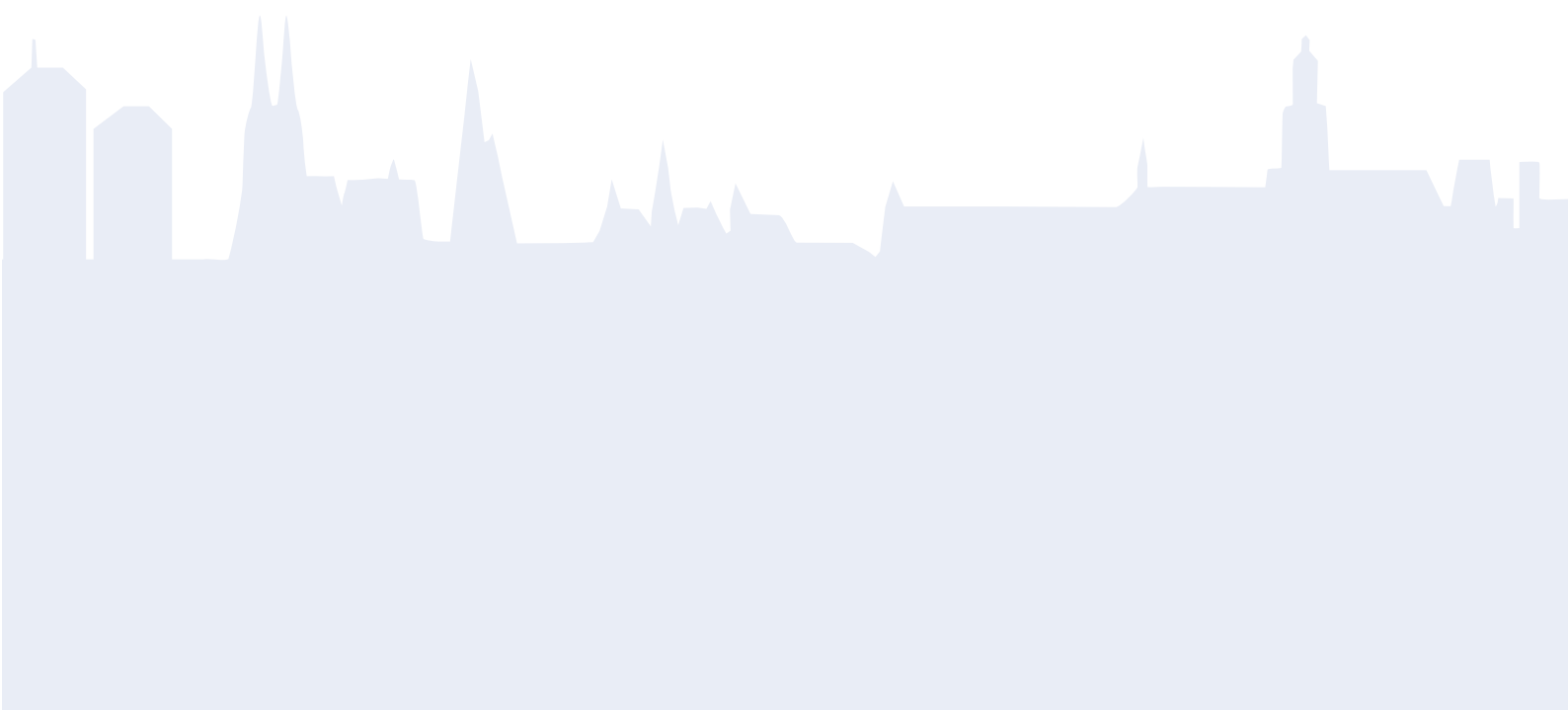
Before, During, and After the COVID-19 Pandemic





Perspectives on Investing in Industry 4.0 in Wrocław:

Before, During, and After the COVID-19 Pandemic



This report has been published by ARAW in cooperation with ITCorner, the Software Development Association Poland (SoDA), The Future Industry Platform Foundation (FPPP), the Association of Business Service Leaders in Poland (ABSL).



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The project has been supported by strategic partners – SDZLEGAL SCHINDHELM, CBRE, Michael Page.



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Agencja Rozwoju Aglomeracji Wrocławskiej SA
pl. Solny 14
50-062 Wrocław
Poland
tel. +48 71 78 35 310
e-mail: araw@araw.pl
araw.pl

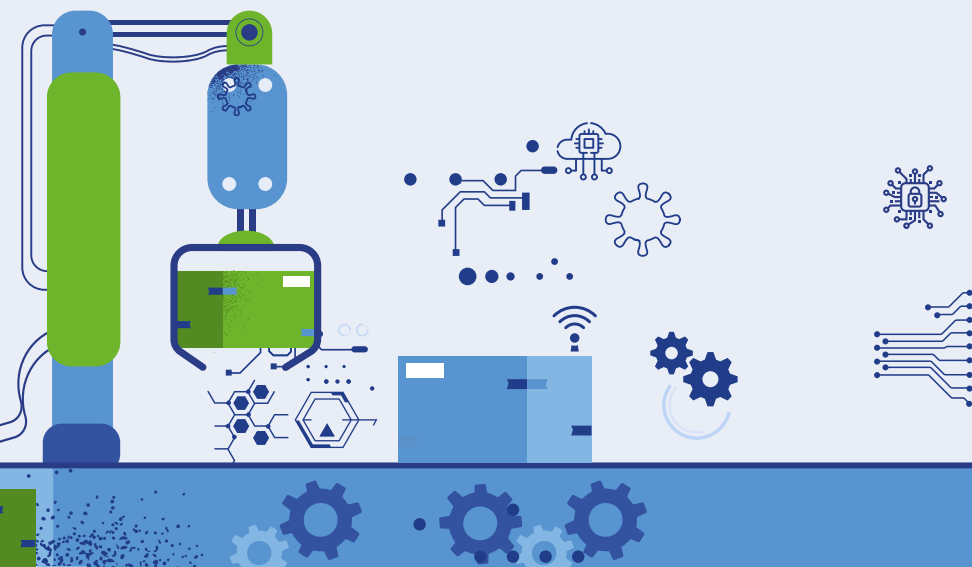


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FOREWORD



We present *Perspectives on Investing in Industry 4.0 in Wrocław: Before, During, and After the COVID-19 Pandemic*, a comprehensive report written in the light of the challenges and prospects for the following years.

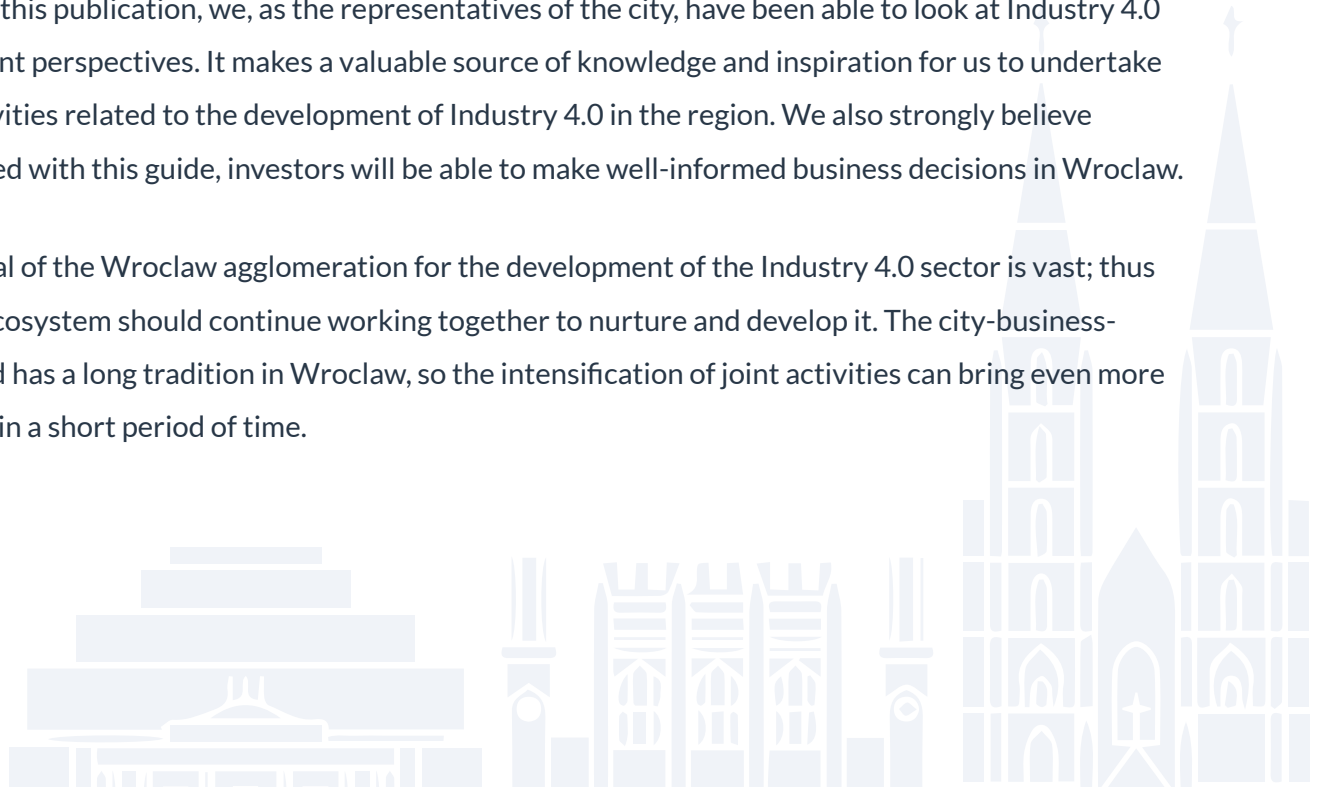
The 4.0 industry is of particular importance to our city. For decades, Wrocław has been driven by knowledge and innovation, which resulted in a strong representation by technology and manufacturing companies in the region.

Studies have shown that before the pandemic, Industry 4.0 was taking on increased importance in the Wrocław landscape. The coronavirus crisis has posed many challenges to the companies operating in the region, but it also created new opportunities.

Aiming to depict this landscape in transition, our publication draws on an extensive body of secondary data and in-depth interviews with representatives of the sector in our region. We would like to thank everyone involved in its preparation – most notably, study experts and respondents, but also partners who have supported us with outstanding commitment, knowledge and experience.

Working on this publication, we, as the representatives of the city, have been able to look at Industry 4.0 from different perspectives. It makes a valuable source of knowledge and inspiration for us to undertake further activities related to the development of Industry 4.0 in the region. We also strongly believe that equipped with this guide, investors will be able to make well-informed business decisions in Wrocław.

The potential of the Wrocław agglomeration for the development of the Industry 4.0 sector is vast; thus the entire ecosystem should continue working together to nurture and develop it. The city-business-science triad has a long tradition in Wrocław, so the intensification of joint activities can bring even more new effects in a short period of time.



This connection can help us to build a strong Industry 4.0 sector able to compete with similar ecosystems in Europe and worldwide. This report clearly demonstrates that the community of Wrocław is ready to pursue this goal.



Dr Magdalena Okulowska

President of the Wrocław Agglomeration Development Agency (ARAW)

THE RATIONALE FOR THIS REPORT

Is Wrocław a reasonable choice to place an Industry 4.0 investment? To meet the business needs of today's manufacturing companies, a location should provide an environment ready and open not only for slow-moving change but clearly – for an industrial revolution.

It seems that before the pandemic, the Wrocław agglomeration had everything in place to welcome Industry 4.0 with open arms. However, COVID-19 has surely affected this scene and its members. What changes has it triggered and what opportunities have emerged as a result? Is it still a favourable place for investment?

This report aims to depict the situation of the Industry 4.0 sector in Wrocław before and during the pandemic – in a succinct, yet thorough way. It presents relevant facts about the region, and, most of all, it reveals what Industry 4.0 scene members think about the city and its potential in the context of the pandemic.

In a word, this publication supports investors and local companies with the information they need to consider at different stages of the decision-making process.

WHAT THIS REPORT CONTAINS

Why is the 4th industrial revolution happening right now and what differentiates it from previous transformations? **Chapter 2** discusses this issue and core technological advancements that have helped to

unlock it. As Industry 4.0 has brought about an array of consequences for the global economy, society and business, this section additionally overviews prospects on this subject.

Before the pandemic individual regions and cities were trying to encourage the development of Industry 4.0 – and Wrocław was one of them. Its location, critical infrastructure investments, policies, programmes, and high numbers of graduates in STEM-related fields, make it a competitive landscape for Industry 4.0 both at the national and international level. **Chapter 3** discusses the city’s unique advantages for investors and entrepreneurs.

The outbreak of the pandemic has impacted the situation of manufacturers around the world – and Wrocław is no different in this regard. How has COVID-19 changed the rules of the game in the region? **Chapter 4** discusses this issue in detail, presenting key findings from in-depth interviews with Industry 4.0’s local players.

The respondents shed light on the operational, organisational, and business challenges that COVID-19 has posed for Industry 4.0 in Wrocław and Lower Silesia. Asked to name significant changes, study participants explained how they were handling the coronavirus crisis in the short-, mid- and long-term. Finally, they shared their outlook for the future and unveiled ideas on how to turn a global crisis into new opportunities. Leading industry experts commented on their conclusions.

So what will the future of Industry 4.0 in Wrocław be like? The final section, **chapter 5** focuses on that issue, reviewing lessons learnt during the coronavirus crisis by the representatives of modern business services, manufacturing, and IT companies. It presents advantages that the Wrocław agglomeration as a landscape in transition offers to investors and equips the reader with a guide on how to start a business in Wrocław.

RESEARCH METHODOLOGY

The report features conclusions based on 12 structured, in-depth interviews with representatives of the Industry 4.0 sector in Wrocław. The main goal was to learn more about how they perceive their current situation – on an individual and collective level.

Conducted by an external researcher in September 2020, all interviews were kept anonymous to ensure maximum confidentiality, trust, and openness of the participants.

CEOs, managing directors, and senior managers who took part in the survey represent the three different types of organisations:

- **local production sites and Shared Services Centres (SSC) of international manufacturers;**
- **small, medium and large companies implementing IT solutions – working on software, embedded software, and hardware projects;**
- **a foundation promoting the development of Industry 4.0 in Poland.**

ABOUT THE EXPERTS

The conclusions were accompanied by commentaries of leading industry experts: **Rafał Pisz** (Board Member at ITCorner), **Maciej Borkowski** (Vice-President of The Association of Business Service Leaders – ABSL, Head of Wrocław Chapter), **Andrzej Soldaty** (expert in industrial automation, business leader, and President of the Future Industry Platform Foundation), **Prof. Edward Chlebus** (Head of the CAMT Centre of Excellence at the Wrocław University of Science and Technology), **Piotr Beling** (member of SODA – Software Development Association Poland), and **Dr Magdalena Okulowska** (President of the Wrocław Agglomeration Development Agency – ARAW).

The study was created by ARAW with the help of partners.



ABOUT THE STUDY PARTNERS



SDZLEGAL SCHINDHELM is a member of the international SCHINDHELM network of law and tax firms serving business clients in 29 locations in 14 countries.

For more information visit:
schindhelm.com

Michael Page

Michael Page is a global leader in personnel consulting and recruitment of qualified specialists and middle and senior management. The company has 141 offices in 36 countries around the world.

For more information visit:
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CBRE

CBRE is the world's largest commercial real estate services and investment firm, with more than 100,000 employees. CBRE has been on the Fortune 500 list since 2008.

For more information visit:
cbre.pl

SoDA

Software Development Association Poland (SoDA) brings together professionals with a background in IT. It promotes, supports, and integrates Polish software companies, ensuring the exchange of know-how and developing partnerships.

For more information visit:
sodapl.com

ITCORNER

ITCorner is a cluster of technology companies from all over Poland. The association acts as a platform for exchanging knowledge and experiences on issues related to business and new technologies.

For more information visit:
itcorner.org.pl

ABSL

The Association of Business Service Leaders (ABSL) represents the sector of business services in Poland. It brings together shared service centres, business process outsourcing, information technology outsourcing and R&D centres.

For more information visit:
absl.pl/en



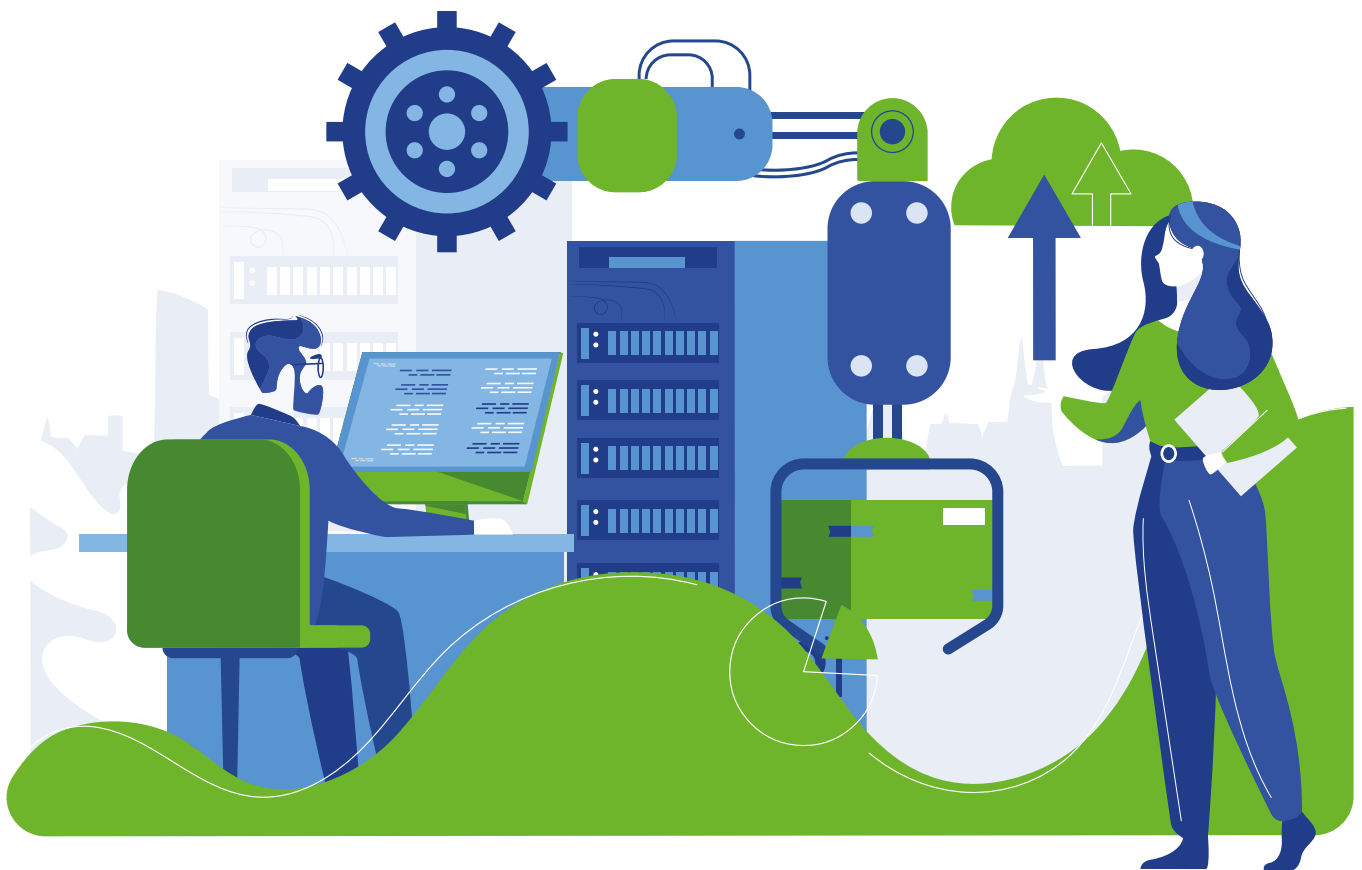
The Future Industry Platform Foundation (FPPP) is a publicly funded body aiming to integrate all stakeholders interested in Industry 4.0 and accelerate the digital transformation of the production manufacturing sector in Poland.

For more information visit:
przemyslprzyszlosci.gov.pl

ABOUT ARAW

Wroclaw Agglomeration Development Agency (ARAW) is a business support institution established in 2005 by the City of Wroclaw and 29 other municipalities. ARAW aims to promote the region, support its economic development, attract foreign investment, startups and high-tech companies, as well as foster a local innovation ecosystem. So far, ARAW has supported the successful landing of over 200 FDI projects in the Wroclaw area which has led to creating over 100,000 jobs. The agency provides comprehensive business support – even 80% of Investment Support Team work is dedicated to post-investment assistance.

For more information visit: invest-in-wroclaw.pl



CHAPTER 2:

GLOBAL APPROACHES TO INDUSTRY 4.0 AND THE IMPACT OF THE PANDEMIC ON MANUFACTURING

The birth of 'Industry 4.0' is often linked to the Hannover Messe Fair in 2011 when the concept of industry based on new technologies was first proclaimed. It has since then subsumed into the business lexicon as a catch-all covering a range of issues – from manufacturing automation to mass customisation of production.

The term is all-embracing, thus this chapter will shed light on key concepts, benefits and opportunities brought about by Industry 4.0 globally.

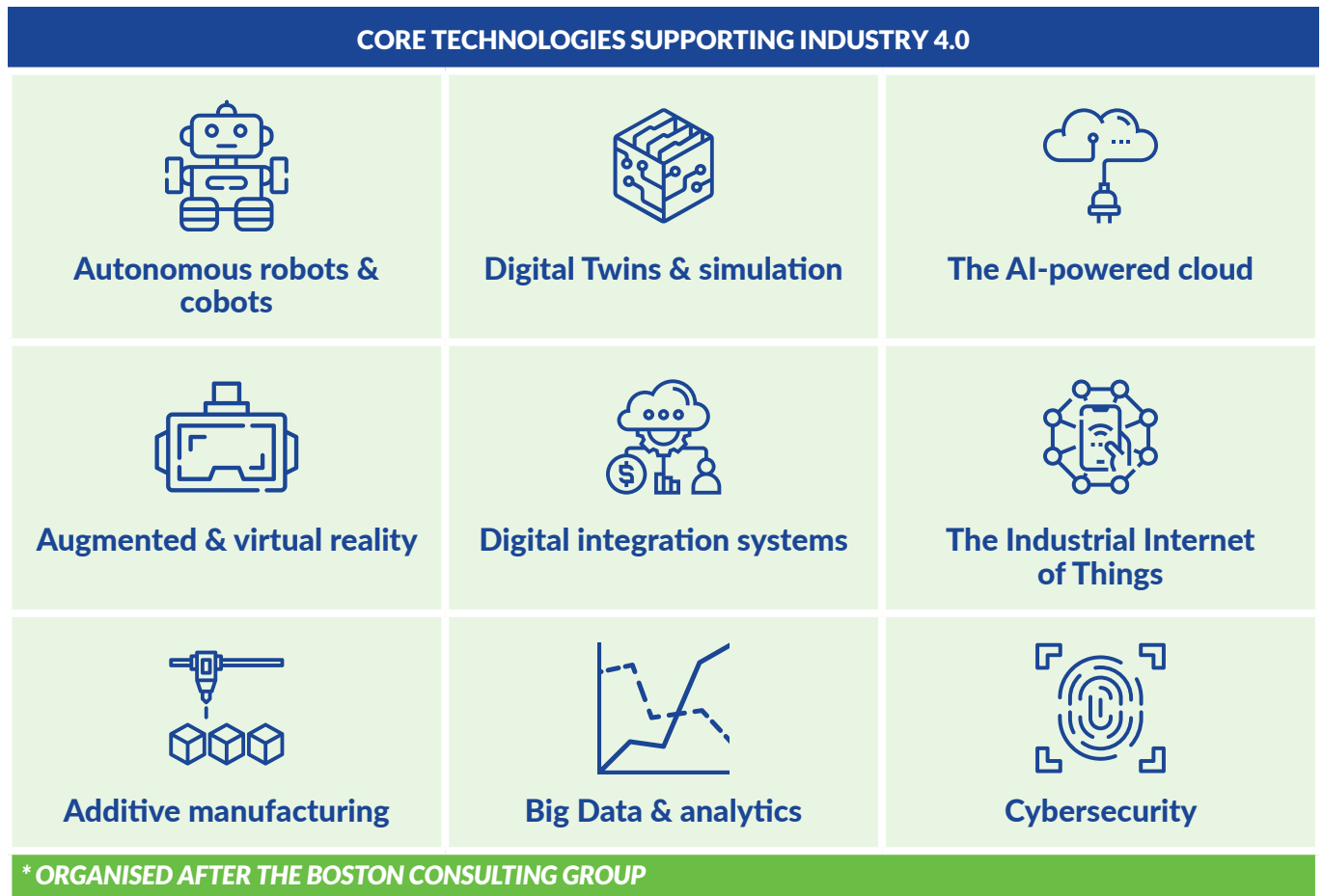
It will conclude with a brief discussion of the impact the pandemic has had on the Industry 4.0 sector around the world. The way these global changes affect the manufacturing scene in Poland and Wroclaw, in particular, will be a subject of the chapters that follow.

WHAT INDUSTRY 4.0 MEANS

The vision of networked factories, machines, and production systems may seem bold. Yet many technological solutions powering Industry 4.0 were already in use at the end of the 1970s; thus, the shift was more of an incremental and qualitative nature.

What differentiates Industry 4.0 is the unprecedented significance that data plays in manufacturing. This change wouldn't be possible without advancements such as the Internet of Things (IoT), the Cloud, Robotic Process Automation (RPA), or Artificial Intelligence (AI).

Therefore, this publication follows the **BCG's definition of Industry 4.0**¹, seeing it as a transformation that enables analysing data across machines and using it for more efficient manufacturing at reduced costs.



Apart from increasing productivity, Industry 4.0 also encourages developing new products and business models. As a result, it modifies the workforce profile and reconfigures the competitiveness of companies and regions.

These issues will be discussed later on in this chapter but first, let's focus on the three core advancements differentiating Industry 4.0 from the previous revolutions.

DATIFICATION

Integrating data from devices, sensors, and IT systems enables developing new solutions at all stages of the product lifecycle – from design to production, logistics and maintenance.

¹ Boston Consulting Group, *Embracing Industry 4.0 and Rediscovering Growth*, available from: <https://www.bcg.com/capabilities/operations/embracing-industry-4.0-rediscovering-growth>

This capability became possible with the invention of the Industrial Internet of Things (IIoT) – a network of platforms and sensor-equipped objects – all prepared to collect and share data. Thanks to IIoT, interconnected machines become parts of autonomous networks continuously collecting, analysing, and using data in real-time.

IIoT enables monitoring of all production processes and scheduling maintenance accordingly. When integrating Manufacturing Execution Systems (MES), Enterprise Resource Planning (ERP), and Customer Relationship Management (CRM), the network allows for comprehensive management of all related operations.

THE CONVERGENCE OF IT SYSTEMS AND OPERATIONAL TECHNOLOGY (OT)

In the past, IT and OT worked as separate entities: the first one mostly serving management, the latter controlling machines and resources. Thanks to the IIoT, these two worlds have been increasingly converging.

Cyber-physical systems (CPS) embody this tendency as machines now combine both the IT and operational qualities. One of the most advanced CP systems – Digital Twins – enables creating digital replicas of physical objects but also processes based on data collected from sensors.

ROBOTISATION AND AUTOMATION

Industry 4.0 is also underpinned by a growing level of robotisation and automation. Apart from automated production lines, factories now boast autonomous mobile robots (AMRs) and collaborative robots (cobots).

According to the *International Federation of Robotics*², in 2020 there were over 2.7 million industrial robots worldwide. The automotive, electronics, and machinery sectors have been traditionally the ones to benefit most from such units – with Asia remaining the strongest market for industrial robots.

Mobile and AI-powered robots increase the ability to reconfigure the setup for shorter production series, thus increasing product personalisation and servitisation – and giving rise to new business models.

² IFR, IFR presents World Robotics Report 2020, available from: <https://ifr.org/ifr-press-releases/news/record-2.7-million-robots-work-in-factories-around-the-globe>

INDUSTRY 4.0: NEW BENEFITS, NEW BUSINESS MODELS

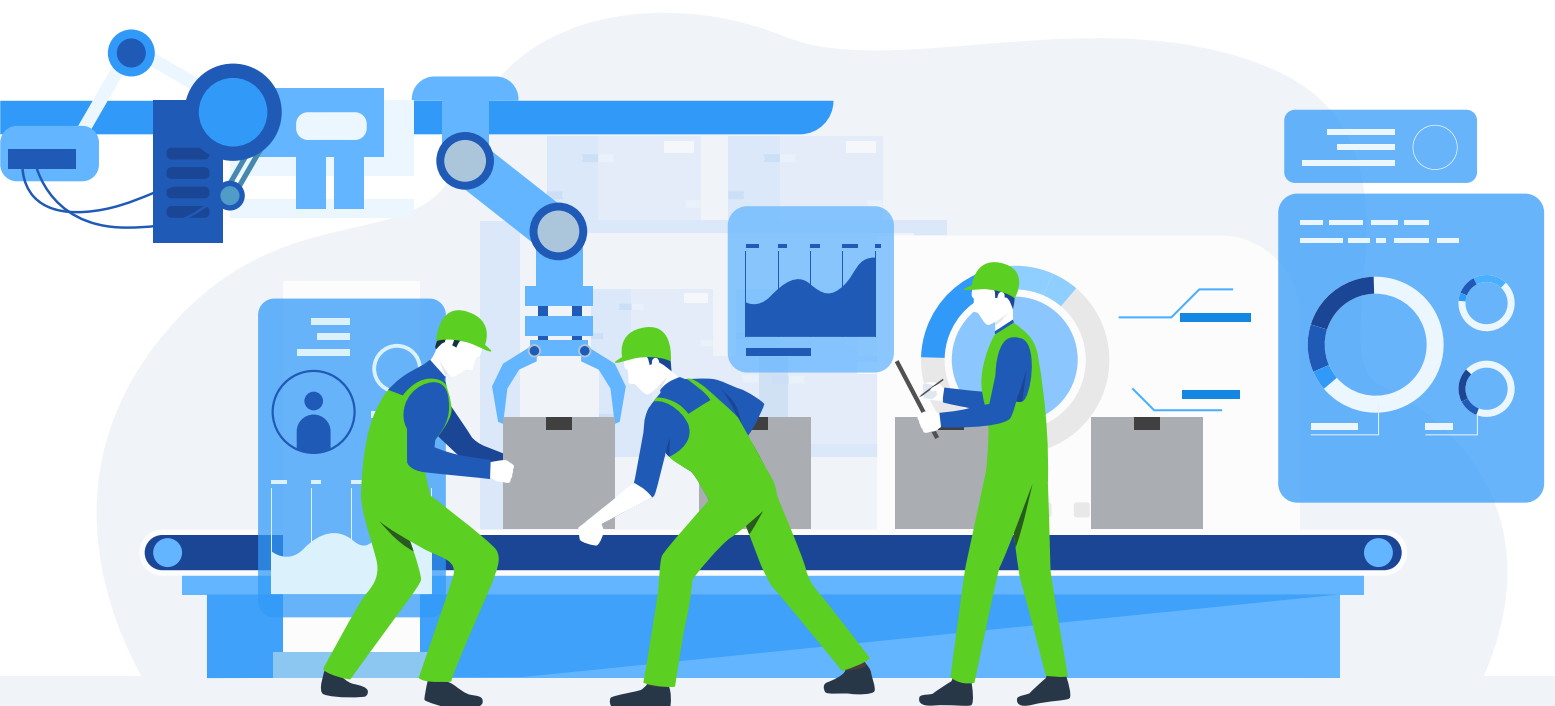
Instantly processing data, manufacturers can optimise manufacturing processes and respond faster to changing customer needs – and this ability reconfigures the entire ecosystem.

PRODUCT PERSONALISATION AND SERVICISATION

The ability to create more product variants while using the same resources is crucial to building a competitive advantage. That's why increasing production flexibility has long been a pressing matter for manufacturers.

Again, data is the game-changer here. Processing real-time information at all stages of user interactions enables creating product simulations that can be adapted to match unique, individual requirements of the customer.

Similarly, many manufacturing businesses now expand the value for their clients by shifting from selling products to selling Product-Service Systems (PSS). Pioneered in the 1960s by Rolls Royce, servitisation relieves customers of capital costs, instead offering them advanced solutions in a subscription model.



PLATFORMISATION OF PRODUCTION

Just as products are now increasingly offered as a service, the manufacturing process is also subject to similar changes.

Digital technologies enable breaking it into specific services that can be bought on-demand by other companies (Manufacturing-as-a-Service). Benefitting from the production capacity of other organisations, manufacturers can use equipment they require in a given product series but without increasing their capex.

LOGISTICS 4.0

Transformed production processes also impact product distribution.

Historically, production has been the central activity of manufacturing, while distribution was an afterthought. According to Michael Mandel of the *Progressive Policy Institute*³, the ability to deliver a custom product fast becomes key to building a competitive advantage.

With the advent of Industry 4.0, we are witnessing how container logistics is giving place to digitised distribution enabled by specialised fulfilment centres – very much like in e-commerce. Of course, boosting processes with technology isn't new. However, what differentiates Logistics 4.0 are progressive datification and smart automation – both translating into increased agility and faster delivery.

REORGANISATION OF COMPANIES

Industry 4.0 reconfigures the nature of work both in terms of managing both the process and people.

The fourth industrial revolution departs from Lean Manufacturing and favours Agile methodologies. Agile Manufacturing focuses on delivering products that closely match clients' requirements while controlling costs and quality to ensure a relatively low final price and the fastest possible Time to Market.

Intelligent technologies help to achieve this objective, so the need for a highly-skilled workforce is also of paramount importance.

³ Michael Mandel, The Rise of the Internet of Goods, available from: <http://www.progressivepolicy.org/wp-content/uploads/2018/08/Internetofgoods-reportPPI-2018.pdf>

THE RIGHT COMBINATION OF TECHNOLOGIES AND SKILLED WORKFORCE OPENS A MULTITUDE OF BENEFITS TO MANUFACTURERS



Increased efficiency and productivity

Intelligent technologies allow producing more at lower costs and with less waste. According to **McKinsey**⁴, automating production can boost manufacturing productivity by approx. 50%, while **MIT**⁵ estimates that robots can reduce workers' idle time by 85%.



Improved supply/demand matching

Cloud and AI-based inventory management solutions enable better interactions with suppliers. Paired with big data, they help to predict future demands and adjust the supply accordingly.



Revenue gains

Increased productivity and flexibility drive better financial results. **Deloitte**⁶ found out that 90% of companies with comprehensive Industry 4.0 strategies generated at least 5% annual revenue growth.



Savings on operational cost

Technologies enable shorter operational lead times, higher asset utilisation and maximum product quality. All told, **PwC**⁷ survey respondents expected them to save US\$421 bn in costs each year.



Machine downtime reductions

Predictive maintenance systems can spot a failure before it occurs. According to **Deloitte**⁸, such solutions can reduce the maintenance planning time by 20-50%, and diminish its costs even by 10%.



Innovation opportunities

Increased visibility and transparency across the entire value chain creates opportunities to innovate – be it business processes, developing a new product, optimising a supply chain, or improving the Overall Equipment Efficiency (OEE).



Improved customer experience

Industry 4.0 technologies help to innovate all stages of the customer journey. Product customisation, timely delivery information, reducing costs and ensuring seamless support all add to improved customer experience.



Enhanced flexibility

Data-powered solutions and manufacturing platforms allow for increased agility. It now becomes easier to scale production up and down, add new elements to the production line and create opportunities for high-mix manufacturing or one-off runs.



Improved traceability and compliance

Compliance is key in industries such as pharma or medical device manufacturing. Industry 4.0 technologies enable automating related processes, including track and trace, quality inspections, serialisation, or data logging.

4 McKinsey Digital, Digital in industry: From buzzword to value creation, available from: <https://www.mckinsey.com/business-functions/mckinsey-digital/our-insights/digital-in-industry-from-buzzword-to-value-creation>

5 MIT Technology review, How Human-Robot Teamwork Will Upend Manufacturing, available from: <https://www.technologyreview.com/2014/09/16/171369/how-human-robot-teamwork-will-upend-manufacturing/>

6 Deloitte, Industry 4.0. Challenges and solutions for the digital transformation and use of exponential technologies. Available from: <https://www2.deloitte.com/content/dam/Deloitte/ch/Documents/manufacturing/ch-en-manufacturing-industry-4-0-24102014.pdf>

7 PwC Netherlands, Industry 4.0: Building the Digital Enterprise, available from: <https://www.pwc.nl/en/publicaties/industry-4-0-building-the-digital-enterprise.html>

8 Deloitte, Making maintenance smarter Predictive maintenance and the digital supply network, available from: <https://www2.deloitte.com/us/en/insights/focus/industry-4-0/using-predictive-technologies-for-asset-maintenance.html>

THE IMPACT OF COVID-19 ON INDUSTRY 4.0 WORLDWIDE

Before the outbreak of COVID-19, there was widespread interest in Industry 4.0. The sector's value was projected to grow up to **\$3.7 trillion by 2025**⁹.

However, despite these positive outlooks, the actual landscape of Industry 4.0 adoption has been far more complex.

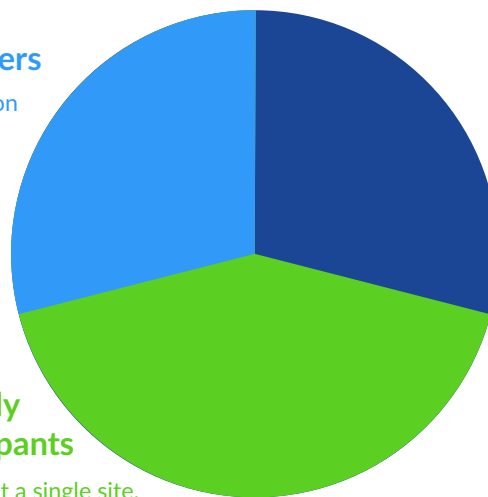
ASPIRATIONS VS REALITY

90% of respondents in **McKinsey's**¹⁰ annual survey admitted seeing the benefits of digital transformation in manufacturing. A majority of them included introducing new technologies as an essential part of their organisational development strategies.

However, as research from the **World Economic Forum**¹¹ demonstrates, despite these declarations, the reality was still far from this ideal. In 2018, the adoption of technology in production still remained slow across industries and regions.

COMPANIES PILOTING OR DEPLOYING IOT SOLUTIONS (% RESPONDENTS)

30% of surveyed manufacturers had not yet started their transformation journey.



29% of respondents had started to roll out new solutions across their production processes.

41% of study participants were still piloting technologies at a single site.

SOURCE: WORLD ECONOMIC FORUM

⁹ World Economic Forum, The Next Economic Growth Engine: Scaling Fourth Industrial Revolution Technologies in Production, available from: <https://www.weforum.org/whitepapers/the-next-economic-growth-engine-scaling-fourth-industrial-revolution-technologies-in-production>

¹⁰ McKinsey & Company, Industry 4.0: Reimagining manufacturing operations after COVID-19, available from: <https://www.mckinsey.com/business-functions/operations/our-insights/industry-40-reimagining-manufacturing-operations-after-covid-19>

¹¹ World Economic Forum, The Next Economic Growth Engine: Scaling Fourth Industrial Revolution Technologies in Production, available from: <https://www.weforum.org/whitepapers/the-next-economic-growth-engine-scaling-fourth-industrial-revolution-technologies-in-production>



Transformation processes are still mostly focused on the first stages of transformation and ‘maturity’ from a benefit and potential perspectives, such as enhancing productivity, optimisation of operational and business processes or predictive maintenance.

Deloitte's study¹² also confirmed “short-termism” of manufacturers and their struggle to develop holistic strategies that would take advantage of Industry 4.0 technologies. Two-thirds of survey participants admitted that their companies had no formal strategy or were taking ad-hoc approaches to digital transformation.

TRANSFORMATION LEADERS

Companies with long-term strategies are still in the minority. However, there is a leading group of manufacturers that have been making great strides in scaling their adoption of Industry 4.0 technologies.

The World Economic Forum has recognised these factories as part of its **Global Lighthouse Network**¹³ which currently consists of 44 sites. While all champions have successfully transformed at the site level, some of them have also extended their journeys through the entire value chain.

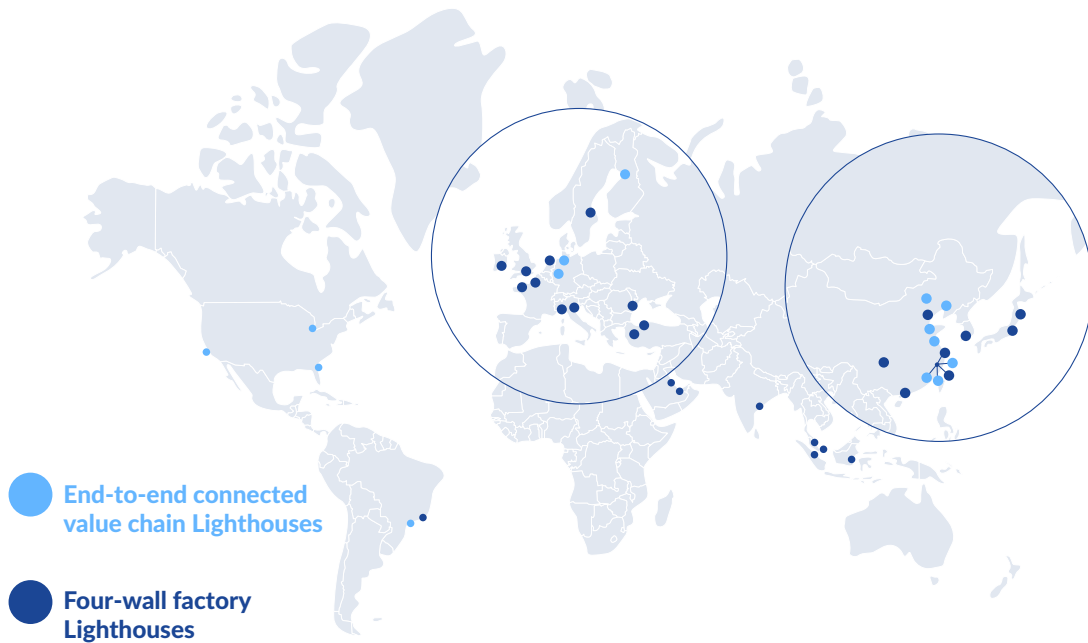
What's also worth pointing out is that all Lighthouses have invested in building staff competencies, adapting their organisational structure and developing new ways of working.



¹² Deloitte, Industry 4.0: At the intersection of readiness and responsibility, available from: <https://www2.deloitte.com/global/en/insights/deloitte-review/issue-22/industry-4-0-technology-manufacturing-revolution>

¹³ World Economic Forum, Global Lighthouse Network: Insights from the Forefront of the Fourth Industrial Revolution, available from: <https://www.weforum.org/whitepapers/global-lighthouse-network-insights-from-the-forefront-of-the-fourth-industrial-revolution>

THE GLOBAL LIGHTHOUSE NETWORK INCLUDES 44 SITES AS OF 6 JANUARY 2020












SOURCE: THE WORLD ECONOMIC FORUM

NEW CHALLENGES, NEW RESPONSES

Manufacturing has historically been a slow-moving industry, but the coronavirus has created new challenges that are requiring production companies to innovate at unprecedented speeds.

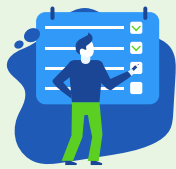
SOME OF THE MOST IMMEDIATE CONSTRAINTS FACED BY MANUFACTURERS GLOBALLY INCLUDED:

	Supply chain disruptions		Cashflow issues		Manufacturing in a safe environment
	Worker unavailability		Sudden drops and uptakes in demand		Limited ability to travel
	Employee engagement and culture		Lack of collaboration and cohesion		New data security and fraud-related risks

As more businesses emerge from the crisis, the case for digitisation at scale will likely be stronger than ever. The need to adapt to the new normal is also an opportunity to re-imagine a future with digitised, more resilient operations.

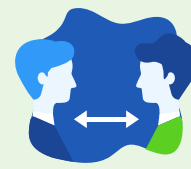
According to **McKinsey**¹⁴, this upswing will be subject to two opposing forces – the need to develop agility but also the constraints imposed by cash preservation.

The most important pandemic-related areas in which manufacturers seek to deploy digital solutions are planning, managing disruptions at suppliers or production plants, reducing workplace health risks, and optimising delivery.



Planning for operations

Traditional demand forecasting algorithms rely on relatively simple statistical tools. The scale of Covid-19 fluctuations calls for more advanced solutions such as autonomous planning tools based on AI algorithms and supplemented by internal and external data from suppliers, customers, or broader economic indicators.



Boosting workplace safety

Digital technologies enable remote work and collaboration and eliminate the need for non-critical employees to leave their homes. Apart from common remote collaboration tools, there's been an uptake in more advanced solutions, such as machine-vision algorithms and wearables – all geared towards maintaining safe distancing.



Improving productivity

Manual data collection is prone to errors, especially in times of social distancing and lockdown. Digital solutions allow manufacturers to automate the data collection process by adding sensors or using machines' programmable logic controllers (PLCs) to collect data and display it on live dashboards. As a result, factories can monitor and act upon performance information remotely and in real-time. At the same time, physical automation and robotics can supplement labour capacity.



Logistics

The pandemic has reduced availability of transportation modes and introduced new requirements for packaging or contactless delivery. Thanks to advanced analytics, manufacturers increase the visibility of demand and supply for logistics services at all stages. Combined with digital control towers, fleet management, network engineering, and carrier analytics, these solutions can increase service uptime and ensure that customers get products on-time and at the right cost.

Of course, transformations at scale are challenging – and as **McKinsey**¹⁵ found out, even 70% of such initiatives fail. Most companies in their Industry 4.0 journeys remain stuck in a ‘pilot purgatory’, with only 38% looking at horizontal integration of processes going beyond the factory.

So will the pandemic change this dynamic? This is yet to be seen.



CHAPTER 3:

THE INDUSTRY 4.0 LANDSCAPE IN WROCLAW BEFORE THE PANDEMIC

Global trends are important, but it's how they influence and interact with local ones that will ultimately set the direction for industry in any given place. This chapter will focus on conditions in Wroclaw, Lower Silesia and Poland and what impact they had on the development of Industry 4.0 before COVID-19 came on the scene.

A solid base was already present in Wroclaw that favoured digital transformations in the many sectors operating around the region. There were areas needing improvement, but Wroclaw looked competitive both on the national and international level.

Before getting into local details though, a review of the situation in Poland as a whole is necessary to provide context.

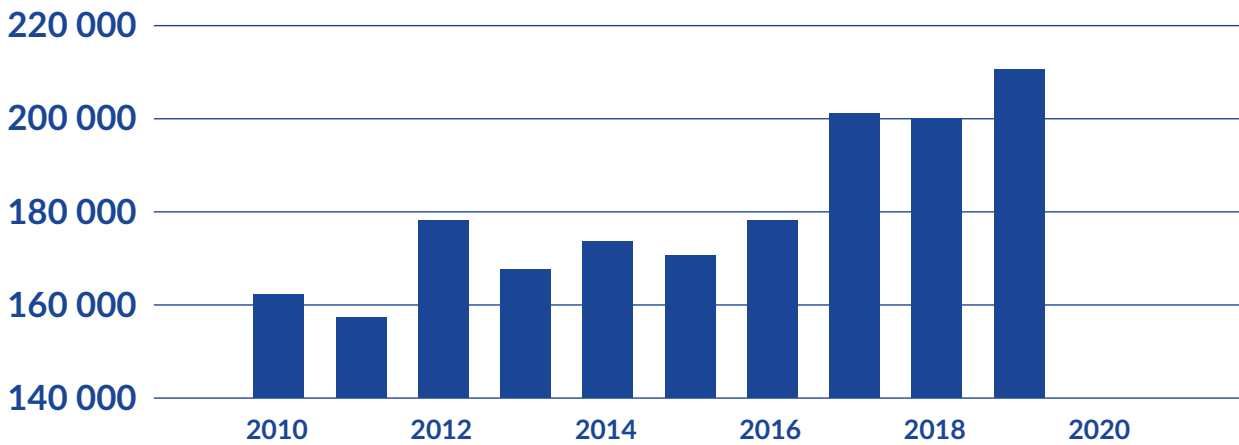
INDUSTRY 4.0 IN POLAND

A STABLE AND GROWING ECONOMY

As 2019 came to an end, the Polish economy had been growing uninterrupted for more than 25 years. Gross domestic product (GDP) growth had averaged above 3% for the previous five years. Even during the financial crisis of 2008-9, GDP in Poland kept rising, albeit at a slower pace.



This growth was mirrored in consistently increasing foreign direct investment (FDI) in Poland. The results for 2019 revealed another record year, 209.5 billion euros of FDI, according to the **National Bank of Poland**¹.



***SOURCE OF DATA TRADING ECONOMICS**

These positive trends were reinforced by a survey of foreign manufacturers operating all over Poland². A majority, 61%, said that in retrospect, the decision to invest in Poland was “excellent”. The rest said the decision was either “very good” or “good”. None of the respondents rated it as anything less than “good”.

81%

of the surveyed production companies had been present in Poland for over ten years³.

86%

of them plan to expand their operations in Poland in the next three years⁴.

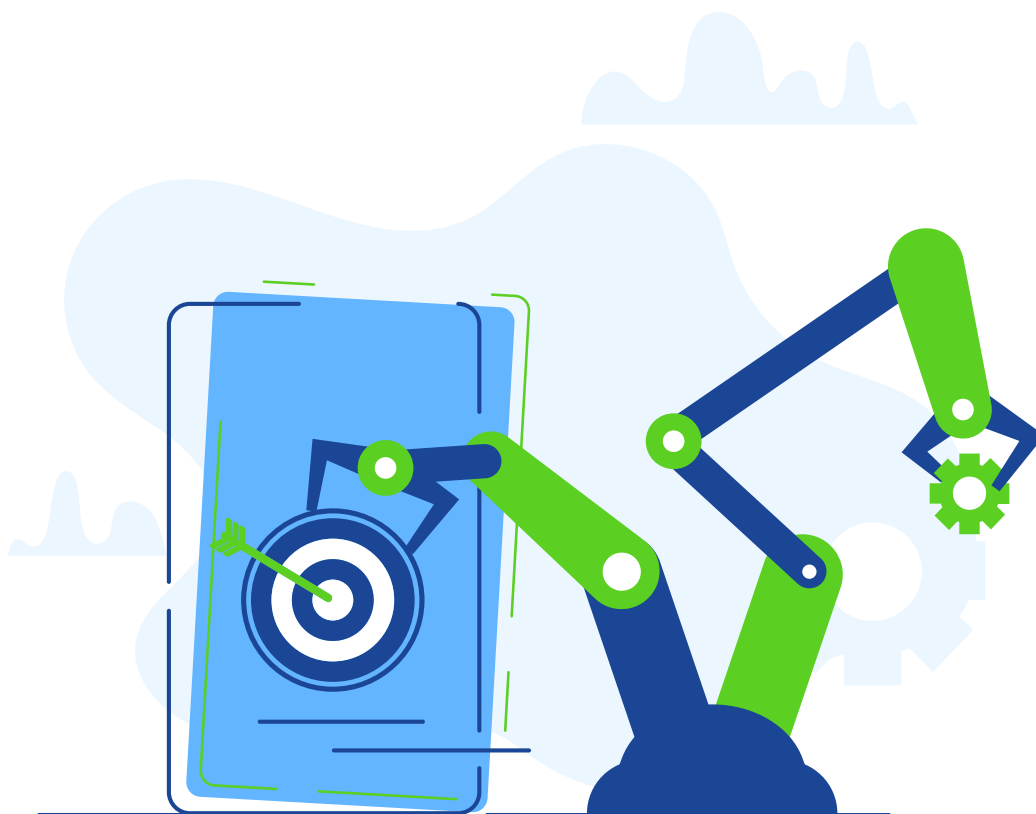
These data points describe a business atmosphere that has encouraged stable growth, an essential base for developing the advanced technologies required for Industry 4.0.

1 Trading Economics, Poland Foreign Direct Investment 1996-2019 Data, available from: <https://tradingeconomics.com/poland/foreign-direct-investment>

2 Digital Industry and Foreign Direct Investment in Poland – the entire study will be published as a part of the doctoral dissertation by Karolina Pokorska, a PhD candidate at the Wroclaw University of Economics and Business and the Director of the Business Support Centre at ARAW.

3 Ibid.

4 Ibid.



INDUSTRY 4.0 CHALLENGES

Not all the indicators were positive, however. In that same survey, many expressed concern at the rising cost of doing business in Poland as well as difficulty in finding qualified workers to confront the challenges of Industry 4.0.

These problems were complicated by the general feeling that Poland didn't have a clear strategy for encouraging research and development (R&D) into Industry 4.0 technologies. In contrast to neighbours such as Germany, considered as a leader in Industry 4.0 strategies and support, businesses weren't satisfied with the approach in Poland.

National policymakers started to respond to the situation with new programmes, such as 2019's Innovation Box, which provides tax incentives for R&D investments into advanced technologies.

Even before this national response, however, individual regions and cities were beginning to think about how best to encourage the development of Industry 4.0 closer to home.

INDUSTRY 4.0 IN WROCLAW

Wroclaw has benefited more than most cities from Poland's economic boom. The city often tops the list of economic areas receiving the most FDI. Its central location doesn't hurt. Five national capitals – Berlin, Vienna, Prague, Bratislava and Warsaw – are all within a few hours' drive from Wroclaw.

Over 78%

of the surveyed production companies referred to the proximity to their key clients as one of the essential factors in the decision to invest in Lower Silesia⁵.

The same is true for the Lower Silesian region as a whole. **According to Eurostat data⁶**, it's consistently had one of the highest GDP per capita in Poland for the last decade.

The cited study on digital industry and FDI investment demonstrates that the investors' overall assessment of the region is positive⁷.

89%

of the surveyed production companies saw their decision to invest in Lower Silesia as "very good" or "excellent"⁸.

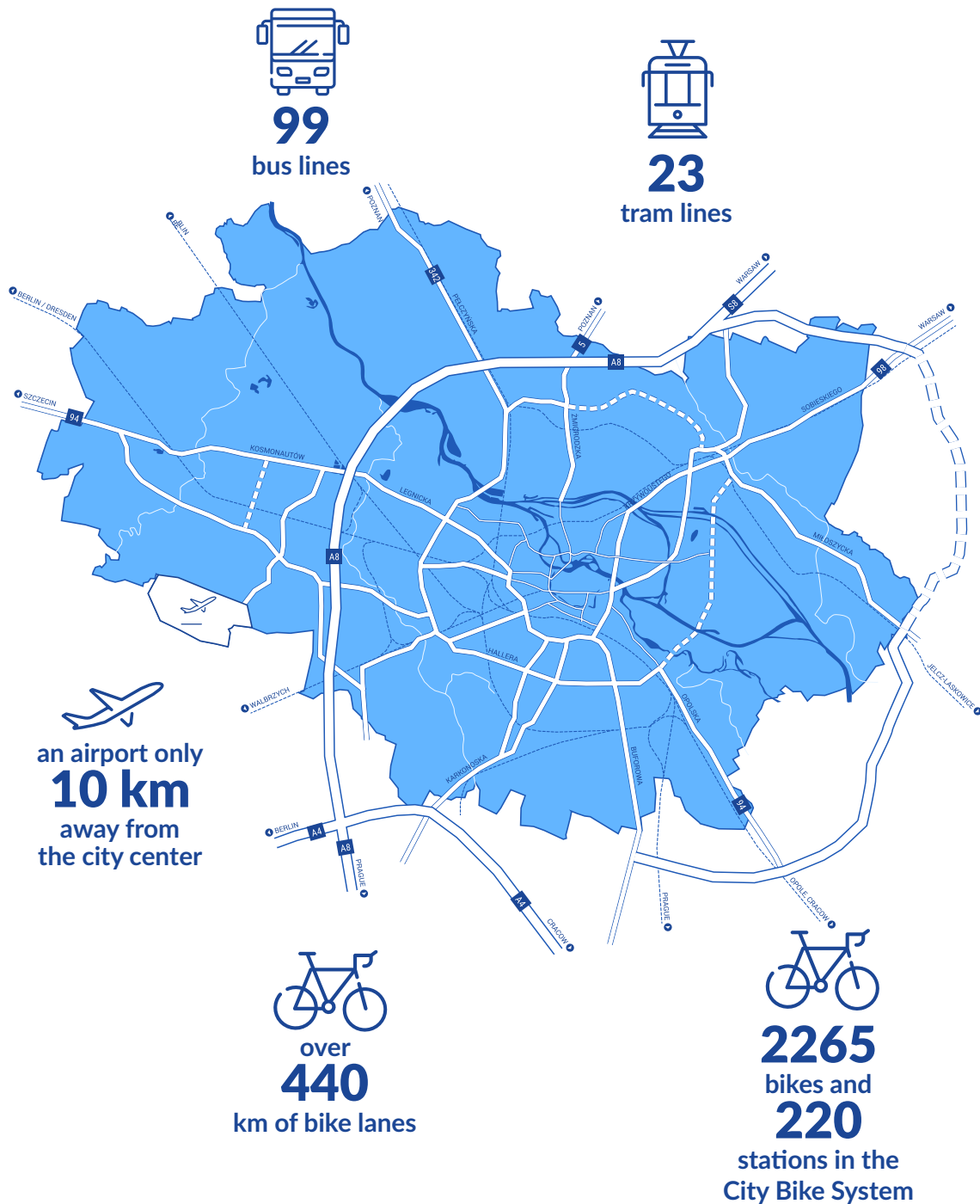
Key infrastructure investments have also helped. Motorways, railways and an airport make the city even more accessible. Trams, buses and bike lanes make it much easier to live, work, and travel around Wroclaw.

5 Ibid.

6 Eurostat, *Gross domestic product (GDP) at current market prices by NUTS 2 region*. Available from: https://ec.europa.eu/eurostat/databrowser/view/NAMA_10R_2GDP_custom_196242/default/table?lang=en

7 Digital Industry and Foreign Direct Investment in Poland – the entire study will be published as a part of the doctoral dissertation by Karolina Pokorska, a PhD candidate at the Wroclaw University of Economics and Business and the Director of the Business Support Centre at ARAW.

8 Ibid.



SOURCE: THE MUNICIPALITY OF WROCLAW

But just as for Poland as a whole, such pillars are necessary but not sufficient for encouraging investment in high-tech industries.

To improve the situation, policies and programmes in Wrocław have focused on the two main challenges facing businesses: reducing the cost of doing business and hiring highly skilled workers.

HIGHER EDUCATION IN WROCLAW

Over 112,000 students attend 27 higher education institutions in Wroclaw each year⁹. Most of them seem to be aware of the international business challenges that await them.

Around 50,000 of these students are working towards diplomas in engineering, IT and related fields. Over 95% declare a solid command of English, and about 50% say the same of their German language skills. Thousands of international students add to this pool of linguistic talent.



27 HE institutions



112,000 students



44,500 STEM students¹⁰

The kinds of projects and laboratories students are taking part in indicate an awareness of Industry 4.0 trends. The Wroclaw University of Science and Technology, **the largest and one of the top three technical¹¹** universities in Poland, recently announced the creation of the Lower Silesian Centre for Digitisation and Industry 4.0, a joint public-private venture.

The students and faculty at the University of Wroclaw have produced several products based on innovative automation technologies. For instance, one of the systems developed by scientists at the University of Wroclaw can automatically send flood warnings thanks to specially developed algorithms and measuring stations. Another project – a crewless rescue vehicle – uses a drone equipped with sensors and artificial intelligence (AI) algorithms to help find missing persons in sparsely-populated areas.

Looking at a list of recent thesis topics at the Wroclaw University of Economics and Business, you also get the idea that Industry 4.0 topics are on students' minds, for example, *The role of Big Data in society and for modern business models; Industry 4.0 in practice at Mercedes Benz Manufacturing Poland; Innovation and Industry 4.0 in EU countries—a comparative analysis.*

⁹ ARAW, WROCLAW. DRIVEN BY KNOWLEDGE PEOPLE & INNOVATION, 2020. Available from: <https://invest-in-wroclaw.pl/en/>

¹⁰ Ibid.

¹¹ Perspektywy Foundation, University Ranking - Universities of Technology 2020, available from: <http://ranking.perspektywy.org/2020/>

The labour market in Wrocław is eager for those students to enter the workforce. **The unemployment rate before the pandemic hovered around 2%¹².**

This fact could be part of the reason the city sees more new hires in the tech sector than the European average. It could also be why so many students want to come. With so many career opportunities, it's no surprise a survey found that 88% of Wrocław's students would recommend studying there to a friend¹³.

BUSINESS IN WROCLAW

Business in Wrocław and the whole Lower Silesia region is notable for its diversity.

A perfect illustration of this for Industry 4.0: Wrocław is home to both industrial robot manufacturers and consulting firms specialising in the software to run them.

This is just one example. Businesses in Wrocław and Lower Silesia cover a wide spectrum. This means a large number of possible contributors to Industry 4.0 and just as many companies that stand to directly benefit from improved methods and technologies.



Almost 52,000

employees work in the Wrocław IT and business service sectors¹⁴.



340,000+

employees work in manufacturing in Lower Silesia across fields such as aerospace, chemical engineering, electronics and more¹⁵.

12 According to the Statistical Office in Wrocław, Socio-economic situation in 2019, available from: <https://wroclaw.stat.gov.pl/infografiki/infografiki/infografika-o-miescie-wroclawiu-i-iv-kwartal-2019-r-,30,8.html>

13 BEELINE Research & Consulting – 2015.

14 ABSL, *Business Services Sector in Poland 2020*. Available from: <https://shop-absl.pl/Business-Services-Sector-in-Poland-2020-p74>

15 Ibid.

SSC/GBS: HR, F&A, Admin

3M / US
 Amrest / PL
 AXA XL / US
 Axiom Law / US
 Becton Dickinson / US
 BNY Mellon / US
 Credit Suisse / CH
 Deichmann / DE
 Delaval / SE
 EY GDS / UK
 Fortum / FI
 Fresenius Kabi / DE
 Fresenius Medical Care / DE
 Getsix Holding / DE
 Google / US
 HPE / US
 HP Inc. / US
 Kaufland / DE
 Mahle / DE
 Merck / DE
 Olympus / JP
 Qiagen / DE
 Parker Hannifin / US
 Pattonair / US
 PPG / US
 Santander Global Operations / ES
 Schaeffler / DE
 Smith+Nephew / UK
 SSAB / SE
 Toyota / JP
 UBS / CH
 UPS / US
 Volvo / SE
 ZF / DE

KPO

Allianz / DE
 BNY Science / US
 Crisil Irevna / IN
 EY GDS / UK
 McKinsey / US

BPO

Contract Administration / GB/PL
 CSS Corp / US
 DXC / US
 Impel Business Solutions / PL
 Xylem / US

Contact center/ Debt Collection

ACN / US
 CCIG / PL
 Intrum / SE
 KRDL / PL
 Kruk SA / PL
 Lindorff / NO
 Pyszne.pl / PL
 Qatar Airways / QA
 Santander Consumer Bank / ES
 Ultimo / PL

R&D IT

CD Projekt Red / PL
 Diehl Controls / DE
 Dolby / US
 Etteplan / FI
 Gigaset / DE
 GlobalLogic / US
 LiveChat / PL
 Neurosoft / PL
 Nokia / FI
 Opera Software ASA / NO
 DataWalk / PL
 Optiva / CA
 Red Embedded Group / UK
 Ryanair Travel Labs / IE
 S3 / IE
 Techland / PL
 UNIT4 / NL
 Viessmann / DE

IT services

Accenture / US
 Alfa-Net / PL
 Altimi Solutions / PL
 Aptitude Software / UK
 Atos / FR
 AxiomSL / US
 Birlasoft / IN
 InfiniIT Codelab / PL
 BTech / PL
 Capgemini / FR
 Ciklum / DK
 Clearcode / PL
 Code Poets / PL
 Cogniance / US
 Comarch / PL
 CrazyCall / PL
 Criteriamx / AT

CSS Corp / IN
 DataArt / US
 Divante / PL
 Duco / US
 Epam Systems / US/BY
 Epiq Systems / US
 FrameLogic / PL
 Gorilla Group / US
 HCL / IN
 Hicron / PL
 IBM / US
 Infor / US
 Infosys / IN
 Infusion / US
 InsERT / PL
 Intive / PL
 IT Kontrakt / PL
 Luxoft / CH
 Mphasis / US/IN
 NBC / PL
 NeuroSYS / PL
 Objectivity / US
 Ocado / UK
 OpsTalent / UK
 QAD / US
 Quality Task Force / CH
 PGS Software / PL
 RST / PL
 Ryanair Travel Labs / IE
 Sente / PL
 SI Consulting / PL
 Sii / FR
 S3 Group / IE
 Softserve / UA
 Spyrosoft / PL
 Sygnity / PL
 Talex / PL
 Thaumatec / PL
 Tieto / FI
 Tigerspike / UK
 ToopLoox / PL
 Transition Technologies / PL
 Unic / CH
 Unity Group / PL
 VM.PL / PL
 Volvo IT / SE

Selected Wroclaw Startups

Ada
 Bioavlee
 Bioceltix
 Biotts
 Blebox
 Brand24
 byteLAKE
 BZB UAS
 Carly
 ChallengeRocket
 Cryptomage
 Datarino
 Drivebox
 Droids on Roids
 Drying Process
 Encedo
 Explain Everything
 Flash Robotics
 Funmedia
 Genomtec
 Giant Lazer
 Identt
 Infermedica
 Kadromierz
 Laparo
 LeoRover
 Liga Niezwykłych Umystów
 Look4App
 Meeting Application
 Monterail
 Nestmedic
 Piwik PRO
 Proa Technology
 ProxiGroup
 Pure Biologics
 QNA Technology
 Sat Revolution
 Saule Technologies
 Scanway
 SensDX
 Smabblers
 Syntoil
 TestArmy
 TimeCamp
 Tooploox
 VR Global
 Woodpecker
 Zeccer
 Zmorph
 zrzutka.pl

This diversity of industry also offers new possibilities for workers and for those looking to invest.

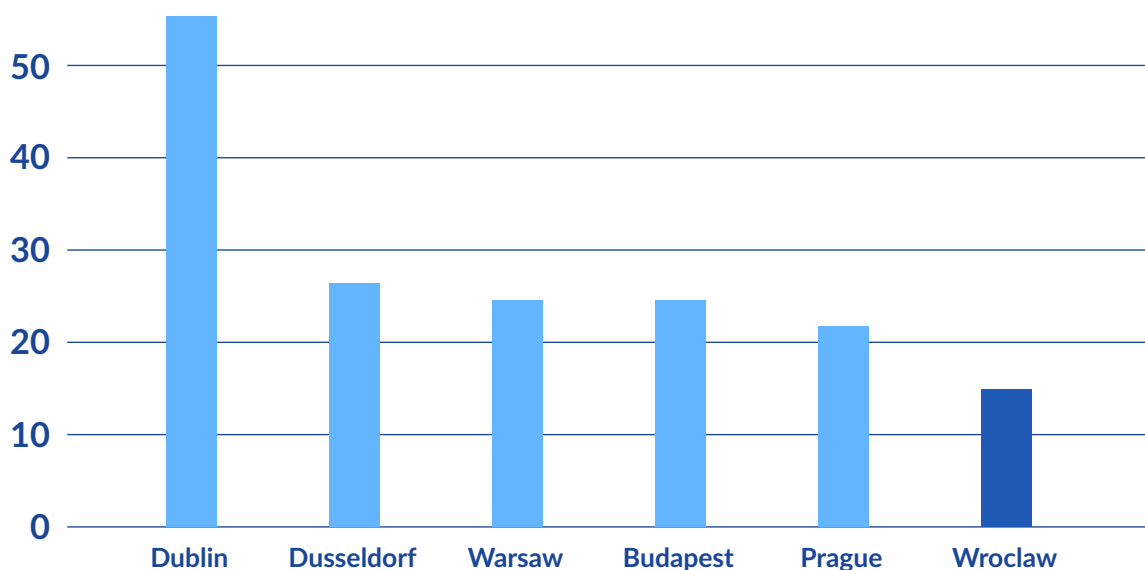
There are many programmes in place to encourage more investment at both the regional and city level. Programmes such as Invest in Wroclaw, Startup Wroclaw and the Lower Silesian Agency of Economic Cooperation help businesses with everything from recruiting top talent to finding the best financing and tax conditions. **Chapter 5** includes more practical information on how to launch an investment in Wroclaw.

64%

of the surveyed production companies mentioned public investment incentives as one of the essential factors in the decision to invest in Lower Silesia¹⁶.

The city has also worked to maintain a healthy office and warehouse market. Both vacancy rates and prices per square metre have remained healthy and competitive for years, especially in comparison with markets in nearby countries.

PRIME RENT FOR OFFICE SPACE IN € PER SQM MONTHLY



SOURCE: CBRE | ADVISORY & TRANSACTION SERVICES | INDUSTRIAL & LOGISTICS

The commercial real estate sector will see even more changes than other parts of the economy after the pandemic. Still, the availability of affordable office and warehouse space will remain important.

Other programmes and policies try to ensure the workforce is qualified and happy. Apart from the large higher education system mentioned above, many continuing education programmes and associations are active in the city, such as Study in Wroclaw ([study-in-wroclaw.pl](https://www.study-in-wroclaw.pl)).

¹⁶ Digital Industry and Foreign Direct Investment in Poland – the entire study will be published as a part of the doctoral dissertation by Karolina Pokorska, a PhD candidate at the Wroclaw University of Economics and Business and the Director of the Business Support Centre at ARAW.

There are also initiatives that focus on making Wrocław an even better place to live and work. Examples of such activities include adding green spaces, making it easier to get around the city and provide better access to health care – all goals of **Wrocław's strategy for 2030**¹⁷ backed by the city and the EU funding for projects.

Many data points show that these efforts are bearing fruit. The metropolitan area of Wrocław is growing, with now over 2 million people living within an hour's drive. Foreigners are also entering the local job market, with almost **61,000**¹⁸ of them registered in the state social insurance (ZUS) system.

More importantly, businesses are taking advantage of the improvements. **A 2019 survey**¹⁹ showed that 82% of large IT corporations in Wrocław chose the city because of the access it gave to qualified workers. In the case of international production companies, this rate can reach even higher. All respondents in the digital industry study pointed to the availability of skilled labour as a crucial factor behind their decision to launch an investment in Lower Silesia²⁰.

Combined with a large and diverse manufacturing workforce, the pieces start to fall in place. Innovators already present in Wrocław are taking advantage of the pool of talent in Wrocław. The consistent growth of investment and job opportunities in the region means that even more innovative firms are expected to set up business here. What's also important is that **Wrocław is the second largest startup hub in Poland**²¹ and has the **highest concentration of tech entrepreneurs in the country**²².

THE PANDEMIC FACTOR

In many ways, Wrocław is playing catch-up with European Industry 4.0 leaders. But the city also offers many unique advantages for investors and entrepreneurs.

All the essentials are in place for Lower Silesia and its economic capital Wrocław to become leaders in Industry 4.0 in Poland and Europe.

17 Urząd Miasta Wrocławia (The City Council of Wrocław), Strategia Wrocławia 2030, available from: <https://www.wroclaw.pl/rozmawia/strategia-wroclaw-2030> (only in Polish)

18 Wrocław.pl, Foreigners choose Wrocław – they work and study, available from: <https://www.wroclaw.pl/en/foreigners-choose-wroclaw-they-work-and-study>

19 ARAW, Wrocław IT sector – 2019 Report, available from: https://www.wroclaw.pl/biznes/files/Raport_IT_ENG_web.pdf?utm_campaign=wroclaw-startup-button-en&utm_source=wroclaw-en-startup&utm_medium=pdf

20 Digital Industry and Foreign Direct Investment in Poland – the entire study will be published as a part of the doctoral dissertation by Karolina Pokorska, a PhD candidate at the Wrocław University of Economics and Business and the Director of the Business Support Centre at ARAW.

21 Startup Poland, Polish Startups 2018 Report. Available from: <https://www.home.startuppoland.org/>

22 Startup Poland, The Polish Tech Scene. Available from: <https://www.home.startuppoland.org/>

It's important to remember that all the strengths and fundamentals listed above still provide Wrocław with a competitive advantage. The pandemic has changed a lot, however – and these changes will be the focus of the next chapter.



CHAPTER 4:

HOW HAS THE COVID-19 CHANGED THE RULES OF THE GAME IN WROCLAW?

The previous chapters have already mentioned the effects the outbreak of the pandemic has had on manufacturers around the world.

So how have these tendencies affected the Industry 4.0 scene in Wroclaw and its members? What challenges did they encounter, and how did they respond to them? And how are they preparing for potential crises of similar scale and gravity?

In September 2020, twelve Industry 4.0 players shared their views on the impact of Covid-19 on running a business in Wroclaw – both on an individual and collective level.

Here is what they said about the state of the local Industry 4.0 scene– accompanied by commentaries from leading industry experts.

INDUSTRY 4.0 IN WROCLAW BEFORE THE PANDEMIC

With only one exception, all organisations rated their pre-pandemic situation as stable and good or very good.

THE SITUATION BEFORE THE PANDEMIC AS VIEWED BY THE STUDY PARTICIPANTS



Steady growth & development

The majority of respondents were actively recruiting new employees. They were planning to expand their office space and were working on improving their operational processes.



Increasing sales potential

Despite an already favourable situation, all respondents saw the potential for increasing their sales even further and were working on new products and services.



Investing in Industry 4.0 technologies

Technologies and solutions that were most invested in before the pandemic included remote monitoring, predictive maintenance, smart automation, MES systems, and tools powered by big data.

Yet, when assessing the level of digital maturity of Industry 4.0 in Poland, IT companies admitted that the complexity of projects often diverges from the solutions delivered to clients abroad.

AMONG THE REASONS FOR THIS SITUATION, THEY MOSTLY REFERRED TO THE THREE ISSUES



A lower level of industrialisation in Poland than abroad

This aspect surfaced in all interviews with companies focused on serving Industry 4.0 clients e.g. in the DACH region.



A relatively low level of awareness of Industry 4.0 benefits

Developers working with production plants in Poland often felt their clients weren't aware of all possibilities and benefits of digital solutions.



A low level of awareness of solutions developed locally

Respondents found that local players often don't know that solutions used by top global manufacturers come from R&D centres based in Wroclaw.

“What first drew my attention was the lack of information exchange between technology providers based in Wrocław and manufacturers that could use their solutions. These findings prove that there is a great potential for technology companies specialised in Industry 4.0 but also for the City of Wrocław to animate such collaboration.

The study is in line with media reports and my observations on the dynamic development of the production industry. I think this situation can give grounds for the effect of information silos. When the market is booming, everyday constraints often become the main point of focus for management. The slowdown may direct the attention of manufacturers to IT solutions and contribute to their faster adoption.”



Rafał Pisz

Board Member at ITCorner – a Lower Silesian cluster of IT companies, CEO of QuantUp, and a member of the supervisory board of DB Energy S.A. Creator of the R&D centre behind the first SaaS solution for supply chain management (now part of Siemens Digital Logistics).

THE CHALLENGES OF THE PANDEMIC FOR INDUSTRY 4.0 IN WROCLAW

The first case of SARS-CoV-2 in Poland was confirmed at the beginning of March 2020. Soon afterwards, the Polish government started introducing lockdown restrictions across the entire country.

Among the most important challenges related to the pandemic outbreak and subsequent restrictions, the study respondents mentioned:



A heightened sense of uncertainty

All the participants admitted having experienced higher levels of uncertainty regarding the potential development of the pandemic and its after-effects. Some of them also complained about the excessive politicisation of the issue. In their opinion, this approach further exacerbated the state of chaos.



Cash flow fluctuations

All respondents mentioned temporary cash flow challenges during the pandemic. They managed to overcome them thanks to their previous savings, obtaining grants from institutions such as the **NCBR**¹, but also upselling and acquiring new clients. Only one company said that the pandemic directly threatened its existence – but they survived the crisis thanks to public support (**Tarcza Antykryzysowa**²).



Legal challenges

Remote business operations were not yet formally regulated by Polish labour law. Lack of clarity about health and safety regulations for remote workers was challenging, especially, for the participants in the SSC segment.



Switch to remote work

Almost all respondents had to move to remote work quickly. Distributed teams had to work on finding effective ways of communication using collaboration tools.

THE LACK OF PHYSICAL CONTACT

All participants identified the lack of physical contact as a critical challenge. This change had a different meaning for each segment:

- **For manufacturers**, it immediately brought production to an almost complete halt.
- **For software development companies and business process centres**, lockdown brought the need to switch to 100% remote work. All participants saw this step as challenging, yet accomplished successfully and eventually leading to increased productivity.
- **For companies specialised in embedded software and hardware**, it put an end to contact with the client, significantly decreasing sales and the pace of project implementation.

DIFFERING IMPACT OF THE PANDEMIC ON SOFTWARE COMPANIES

- **Companies specialised in software solutions** observed an increased interest in their services.
- **Companies specialised in embedded software and hardware** indirectly experienced problems encountered by their clients. All respondents from this segment mentioned: contract re-negotiations, lowering rates, project delays and cancellations, and extending payment dates. Their usual sales channels were suspended, so the participants from this segment turned to online sales and marketing.

¹ NCBR stands for Narodowe Centrum Badań i Rozwoju (National Centre for Research and Development). As a publicly-funded agency, NCBR supports the development of Polish R&D projects. More on the website: <https://www.ncbr.gov.pl/>.

² Tarcza Antykryzysowa was a set of publicly-funded support solutions for business affected by the pandemic: <https://www.gov.pl/web/tarczaantykryzysowa/wyszukaj-wsparcie-dla-swojej-firmy>

THE MOST SIGNIFICANT CHANGES BROUGHT ABOUT BY THE PANDEMIC

PERMANENT TRANSITION TO REMOTE WORK

All surveyed organisations switched to remote work in a short period of time, but their offices remained open. The teams managing production plants also went into home office (HO) mode.

This smooth transition was possible thanks to the prior presence of remote working tools. The crisis reaffirmed the belief that investing in digital transformation was the right decision. In September, all companies were allowing their employees to choose from where they want to work and the most popular model combines HO with an irregular office presence. The office is on average used by approx. 10-20% of employees.

“For many companies, the outbreak of the pandemic has been an accelerator to take decisions about digital transformation. Although the majority of large companies in the service industry had not tested remote work on such a scale, facing the lockdown restrictions, they switched to it smoothly.

This forced experiment demonstrated that the previous model of working only from the office could no longer be the case in the post-Covid reality. That’s why the shift to working from home 2-3 days a week and reduced demand for office space will become the new norm.”



Maciej Borkowski

Vice-President of The Association of Business Service Leaders (ABSL), Head of the Wrocław Chapter and nationwide IT club, expert in building and managing complex business operations within the manufacturing, finance and banking services.




NEW APPROACHES TO WORKSPACE

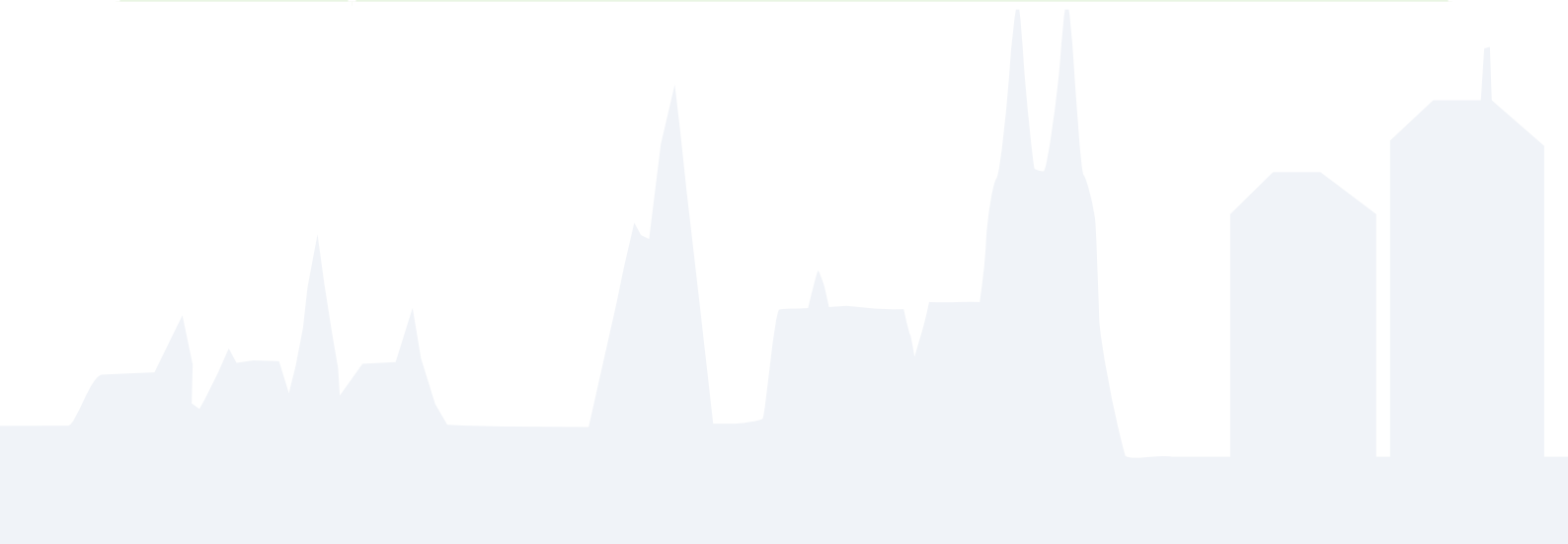
Changes in work mode affected the space of offices and production plants. Almost all participants said that despite previous plans to increase their workspace, they now plan to use it more effectively or even reduce it.

OFFICES	PRODUCTION PLANTS
<p>Most software companies encourage employees to keep working in a hybrid model – combining work from home and office. With fewer people in the office, respondents now plan to reorganise the space: create hot desk sections for their employees and potentially sublet some of its rooms.</p> <p>One of the companies has already implemented a mobile application for booking desks, thanks to which it controls the number of people in the office.</p>	<p>Manufacturers mentioned limiting access to or even closing social areas in their plants.</p> <p>They also shared plans to further reduce the amount of potential social interactions by investing in automation and digital solutions supporting remote manufacturing operations.</p>

SEARCHING FOR SAVINGS

The pandemic outbreak forced companies to cut unnecessary spending.

	<p>The first to go were the costs associated with business trips, training, and additional office services (e.g. catering). Companies also sold non-essential assets and tried to re-negotiate their office lease contracts.</p>
	<p>Several participants admitted planning to cut down investments in new initiatives or additional assets to save cash needed to tackle another wave of lockdown.</p>
	<p>Only one company temporarily reduced their employees' salaries - but the difference has already been reimbursed. At one production site, management cut their salaries by 20% for a few months but did not want to cut the team's salary. Some companies mentioned that in September they were already handling promotions and annual pay rises as usual.</p>



CHANGES IN EMPLOYMENT – FROM TEMPORARY REDUCTIONS TO RECRUITMENT IN FULL SWING

MANUFACTURING	IT COMPANIES
<p>Production plants started mass layoffs as early as April. All these reductions were agreed on with trade unions as part of voluntary layoff plans.</p> <p>Both blue and white-collar workers were losing their jobs – with staff reductions touching even 20-30% of team members.</p> <p>After a period of slowdown, manufacturers returned to rebuilding the team.</p>	<p>On the contrary, several participants used this moment to recruit specialists released by less fortunate companies.</p> <p>One of the surveyed companies succeeded to hire long-sought data scientists and a few non-technical experts.</p> <p>Recruitment was continuous and at some point, it even increased due to new projects coming in.</p>

SUPPORT FOR THE INDUSTRY 4.0 SECTOR DURING THE PANDEMIC

Most participants learned about the forms of support from their accounting and legal offices but also industry organisations. The tendencies that were surfacing repeatedly included:



Forms of support used by the participants

The national level of support mentioned by the participants mostly concerned the right to defer or cancel social security contributions. Manufacturers also benefited from the furlough scheme and related subsidies.

In terms of the local forms of support, participants mostly used real estate tax reliefs, rent reductions, and more flexible forms of payment.



IT companies didn't use funding options

Except for one company, all the interviewed IT companies did not apply for state funding. They did not meet the required conditions but also didn't feel entitled to ask for help when it wasn't necessary.

Some participants additionally expressed their reluctance to accept this form of support for ideological and brand image reasons.





Comparing support in Poland with help available abroad

Working in an international environment, participants compared the support available in Poland with that received by their offices in other countries.

They often referred to the German Kurzarbeit as a benchmark of support they would like to see in Poland. In this light, they expressed their disappointment with the help available to Polish businesses and stated that it was overly conditional and remitted too late.



Satisfied with how they handled the crisis

Apart from one exception, all participants expressed their satisfaction with how their organisations handled the crisis, especially considering that they didn't use all forms of support available.

“Almost all interviewed organisations see their current condition as stable or even positive, so the picture emerging from this study differs from similar surveys in other regions of Poland.

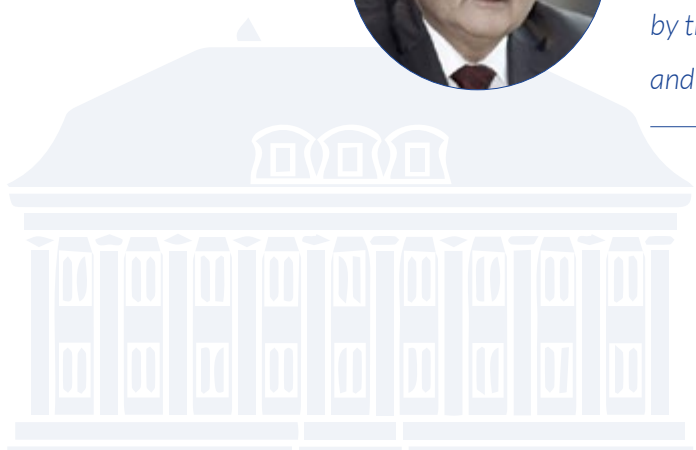
One of the reasons for this situation may be that many activities of companies in Wroclaw have already related to the sector of new technologies.

The Wroclaw Agglomeration became one of the first regions in Poland to start actively promoting Industry 4.0 solutions. The city hosted a series of conferences on the manufacturing of the future and has supported a number of initiatives in this area. This factor has undoubtedly contributed to creating better coping strategies in times of crisis.”



Andrzej Soldaty

Expert in industry automation, business leader, and the President of the Future Industry Platform Foundation, a public body founded by the Minister of Entrepreneurship and Technology to promote, build and manage the community of Industry 4.0 companies in Poland.



NEW OPPORTUNITIES FOR INDUSTRY 4.0 PLAYERS IN WROCLAW

In September 2020, all interviewed organisations saw their situation as stable and under control.

Most of them expressed the belief that their future lies in digital transformation and that so far investments in this area have been the right decision. Instead of questioning the sense of digitisation, the pandemic has directed the attention of manufacturers to which processes to automate and in which order.

THE MOST FREQUENTLY MENTIONED OPPORTUNITIES



The growing significance of outsourcing and remote access

Software companies predict that Industry 4.0 will increasingly rely on nearshoring as well as other remote forms of access to equipment and production spaces.



Lower barrier to entry to international markets

The widespread transition to remote work means that the location of a contractor ceases to be relevant. This means that Polish developers can now enter more attractive markets more easily – but it will also bring an influx of competitors based in cheaper locations.



Increased interest in specific tools and technologies

Apart from tools supporting remote collaboration, Learning Management Systems (LMS), participants also mentioned an increased interest their clients showed in AR/VR/mixed reality, Digital Twins, remote monitoring, predictive maintenance and AI-powered automation.

“The study has shown that many Industry 4.0 elements had already been in play before the outbreak of the pandemic.

The lockdown posed many challenges for the sector but also indicated new opportunities and the need for changes, which certainly accelerated the technological development of companies in Wroclaw.

Previously postponed investments – for instance due to economic reasons or lack of awareness – in the face of new challenges brought about by the crisis turned out to be necessary here and now.”



Dr Magdalena Okulowska

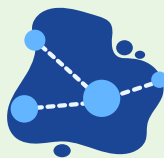
President of the Wroclaw Agglomeration Development Agency (ARAW) - a business support institution established in 2005 by the City of Wroclaw and 29 other municipalities.

TO SEIZE THESE NEW OPPORTUNITIES, THE STUDY PARTICIPANTS MENTIONED THE NEED FOR:



Public funding for R&D projects & smart automation in Polish production companies

This step was indicated as necessary to increase their competitiveness against manufacturers located in other countries.



Creation of networking programmes linking software companies with manufacturers

Almost all participants said that they would like to see more matchmaking initiatives as those carried out by GovTech, MIT Enterprise Forum, WCTT (Wroclaw Centre of Technology Transfer) and EEN (European Enterprise Network).



Improved access to vocational and engineering training in the technical field

All participants - from both software and production companies – underscored the significance of aligning the curriculum of technical training to the needs of the business. They also highlighted the need to attract more students to STEM courses.



Building and promoting local know-how

Almost all participants mentioned the need to raise awareness among Polish manufacturers about Industry 4.0 solutions developed by software companies located in Wroclaw. It became evident that production managers often miss the knowledge that is already available in the region and instead seek help abroad.

“Many of the matchmaking activities suggested by the participants had already started taking place in Wrocław before the pandemic.

When it comes to strengthening the bond between business and academia, the Wrocław University of Science and Technology has been taking an active stance. For instance, it created the Lower Silesian Centre for Digitisation and Industry 4.0 – a consortium bringing together local universities, enterprises, chambers of commerce and associations.

*Our team is also in charge of **DIH Level 4.0**³, a project funded by the Ministry of Development to support the digital transformation of Polish enterprises.”*



Prof. Edward Chlebus

Head of the CAMT Centre of Excellence at the Wrocław University of Science and Technology and since 2008, also leading the Fraunhofer CAMT-FPC Research Centre. Founder of the Lower Silesian Park of Innovation and Science (DPIN), and the winner of multiple awards for outstanding scientific achievements.

FURTHER DEVELOPMENT OF THE INDUSTRY 4.0 SECTOR IN WROCLAW

All participants spoke highly of the potential of Wrocław as a city open to Industry 4.0 and technological innovation.

A number of them also mentioned the strong brand of Wrocław on the map of European tech hubs, expressing the opinion that the pandemic hasn't changed that.

3 The website of the Level 4.0 project: <https://www.level4dih.pl/>.

KEY ADVANTAGES OF WROCLAW APPRECIATED BY THE PARTICIPANTS:

- a highly educated workforce;
- a large number of IT companies with experience in diverse business domains;
- increasing know-how of the region and flow of specialist knowledge;
- a growing number of international investments acquired by the city – especially in the area of R&D;
- increasing specialisation and productisation of IT companies based in Wroclaw.

They also positively assessed activities and initiatives developed by public bodies like ARAW and tech industry associations.

KEY DISADVANTAGES OF WROCLAW MENTIONED BY THE PARTICIPANTS:

- increasing competition for employees – mostly due to the influx of international investment;
- inefficient communication of Industry 4.0 solutions created and implemented in Wroclaw;
- low level of awareness of the value and complexity of solutions developed locally;
- lack of a more vibrant community of organisations operating within the Industry 4.0 sector.

THE MOST IMPORTANT ACTIVITIES SUPPORTING THE DEVELOPMENT OF INDUSTRY 4.0 IN WROCLAW SHOULD INCLUDE:



Improving immigration policy and procedures

Study participants would like to see streamlining immigration and visa processes to facilitate hiring employees from outside of the EU.



Building the brand of Wroclaw as a city specialised in Industry 4.0

The city should further invest in building visibility in the Polish and international arena to attract the attention of partners and investors.



Amplifying activities connecting IT companies and manufacturers

Participants indicated the need to intensify networking sessions, study visits, business matchmaking, and other events aimed at building bonds and openness to local know-how sharing.



Developing a platform for communication and knowledge sharing

There should be a central platform connecting different agents in the Industry 4.0 sector: public entities, business, industry associations, and academia – to facilitate community building, disseminating knowledge about projects and news about potential partnerships.

“The significance of migrants entering the Industry 4.0 sector in Wrocław is paramount. There are many excellent international candidates - mostly from Ukraine and Belarus – who take part in recruitment processes in IT companies.

Considering the situation of Industry 4.0 in Wrocław, we should put more pressure on the government to make immigration and visa procedures far more flexible and efficient.

Apart from easing the entry of international specialists to the Polish labour market, another essential step should be about activities connecting the local IT sector with production companies.”



Piotr Beling

Director of Industry 4.0 – Digital Solutions at Spyrosoft, an international software company and a member of SODA – Software Development Association Poland.



CHAPTER 5:

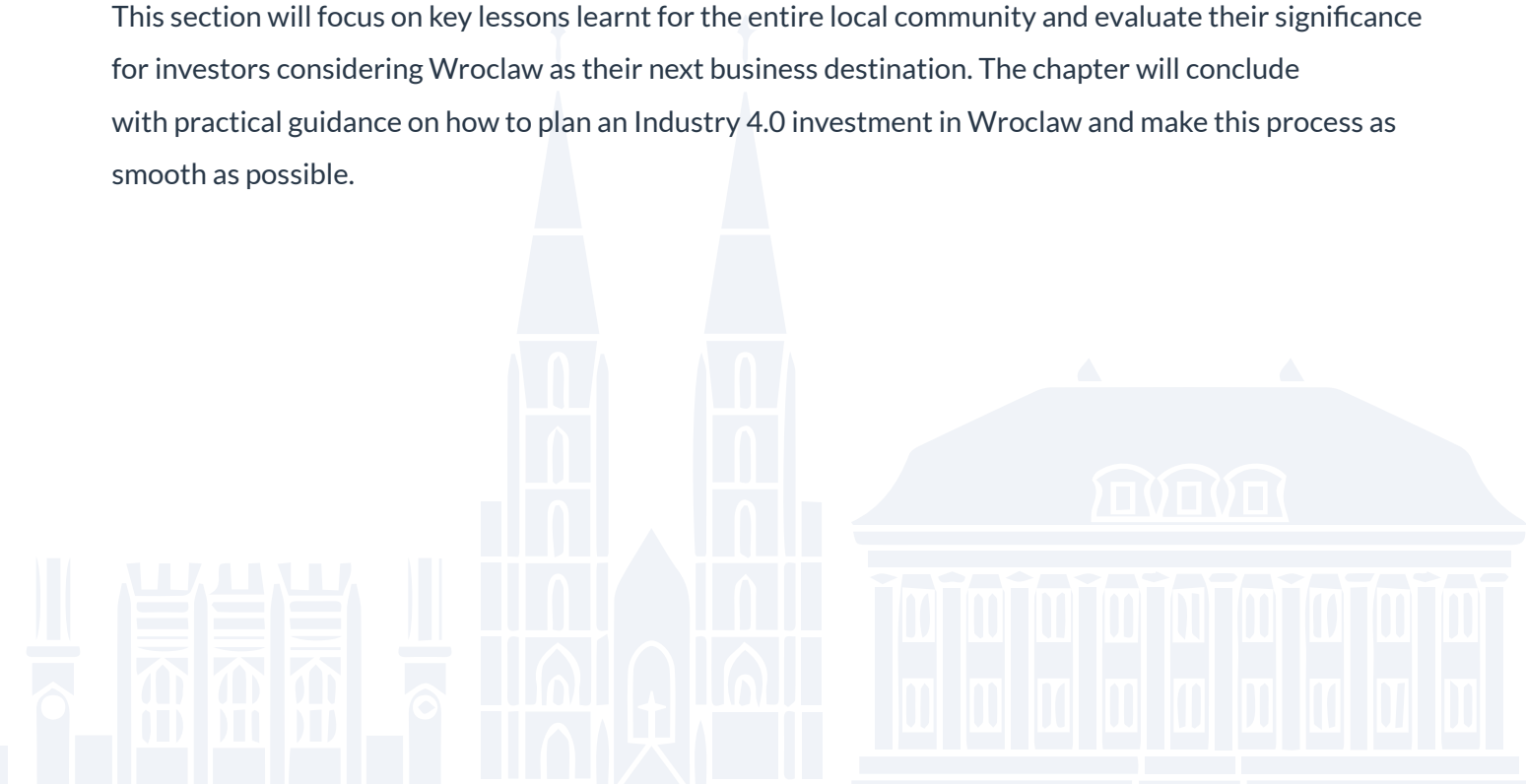
LOOKING TOWARDS THE FUTURE OF INDUSTRY 4.0 IN WROCLAW

The first wave of COVID-19 posed unprecedented challenges for the manufacturing sector. From sudden drops in demand to mass employment reductions and the need to keep social distancing, production companies across the world have been badly affected.

How did these challenges translate into plans of building resilience of the Industry 4.0 sector in Lower Silesia?

Conducted in September 2020, the study captured the situation of its participants around the time when they had overcome the difficulties of the first wave. The previous chapter mentioned some of the strategies developed on an individual level.

This section will focus on key lessons learnt for the entire local community and evaluate their significance for investors considering Wroclaw as their next business destination. The chapter will conclude with practical guidance on how to plan an Industry 4.0 investment in Wroclaw and make this process as smooth as possible.



THE COVID-19 AND INDUSTRY 4.0 IN WROCLAW: LESSONS LEARNT

While the interviewed organisations assessed their overall situation as stable, they also mentioned ideas that could benefit the entire ecosystem during the pandemic and beyond:

A platform for sharing knowledge between the city, business, and academia.

A stronger focus on initiatives reinforcing the Industry 4.0 community in Wrocław.

Encouraging more openness and collaboration between production and IT companies.

"In light of the challenges related to the flow of information and knowledge sharing, I believe that the instruments aimed at improving this situation are most important. So I would focus on building networking programmes and promoting local know-how."



Rafał Pisz

Board Member at ITCorner – a Lower Silesian cluster of IT companies, CEO of QuantUp.

While such initiatives started long before the pandemic, during the crisis, the need to intensify them became evident.

The municipality has acknowledged the urgency to address these needs. For instance, already during the lockdown ARAW started **a series of webinars**¹ dedicated to promoting local know-how and raising the awareness of Industry 4.0 solutions developed in Wrocław.

1 ARAW, Przemysł 4.0. Events information and registration available at: <https://www.wroclaw.pl/przemysl40/>



All invited speakers shared practical knowledge and examples of implementations of Industry 4.0 technologies, but they also discussed missteps on the road to innovation in manufacturing.

Despite being held 100% online, the event was attended in total by over 300 participants who also used this opportunity to network, despite the limitations of online communication tools. The series of online Industry 4.0 seminars will resume in the winter and is planned to take place regularly.

In addition, the efforts to create a platform facilitating a wider dialogue between business, academia, and the council have already been in motion. The study clearly demonstrates that such activities need to be intensified so that all ecosystem participants feel responsible for building such a platform proactively.

“Creating a platform for increased knowledge sharing and cooperation between companies is one of the first steps to unlock further development of Industry 4.0 in Wrocław. Such a platform must, of course, avoid the common trap of dividing modern services from production, because it’s their synergy that creates intelligent factories.”

Wrocław has been focusing on creating a knowledge-based economy and active cooperation between universities and business for years. This city-business-science triad has a long tradition in Wrocław, so the intensification of joint activities can bring even more new effects in a short period of time.”



Dr Magdalena Okulowska

President of the Wrocław Agglomeration Development Agency (ARAW).

Openness and the will to collaborate and share knowledge are necessary for such projects to succeed. Multiple participants of the study mentioned both these qualities as important characteristics of the city’s culture. They have also been at the heart of all activities of local tech industry clusters and associations.

Paired with the sense of shared responsibility, these qualities are crucial for the success of creating a vibrant Industry 4.0 community. Every member of the scene – be it from business, academia, or the city – should feel equally in charge of this goal.

Although the outcomes of such a platform are yet to be seen, the starting point already looks promising – both for the local Industry 4.0 agents and potential investors.

A GROWING INTEREST IN IT SOLUTIONS FOR MANUFACTURING

Restrictions related to social distancing and lockdown have helped to demonstrate the value IT solutions can bring to the manufacturing sector.

All the study interviewees had already started innovating their production processes and operations before the outbreak of the pandemic. They asserted that the crisis helped them to confirm the validity of the decision to invest in the digitisation of their business.

Moreover, they admitted that after overcoming temporary slowdown and related constraints, they would be looking to get back to full speed in their transformation projects.

“Sudden changes in the business environment must have significantly decreased the number of production and manufacturing companies “not convinced” of the need to proceed with the digitisation of their business.

Against this backdrop, it becomes evident how essential it is to develop further business support measures focused on targeting, solution engineering and competence development.”



Andrzej Soldaty

Expert in industry automation, business leader, and the President of the Future Industry Platform Foundation.

Lockdown created new challenges - and thus opened the door to the need to innovate. Interviewed production managers also confirmed that they would also be looking to expand the scope of their digitisation efforts.

This growing openness to change and innovation in manufacturing presents a huge potential for further development – and a chance for businesses and investors willing to enter this niche in Wrocław.

AVAILABILITY OF IT COMPANIES SPECIALISED IN SOLUTIONS FOR MANUFACTURING

Manufacturing and production businesses willing to innovate don't have to look far to find providers of required technological solutions.



100+
R&D and IT centres



50+
accredited labs



18
incubators

The availability of R&D facilities and diverse infrastructure facilitates developing complex research projects and creating innovative services. Wrocław research centres boast cutting edge laboratories and equipment – all operated by highly qualified specialists from across the world.

But Wrocław is not only a recognised IT and R&D hub, but also the **second-largest startup ecosystem in Poland**². According to the report by **Startup Poland**³, the city has the highest concentration of tech entrepreneurs in the country.

Local entrepreneurs develop solutions in areas such as new materials and fuels, big data and AI, but also biological and nano-technologies – to name just a few most relevant to the needs of the manufacturing sector.



18%
of all Industry 4.0 startups in Poland are located in **Wrocław**⁴.

APART FROM THAT, WROCLAW IS HOME TO:

25% of all Polish Analytics and BI startups

19% of all Robotics / Electronics startups in Poland

18% of all Polish Big Data startups

17% of all AI / Machine Learning startups in Poland

SOURCE: STARTUP POLAND

2 Startup Poland, Polish Startups 2018 Report. Available from: <https://www.home.startuppoland.org>
3 Startup Poland, The Polish Tech Scene. 5 Years. Available from: <https://www.home.startuppoland.org>
4 Ibid.

The study proved that there is still a need to improve knowledge and experience sharing between all Industry 4.0 players in Wrocław – both IT companies and production plants.

However, the will to change this situation also kept surfacing in all interviews. The pandemic slowdown has given space and inspiration for some of the participants to take action and build a community of Industry 4.0 players.

Several interviewees mentioned ITCorner – a local cluster of companies in the new technologies sector – as a benchmark for what they would like to achieve. The main objective for them would thus be to create a network of manufacturing and production companies regularly gathering and sharing information relevant to their work.

“As a representative of ITCorner, I can assure you that our cluster will support such initiatives. For many of our members, Industry 4.0 services constitute a crucial component of their offering. That’s why such a platform will be much welcomed by our entire community. It will also be an important stepping stone in the process of increasing dialogue between the municipality and local entrepreneurs.”



Rafał Pisz

Board Member at ITCorner – a Lower Silesian cluster of IT companies, CEO of QuantUp.

SHOULD YOU INVEST DESPITE THE COVID-19 CRISIS?

According to the **World Investment Report from the United Nations**⁵, the immediate impact of the pandemic on Foreign Direct Investment (FDI) will be dramatic and could have lasting consequences.

Global FDI flows are forecast to decrease by up to 40% in 2020, from their 2019 value of \$1.54 trillion. FDI is projected to decrease by a further 5–10% in 2021 and to initiate a recovery in 2022.

⁵ UNCTAD, World Investment Report 2020, available from: <https://unctad.org/webflyer/world-investment-report-2020>

So is this the right moment to invest in a new business location? The answer is, of course, yes and no.

Despite the drastic decline in global FDI flows during the crisis, the international production system will continue to play an important role in economic growth. In the longer term, the pandemic may lead companies to shift the geographic allocation of their international operations.

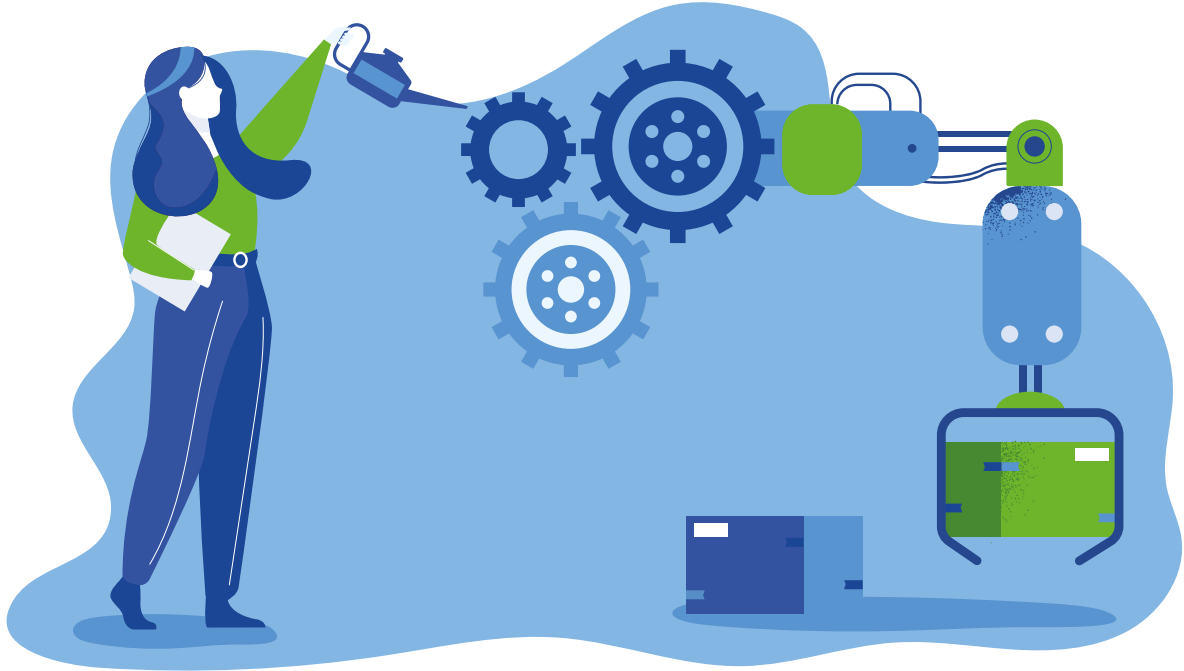
For example, multinational enterprises may review and potentially shorten their global value chains to protect themselves from potential disruptions. Alternatively, they might seek geographic diversification to reduce the risks of exposure to location-specific shocks and reduce costs to be able to deal better with crises.

This factor came up in interviews with representatives of Shared Service Centres (SSC). They admitted that the pandemic-related crisis in other locations of their parent company had increased interest in shifting even more processes to Wrocław.

So while the timing may not seem particularly conducive to invest in new locations, the slowdown can be a good moment to do it and get ahead of the competition. For businesses in the EU, expanding to cities like Wrocław helps to reduce costs while shortening the value chain – thus contributing to building a competitive advantage.

Here's how to get started on investing in Wrocław.



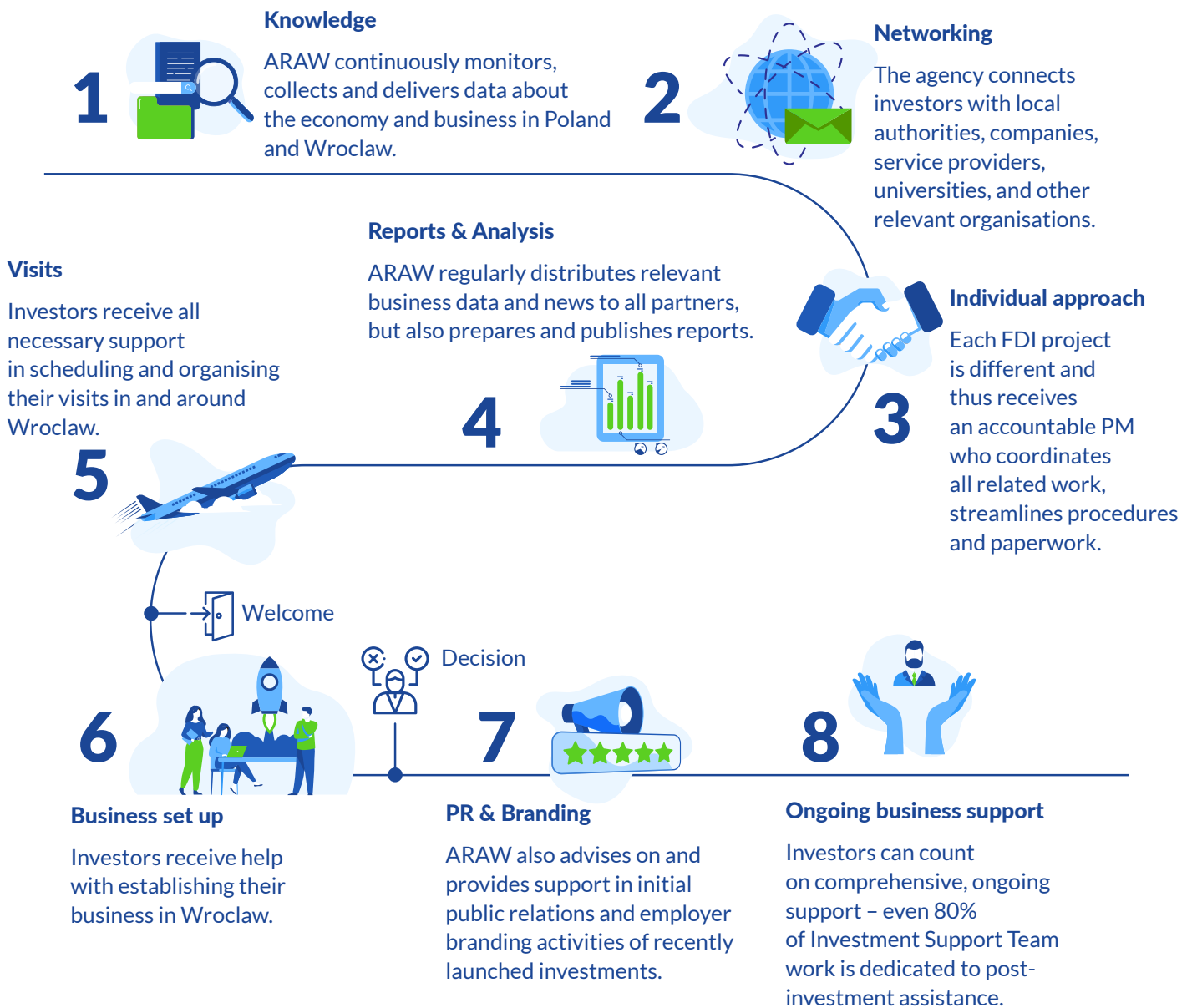


A ONE-STOP-SHOP APPROACH TO INVESTING IN WROCLAW

From taxes to finding suitable office or manufacturing space and hiring qualified staff – there are many issues investors need to account for when planning the move to a new location.

That's why the Wrocław Agglomeration Development Agency (ARAW) offers a one-stop-shop approach for all businesses interested in investing in or around the city.

ONE-STOP-SHOP APPROACH





200+

Foreign Direct Investment
Projects served by ARAW.



100,000+

jobs created thanks to these
FDI projects.



15+ years

ARAW has offered comprehensive business
support services since 2005.

LEARN MORE & GET IN TOUCH

As one of the first investment support agencies in Poland, ARAW was formed by the city of Wroclaw and 29 neighbouring municipalities to foster business growth in the region. Closely collaborating with the Polish Investment and Trade Agency (PAIH), ARAW can serve as a window to not only Wroclaw but the entire country.

Apart from comprehensive business set up support, ARAW manages an extensive range of post-investment assistance and activities. These include events, networking, study visits – many of which aim at fuelling the growth of the local Industry 4.0 scene.

The agency also actively facilitates the development of the local IT and new tech scene, helping to promote local startups, gathering relevant data, and preparing industry reports.



**Wroclaw Agglomeration Development
Agency**

Plac Solny 14, 50-062 Wroclaw

+48 71 78 353 10

office@invest-in-wroclaw.pl

invest-in-wroclaw.pl

Since the beginning, ARAW has closely collaborated with selected partners specialised in areas such as legal and tax support, HR, and real estate. Here are some of the critical issues all Industry 4.0 investors should be aware of before setting up in Wroclaw.

ABOUT THE LEGAL AND TAX LANDSCAPE IN WROCLAW

The most immediate challenges international investors in the Industry 4.0 sector face in Wroclaw stem from relative maladjustment of legislation to the scope of operations enabled by new technologies.

Legal regulations, whether at the national or even EU level, do not always keep up with changes that create new areas of legal risk. In Poland regulations concerning Industry 4.0 are still being developed at the national level.

GOOD TO KNOW

The Polish tax system consists of direct taxes - such as PIT and CIT or real estate tax - and indirect taxes - such as VAT or excise duty.

Taxes in Poland are closely related to legal regulations. These are subject to regular changes which can raise difficulties from the point of view of business operations.

That's why it is common for both Polish and international businesses to use the services of law firms combining both legal and tax expertise.

Despite these challenges, international companies can count on numerous economic incentives when investing in Wroclaw. They often take advantage of the possibility to set up a business in special economic zones, where they benefit from preferential tax rates and exemptions, as well as lowered real estate tax liabilities.

New international investments can claim income tax exemptions for a period of 10, 12, or even 15 years provided that they meet specific eligibility criteria. These mostly relate to the types of activities such businesses plan to carry out.

Apart from income tax exemption, investors often receive other forms of support, such as:

- tax relief for research and development activities,
- IP Box relief for investments in innovation,
- or a recently announced tax relief for the robotisation of enterprises in Poland.

Although enticing, implementation of such solutions in enterprises can be complicated and time-consuming – so again, having a trusted tax & legal partner is advisable.

GET IN TOUCH



Tomasz Szarek

Attorney-at-law & partner

tomasz.szarek@sdzlegal.pl

+ 48 509 475 255

SDZLEGAL SCHINDHELM

Ul. Kazimierza Wielkiego 3,

50-077 Wrocław

schindhelm.com

SDZLEGAL SCHINDHELM provides comprehensive corporate tax and legal services at a local, national, and international level – offering support at every stage of business development.

The company belongs to the international SCHINDHELM network of law companies serving international business clients in 29 locations in 14 countries.

SDZLEGAL SCHINDHELM is also a member of the International Advisory Group – a network of law and tax offices operating in 74 countries.



TAKING CARE OF THE REAL ESTATE NEEDS OF INTERNATIONAL BUSINESS

Wroclaw is effectively facilitating growth of businesses operating in the Industry 4.0 sector, housing organisations from a wide range of manufacturing and logistics businesses.

The industrial and logistics real estate market is developing dynamically to match the growing needs of business.



2.4 million sqm

modern industrial and logistics space in Lower Silesia.



220,000 sqm

space delivered in the first half of 2020 alone.



158,000 sqm

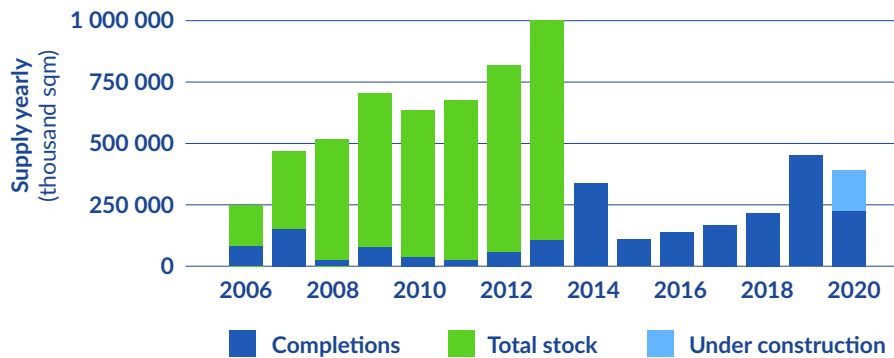
still under construction in 2020.



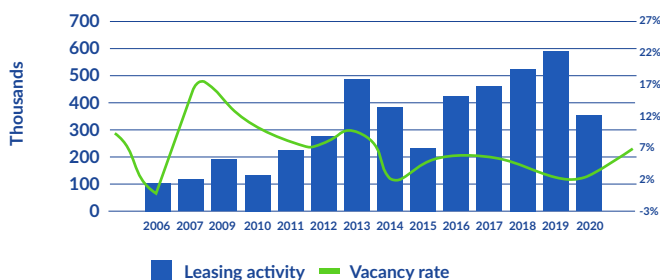
9% vacancy rate

which gives those looking for industrial space slightly more choice than in other regions.

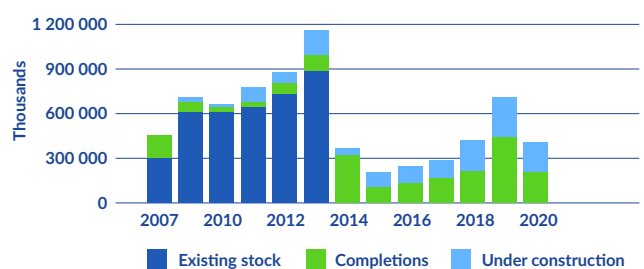
SPACE COMPLETED, UNDER CONSTRUCTION AND TOTAL MODERN SUPPLY DOLNOSLASKIE VOIVODSHIP



DOLNOSLASKIE LEASING ACTIVITY AND VACANCY RATE



DOLNOSLASKIE SUPPLY



GOOD TO KNOW

Wroclaw provides excellent conditions for businesses looking to invest in industrial properties and logistics centres.

However, despite higher availability of production and distribution sites, finding a suitable property is not always easy. To be successful, the process needs to account for local zoning regulations and constraints. It must also identify an optimal location for a given investment project that would be in line with the city's development strategy.

That is why it is essential to find a local real estate partner. CBRE offers expert advice on finding industrial properties in Wroclaw, backed by extensive experience and an international perspective.

CBRE conducts a detailed analysis and tailors each solution to the individual needs of every client. The company provides comprehensive support in areas such as location and financial analysis, market research, strategy, transaction and financing advisory services, contract negotiation, or lease transaction structuring.

GET IN TOUCH

CBRE is the world's largest commercial real estate services and investment firm and the leading full-service real estate services and investment organisation in the world.

CBRE offers a range of integrated services, including facilities, transaction and project management; property management; investment management; appraisal and valuation; property leasing; strategic consulting; property sales; mortgage services and development services.

CBRE



Dominik Łoś

Associate Director

dominik.los@cbre.com

+48 608 658 717

**CBRE | Advisory &
Transaction Services | Industrial &
Logistics – Wroclaw Regional Office**

Pegaz Building B

ul. Grabarska 1

50-079 Wroclaw

cbre.pl

HIRING TOP TALENT IN WROCLAW

Wroclaw and the entire region of Lower Silesia are attractive for foreign investors who appreciate well-educated staff, attractive labour costs, and economic incentives.

A favourable business environment brings a growing number of new investments and expands the plants operating in the region – accelerating their automation, and adding to the development of Industry 4.0.

GOOD TO KNOW

High-tech processes and increasing competition on the local job market can make finding and acquiring the right talent a real challenge. Especially amidst the pandemic, some candidates may be less open to professional changes.

That's why investors should also take into account the possible need to invest in training and building new skills in the team.

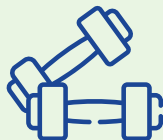
Taking care of the legal aspects of the hiring process is particularly important in Poland – and these mostly include issues such as creating a legal contract, efficient protection of personal data, and sufficient regulation of non-compete clauses.

Due to growing competition for employees, businesses in Poland try to attract candidates with a wide range of non-salary benefits.

THE MOST POPULAR FRINGE BENEFITS IN POLAND



private healthcare



gym & fitness



life insurance



professional courses

Another critical issue to bear in mind is the need to adequately match the candidate to the organisation – not only in terms of skills but also personality. These aspects can seem particularly challenging in the context of international teams.

Having a local recruitment partner is essential to shorten the time needed to find and hire staff, optimise costs, and increase the odds of a successful match. A great example comes in Michael Page, a consultancy that has served as a business partner for local companies and foreign investors – offering unique expertise and international experience.

GET IN TOUCH



Marta Kozak

Manager in Manufacturing & Supply Chain Division

martakozak@michaelpage.pl

+48 798 506 924

Michael Page Wrocław

ul. Łaciarska 4B, 50-104 Wrocław

+48 71 725 35 34

michaelpage.pl

Michael Page is a world leader in HR consulting. Founded in 1976 in London, the company now has offices in 36 countries, on 6 continents.

Michael Page Poland specialises in the recruitment of professionals in areas such as Manufacturing & Engineering, Information Technology, Property & Construction, Sales & Marketing and more.

Michael Page



