

Higher Education in Regional and City Development: Wrocław, Poland

ASSESSMENT AND RECOMMENDATIONS

Unleashing the potential of universities for Wroclaw's growth and development

Wroclaw is Poland's fourth largest city with a population of over 630 000 and 1.2 million in the metropolitan area. In less than ten years, Wroclaw has transformed itself from a declining industrial city into the economic engine of Lower Silesia. Building on its first mover advantage and business-friendly policies, Wroclaw has attracted significant amounts of mobile investments and European structural funds and now boasts a leading budget position among large Polish cities. Thanks to its focus on advanced services, Wroclaw is also leading the way from more jobs to better jobs. Key investments in the knowledge economy include Wroclaw's EIT+ Programme, a major effort to co-ordinate regional development policy for 2007-2013 in RDI, which is the largest single project in the national strategy, with a value of over a quarter of a billion Euros. Wroclaw has also invested EUR 2.5 billion in infrastructure and mobility with the aim of transforming itself into a cultural and creative knowledge hub that attracts mobile investments, talent and tourism. The city leadership is committed to utilising higher education as a key asset in Wroclaw's development. The large and fragmented higher education sector consists of 30 higher education institutions that serve more than 140 000 students and produce 20 000 graduates in public higher education institutions alone.

Wroclaw's economic development has been rapid, but not without problems. In 2005, a year after Poland's accession to the EU, the unemployment rate in the Wroclaw metro area was in double digits, with the rate of 10.9% for the city and 17.3% for the largest neighbouring district. In 2010 and 2011, the unemployment rate had stabilised at around 5% for Wroclaw, but it remained much higher for Lower Silesia (12.5% in 2011). Rapid economic growth has not remedied social and economic exclusion. The deprived inner-city areas and rural areas of Lower Silesia are affected by long-term unemployment and face mounting problems of social and economic exclusion. Other challenges include tying down global mobile investment, raising the global competitiveness of indigenous businesses, securing the future of higher education in the city and defining Wroclaw's role in the Polish national system of cities.

Many of the achievements in Wroclaw and Lower Silesia have been made possible by massive investment from the European Structural Funds. While these

European funds will continue to flow, a more strategic, innovation-oriented approach will be needed for the next programming period (starting in 2014), including better connection to the higher education system. The 2011 higher education law provides an opportunity to modernise universities and unleash their full potential for local and regional development to support Wrocław's position in the global knowledge economy.

Currently, the locally and regionally relevant activities undertaken by Wrocław's higher education institutions – including industry collaboration, skills development and entrepreneurship activities – are generally the result of city-driven or bottom-up processes and are not fully reflected in higher education policy or institutional set-up. There are gaps in important areas like lifelong learning, vocational tertiary education, work-based learning opportunities and support for small and medium-sized enterprises. This situation manifests itself in:

- A lack of strategic anchoring of local and regional development within universities and within the university “system” in Wrocław. Regionally relevant action is dependent on the commitment of individual staff members or students, and not reflected in university strategic development, curriculum development or budget allocation. The funding system provides insufficient incentives to mobilise universities and individuals for regional and city development.
- Weak legitimacy of the needs of the city of Wrocław and Lower Silesia within the universities. Wrocław's universities have not yet taken a full advantage of the changes in national higher education policies that support the third mission of universities through teaching and research. Regionally and locally relevant activities are perceived as separate from research and teaching, which remain supply-driven, rather than demand-led.
- A co-ordination deficit within universities and the lack of processes capable of reconciling the competing agendas. University governance is based on a “federal” model in which individual departments are autonomous in relation to the central administration. Despite the recent changes in national policies the university central administration has not yet developed a full capacity to exercise strategic leadership or influence horizontal areas, such as quality assurance, career development, industry collaboration and technology transfer.

- A co-ordination deficit within the higher education system and the lack of a long-term vision and inter-institutional mechanisms that can bring together different universities and competing strategic agendas. An absence of an integrated tertiary education sector with an underdeveloped postsecondary vocational sector and a lack of pathways. Joint university activity for the city/region and shared learning among universities remains informal, ad hoc and non-strategic. The vacuum has been filled by initiatives from the city administration. The coordination of information and action on the part of the various public agencies, universities and other stakeholders needs improvement.
- A weak evidence base. The system of information and data gathering about the local and regional environment, and the successes and failures of the activities by universities and intermediate agencies is limited in scope and quality. There is a lack of information and robust data in terms of skills gaps, socio-economic background of students, student progress, graduate employment, scope of work-based learning activities, industry demand for RDI, business formation and returns on public investment, which make it difficult to evaluate the outcomes of local and regional policies and institutional practices or design more effective policies.

To face these challenges, the Wroclaw community needs concerted efforts and a systematic approach to human capital and skills development as part of a broad-based, but clearly focused, regional innovation system. It needs to expand tertiary education opportunities by developing an integrated and coherent tertiary education sector and improving lifelong learning opportunities to reduce inequalities. Universities' learning programmes, RDI projects and community engagement activities should become more relevant, demand-driven and aligned with needs of the labour market, industry and existing and emerging clusters. Stronger incentives and improved governance systems are necessary to mobilise universities for local and regional development and improve their quality, productivity and international competitiveness. In order to improve regional development outcomes, evidence-based decision making needs to be strengthened within universities, as well at the national, regional and local levels.

Human capital and skills development in Wroclaw

A country or a city that wants to be globally competitive needs to have a highly

skilled workforce and an economy that can absorb it. Poland and Wroclaw have made great strides in higher education, but continue to have a low wage economy. Against a backdrop of falling demand for higher education, they must rely more on high skill employment to move up the value chain.

Poland and Wroclaw have developed a mass higher education system in the past two decades. Between the academic years 1990/1991 and 2010/11, student enrolments in Poland grew 350% from 400 000 to over 1.8 million. The enrolment rate increased from 15% to 40% among 19-29 year olds, while Poland has maintained internationally high private and public returns on investment in higher education. Higher education participation in the Wroclaw metro area has also grown rapidly; 86% of Lower Silesia's students are concentrated in the city. With 140 000 students, representing more than one-fifth of its population, Wroclaw has transformed itself into one of Poland's most attractive student cities, where every third student comes from another region in the country.

To build long-term global competitiveness, Poland and Wroclaw need to move up the value chain by offering better skills and better jobs. In comparison to developed economies, more people in Poland and Wroclaw are employed in low- and medium-skill jobs. This is partly caused by the industry structure and foreign companies that shift production activities relying on cheap and relatively unskilled labour to Poland. To change this development trajectory, Poland and Wroclaw need to increase the stock of highly-skilled labour and make greater investment in activities that yield high-skill jobs by investing in RDI and knowledge transfer. Wroclaw is already moving in this direction. Between 2008 and 2010, Wroclaw's business service jobs doubled from 5 000 to 10 000. One out of three of these jobs are in R&D, making Wroclaw a national leader in the transition from more jobs to better jobs.

The end of the "demographic bubble" will expose Poland and Wroclaw to a shortage of skilled labour at the point when knowledge-intensive companies and businesses require more talent. The student demand has already stopped growing and may even decline due to the shrinking youth population. The number of 19-year-olds will continue to decrease every year until 2020, when it is estimated to be half the peak year 2002. According to EURYDICE, by 2025 the total Polish student cohort will have declined by approximately 37% to 1.2 million students. This corresponds to a decline of almost 70 000 students, reducing the student population of Lower Silesia to 107 000 students and in Wroclaw to 88 000 students.

Falling demand will not only increase competition between universities in Poland and Wrocław, but will also offer an opportunity to improve the efficiency, quality and relevance of the sector. The fragmented higher education sector in Wrocław and Lower Silesia, which consists of 13 state universities and 17 non-public HEIs, will be under pressure. Great gains will be achieved if efficiency, quality and relevance improve in the university sector, particularly the two biggest universities – the University of Wrocław and the Wrocław University of Technology – that cater to almost half of all HE students in Wrocław. At the same time, an increasing portion of Poland’s and Wrocław’s population must be educated and trained to be able to meet the changing demand for skills.

Poland and Wrocław need to improve the education system’s efficiency by widening access to and ensuring success in tertiary education. Good quality pre-university education and developing an integrated and coherent tertiary education sector would ensure wider utilisation of skills.

A key determinant to equity in and efficiency of higher education lies in the quality of school education. Poland and Wrocław have made significant improvements in the quality of school education and learning outcomes. Between 2000 and 2009, Poland raised the performance of its “lowest-achieving students while maintaining the performance level among its highest-achieving students” in PISA. Wrocław has Poland’s best learning results at the primary education level, but comes third in lower secondary education and second in upper secondary education. As a first mover among Polish cities, Wrocław has introduced special scholarships for math and science students and included art and music in school curriculum.

While Wrocław’s universities have traditionally focused their efforts on recruiting talented students and collaborating with the best schools, there is scope for long-term, multi-stakeholder collaboration to improve students’ motivation and academic performance at underperforming schools. This will be increasingly important in the future, as Wrocław’s schools need to serve not only Polish children with diverse skills and backgrounds, but also children from families of migrants in low-skilled jobs, as well as other under-represented groups such as Roma. Successful international examples in this domain include the University of Victoria in Australia, which has achieved measurable success in widening access and improving success rates of students from low-income families.

The continuing demarcation between vocational and academic tracks in the secondary education system, reinforced by socio-economic status, suggests that

education and labour market opportunities will continue to be stratified in Poland. One way to overcome this is to expand tertiary education opportunities by developing an integrated and coherent tertiary education sector including a stronger post-secondary vocational education and training sector and well-developed pathways. Learning pathways allow students from different backgrounds and with different career expectations to move from secondary education institutions to tertiary education and to maintain their knowledge and competences throughout their lives by availing of lifelong learning opportunities. In order to ensure wider and continuing access and opportunities for upskilling and re-training, Poland's National Qualifications Framework should include learning pathways as an explicit component.

At the regional and local level, collaborative efforts are needed to ensure that educational pathways are supported by credit recognition schemes, course and programme articulation agreements, clear policies related to credit transfer and increased support for joint programmes. Wrocław's city administration could take a lead in facilitating stronger relationships among the different components of the education sector – universities, vocational higher education institutions and schools – so that they operate as an integrated developer of human capital potential.

Despite recent improvements in student support, higher education costs and fee policies are barriers to education in Poland. To ensure more equitable tertiary education, the financial, social and academic assistance to students requires strengthening.

The Polish Constitution guarantees free access to public higher education, but does not guarantee free education; more than half of all HE students pay tuition fees, including students in non-public higher education institutions (one-third of all higher education students) and those in part-time programmes in public institutions. Full-time study programmes in traditional public metropolitan universities are attended primarily by students of higher socio-economic status. At the same time, part-time, fee-paying students make up a large proportion of the students in public institutions, sometimes 40% or more of total enrolment, as is the case in the University of Wrocław and the University of Economics. Research studies indicate that students in paid programmes are more likely to come from less-affluent and less-educated families (Herbst and Rok, 2011). While these results should be treated with caution due to methodological problems (the individuals who left their family homes were excluded from the sample), they point to a possibility that the disadvantaged part of the population pays tuition fees and subsidises the public education to which it has limited access. The lack of robust data on students' socio-

economic background and institutional levels, or about students benefitting for student programmes makes it difficult to evaluate the scope of this challenge.

An important element of equitable tertiary education is the financial assistance provided to disadvantaged students. According to OECD Education at Glance (2012) Polish higher education bases a heavy financial burden on families, which cover 19% of expenditure on higher education, more than in many countries where higher education is, in principle, free. In many countries, the financial burden that falls on families is alleviated by public subsidies for student grants, scholarships and loans. In Poland such subsidies are very low (1% of total expenditure) and as a result have very limited effect on the redistribution of the cost of tertiary education. Government authorities have recently decided to channel more funds to low income students and reduce the amount of merit-based aid. Consequently, 60% of the total student support will be distributed on need-basis and 40% on merit-basis. Additionally, a maximum income threshold for need-based aid has been raised by 30%. While it is too early to evaluate the outcomes of these changes, the grants remain modest in relation to the costs of living and the supply of loans is limited.

Developing a more supportive learning environment with adequate academic and social support for students would solidify Wroclaw's claims as a City of Knowledge. Concerns for efficiency in education or academic failure have not traditionally featured high on the agenda of Poland's and Wroclaw's universities. Additionally, the lack of data on students' academic progress has limited the possibility of estimating the need for academic and social support. Wroclaw universities could consider introducing formalised initiatives embedded within their policies for academic and social support to ensure equity in access to and progress in education. These formalised initiatives could be undertaken in tandem and on a collaborative basis between the universities in order to share best practice. Wroclaw's universities could also embark on monitoring the total student experience in order to assess the quality of higher education, encompassing teaching and learning, curriculum, student life, advising and mentoring.

Wroclaw's higher education is academically driven with limited labour market links. To improve the labour market relevance of education, universities should align their education programmes with the labour market needs and focus on students' learning process and outcomes.

While there is considerable variation among Wroclaw's universities in addressing the skill needs of the region, in general, higher education provision in Wroclaw remains academically-driven. The design of study programmes is supply-

driven, based on the academic capacity of universities rather than the needs of the economy. The undergraduate programmes include limited evidence of interdisciplinary studies, new disciplines, or new pedagogical teaching and learning approaches. The overwhelming majority of students choose the traditional academic path following Bachelor and Masters pathways. Doctoral training follows a traditional format with few opportunities for work-based or industrial PhDs. Due to the lack of focus on employability, students undertake training outside of the educational system, which receives no credit and is not part of the curricula. The university careers services have an important role to play in linking students and graduates to the labour market, but they are poorly resourced and weakly connected to the academic heartland. Only a small minority of students benefit from important inter-university initiatives such as student mentoring.

Poland's government has acknowledged the need for stronger university-industry links. Wrocław's universities could achieve this goal through a wide range of measures. They could more actively engage employers in the curriculum and course design and delivery. They could offer credit-bearing, work-based and/or co-operative learning for all students in collaboration with local industry and other employers. They could use local, private sector employees as instructors and encourage temporary movement of university researchers/teaching staff to the private sector. They could develop a comprehensive strategy for the internationalisation of the curriculum, including "global citizen initiatives" for the benefit of Wrocław's education system and all students, not only those who are internationally mobile. Collaborative efforts between universities could strengthen the mission diversity, boost mobility between institutions and lead to cost savings. Scaling up and mainstreaming promising innovations like competence-based Wrocław Graduate Model introduced by the city administration would also be useful. International examples from Canada, Denmark, UK and Australia could provide inspiration to Wrocław's universities when they draft more student-centred and labour market-relevant learning models.

To enhance research training and research career development, Wrocław's and Poland's universities could also consider introducing "structured doctoral programmes" that incorporate discipline/interdisciplinary courses or modules and transferable skills, and provide a framework for timely completion and industry collaboration. To pool resources, share expertise and to build international visibility, Wrocław's universities could consider establishing a joint doctoral school.

The ageing society requires better utilisation of skills. Given the low activity rates and decreasing youth population,

Wroclaw's education and training system needs to cater to older age groups. Re-skilling and up-skilling and other forms of lifelong learning should be scaled up.

As global competition and transition towards the knowledge economy intensify, it will become increasingly important for Poland and Wroclaw to ensure that older generations have up-to-date skills. This is especially important for Lower Silesia and Wroclaw because of the declining youth cohorts and location within a dynamic corridor in Eastern Europe. This is a challenge in Poland, which has a low participation in adult education. Compared to the OECD average of over 40% of adults, only 20% of adults in Poland participate in learning or training. Furthermore, entering students who are 25 and older form a small minority of all students and have no access to the national student support system.

In order to reduce inequalities in education and training participation by age and skill, Poland could consider a three-pronged approach: First, investment in lifelong learning at mid-career should be increased. Second, the attractiveness of training and its returns for older learners should be improved by adapting teaching methods and content to their needs, by the provision of short, modular courses and through the recognition of prior learning and experience. Third, later retirement should be promoted to encourage greater investment in training older learners. (See also OECD (2006), *Live longer, Work Longer*)

Wroclaw's universities need to engage more actively in lifelong learning opportunities and to be more responsive to the needs of adult learners and older workers who have been "locked out" due to changes in the economy/labour market. To date, Wroclaw's universities have remained more oriented to the needs of "traditional" students than to those of adult learners. Educational opportunities for mature students to facilitate career advancement or change through up-skilling or re-skilling remain limited and are available only through part-time, tuition-based provision. The emerging new labour market and the current employment mix in Wroclaw and Lower Silesia require more robust provision to help upgrade manufacturing and services. In the STEM disciplines, where the government is hoping to underpin economic development in the future, the only opportunities for mature students in Wroclaw and Lower Silesia are in relatively basic information technology. Collaborative efforts in lifelong learning would be particularly useful.

Acknowledging the impact of demographic change and the needs of the multinational companies for specialised skills, Wroclaw's city administration has taken steps to attract and retain talent outside of Lower Silesia. Wroclaw has pioneered a number of high profile talent attraction campaigns such as the *Teraz Wroclaw* (Wroclaw Now), which brands the city as an attractive place for

international students from Eastern Europe. Wrocław's RDI arm, the Wrocław Research Centre, attracts cutting-edge researchers, mainly of Polish origin. While the strategy to internationalise Wrocław is a realistic and necessary response to the decrease of the traditional student cohort, it should not take priority over the need for lifelong learning.

For the Knowledge Metropolis to materialise, Wrocław needs a co-ordinated strategy to develop a highly skilled workforce and an economy that can absorb this workforce. More robust performance measurement, data collection, benchmarking and shared learning is required at both national and local levels. The government should also take steps to prepare for the contracting higher education system.

If Wrocław wants to forward its Knowledge Metropolis agenda, it needs a co-ordinated regional strategy ranging from secondary education to tertiary education and lifelong learning in order to develop a highly skilled workforce and an economy that can absorb this workforce. Building a stronger strategy for human capital and skills development in Wrocław and Lower Silesia requires four key elements: First, robust data on the status of the region's human capital; second, a policy audit to identify barriers to meeting needs; third, regional/national policy to foster tertiary education institutions – including further, vocational and higher education institutions – with multiple, complementary missions aligned with regional needs; and fourth, a revision of student selection, finance policy (institutional, regional and national student support) and governance/regulation.

Poland's higher education system requires more robust performance measurement, data collection and benchmarking so that institutions and the government can track its progress. Universities need the common fact base provided by benchmarks to serve as an external reference for their own performance. As a follow up to the recent changes in the legislation, the Polish government could agree with universities on standard practices for recording and measuring productivity, particularly efficiency in graduate production, and publishing university productivity data. Without comprehensive and accessible data, institutions cannot be held accountable for their progress.

Finally, facing the contracting higher education sector, the Polish government should take steps to ensure sustainable sub-national provision of tertiary education and to provide guidance for successful merger and collaboration strategies. The

government could consider conducting an assessment of current and planned capacity against anticipated student numbers in order to identify gaps/surpluses in staff and infrastructure by running a pilot review in Lower Silesia. Care should be taken to ensure that the population outside of major urban centres continues to have access to lifelong learning and business-related services through flexible, multi-provider learning and extension centres that draw on a range of providers. Learning from international examples collected, for example, by the Higher Education Funding Council in England (HEFCE) could help in preparing for a more structured downscaling of the system.

The following measures would promote human capital and skills development in Wrocław

Recommendations for the national government

- Ensure that the National Qualifications Framework that is under preparation recognises and promotes a strong set of diverse post-secondary educational provisions, which provide a wide range of learning opportunities and student experiences, as well as facilitating learning pathways from secondary to lifelong learning.
- Reduce inequalities in education and training participation by age and skills by adopting a three-pronged strategy: First, increase investment in lifelong learning at mid-career. Second, improve the attractiveness of training and its returns for older learners by adapting teaching methods and content to their needs, by the provision of short, modular courses and through the recognition of prior learning and experience. Third, promote later retirement to encourage greater investment in training older learners.
- Revisit the achievements of the Bologna Process and continue the process of curriculum reform to encourage flexible pathways and enhance mobility through credit accumulation across Poland and internationally in order to avoid superficial structural change.
- Carefully monitor the equity impacts of the current student financial support, particularly the scholarship model, for disadvantaged (low socio-economic status), mature and part-time students. Consider whether the student support system can be expanded and based on a system of means-tested grants, complemented with a universal, income contingent loan

scheme, with fee waivers for the neediest students. Consider introducing a special financial incentive for institutions to attract under-represented groups and affirmative action to take applicants' educational backgrounds into account in the selection process. Establish initiatives for higher education institutions to widen access at the entry point and to support students from disadvantaged backgrounds as they progress through their studies.

- In collaboration with regional and local stakeholders and higher education institutions, assess current and planned capacity against anticipated student numbers in different regions. Encourage infrastructure-sharing arrangements between education providers and the establishment of tertiary education centres that draw on a range of providers.

Recommendations for the local/regional government

- Develop a co-ordinating structure and appropriate mechanisms to articulate a long-term vision and strategy for human capital and skills development stretching from primary education to tertiary education and lifelong learning. Outline clear qualitative and quantitative goals and confirm the respective contribution of individual institutions (or types of institution), building relationships among the different components of the education sector. Establish an information system to monitor the performance of higher education in the region and benchmark its progress with appropriate comparators in the country and with OECD countries. This requires: *i*) robust data on the status of the region's human capital, *ii*) a policy audit to identify barriers to meeting needs, *iii*) regional/national policy to foster higher education institutions with multiple, complementary missions aligned with regional needs, and *iv*) possible revision of student selection, finance policy (institutional, regional and national student support) and governance/regulation. Develop data and information on: *i*) educational attainment rates benchmarked to country-level achievement, the OECD average and the best-performing OECD countries, *ii*) migration by educational level and age, *iii*) regional higher education participation rates (age groups including youth, adults; socio-economic status), *iv*) robust information on which institutions serve the region's population, *v*) labour market needs, *vi*) degrees awarded by regional tertiary

education institutions and *vii*) functioning pathways between and among higher education institutions, as well as other levels of education.

- Create mechanisms for enhanced collaboration between HEIs, and between HEIs and the city/region, building on the successful examples of collaborative efforts such as Teraz Wrocław.
- Map the post-secondary education landscape to help brand Wrocław as a “region of knowledge”.
- Consider launching a city-driven flagship programme to support women leadership in business, academia, arts and culture.
- Facilitate stronger, evidence-based strategic decision-making through robust data. The most effective region-wide graduate labour market systems are based on the collection of comprehensive labour market intelligence and online publication of the data in a single place. This improves students’ ability to make rational choices about their studies, helps graduates and employers to come together and helps students find employment. Effective labour market systems use the data strategically to identify regional and institutional priorities and help higher education institutions respond in terms of course provision and the supply of employer-specified skills.
- Working with the HEIs and research institutes, create a Strategy for Human Capital Development to increase the supply of knowledge-intensive workers for sectors in which the region has a comparative advantage.

Recommendations for the universities and other HEIs

- Review the institutional profile and education provision to increase inter-disciplinarity, diversify learning methodologies and place the students at the centre of the learning process.
- Actively engage employers in curriculum development, invite professors from industry and encourage employment after the first cycle.

- Address the needs of a diverse student population and link this with the construction of flexible learning paths, which should include tertiary-type B post secondary education.
- Address the need for lifelong learning and more flexible modes of delivery for those who combine work and study.
- Embed compulsory employability skills, work-based learning, internships, entrepreneurialism, Intellectual Property consciousness, etc. in all programmes – including “structured” PhD programmes.
- Systematically monitor student progress, as well as students’ labour market outcomes and graduate destinations. In developing quality assurance mechanisms, monitor not only student satisfaction, but also the total student experience, which includes services provided by the higher education institution and assess the quality of higher education, encompassing teaching and learning, curriculum, student life, advising and mentoring.

Research, development and innovation

Wroclaw’s framework conditions for innovation have improved, but remain suboptimal. As a result, Wroclaw and Lower Silesia underperform in innovation and fail to take full advantage of the innovation potential of the large student population. There is a need to align the supply of skills with the demand from industries and clusters.

Lower Silesia, like many regions in Eastern Europe, is a “knowledge-absorbing region”. The European Innovation Scoreboard ranks Lower Silesia at the 137th place among the EU regions in the group of “medium to low innovation performers”. While Lower Silesia’s innovative firms engage in more dynamic collaboration and the region has a greater intensity of innovation diffusion than Warsaw and its surroundings, firms in Lower Silesia continue to make limited investments in innovation. The neighbouring regions of Prague in the Czech Republic and Sachsen Anhalt in Germany all perform better in most segments of innovation activities.

One reason for Lower Silesia's modest performance in innovation is the below (national) average R&D spending of the region (0.4% of its gross value added) and the low share of innovative SMEs. This suggests that the competitiveness of Lower Silesia continues to rest on its wage cost advantage. Wrocław has nonetheless developed some acknowledged strengths in university research, particularly in mathematics and information and communication technologies. About 9% of Wrocław's higher education students are following ICT courses, half of them in computer science. This concentration of skills in information technologies is attracting large ICT companies, but inherited university governance models and practices remain an obstacle to faster change.

Another reason for Lower Silesia's modest innovation performance is the fragmentation of research capacities in universities. Universities are major actors in the science and research system in Poland, accounting for 37% of all R&D activity. Lower Silesia and Wrocław have a large, but fragmented, higher education sector. Even if the two leading universities – the University of Wrocław and the Wrocław University of Technology – account for almost a half of all students, research is relatively dispersed within and between institutions. For example, the Wrocław University of Technology runs half of the invention projects in Lower Silesia, but its R&D effort is scattered across 58 fields of research.

Due to lack of alignment between the supply of skills and industry demand, Lower Silesia, a heavyweight in industrial production and the Polish region with the fourth highest GDP, faces difficulties finding skilled manpower, notably engineers. For example, in ICT, an acknowledged area of strength, Wrocław produced only 1 786 graduates in 2008. While the gap is less significant than in the rest of Poland, Wrocław's universities continue to train significantly more students in the humanities, social sciences and administration than in engineering and ICT. Due to the projected decline in the number of graduates from vocational schools, it will be difficult to remedy the shortage of engineers and technicians unless major initiatives are taken by Wrocław's leading universities. Recent changes in higher education legislation facilitate the development of a more relevant and demand-led education provision.

Wrocław's universities have room for improvement in the context of addressing regional issues and forging stronger links with local companies and clusters. They can play a major role in strengthening the regional innovation system (RIS), provided

that they embark on coordinated and coherent initiatives in RDI and the supply of services.

Wroclaw's and Lower Silesia's regional innovation system is built on a relatively robust industrial base. Lower Silesia is an industrial region with a number of clusters and several branch plants of multinational companies that cover a large spectrum of activities including: automotive industries, household appliances, wood construction, renewable energy, mineral resources and electrotechnic equipment.

While Wroclaw's universities are Lower Silesia's largest R&D investors, they have thus far not played a major role in the regional innovation system within the region's industrial framework. Additionally, the EIT+ Research Centre's cutting-edge fields are more plugged into the global innovation system than the local and regional innovation system. Wroclaw's universities could improve demand-driven innovation and research in industries relevant to the region. This could be achieved in many ways. The business model of the technology transfer offices could be further developed so that the TTOs become more efficient and market-oriented. The longstanding Knowledge Transfer Partnerships (UK) could serve as an inspiration for developing the newly-established Mozart Programme into a more robust, people-based mobility scheme.

Wroclaw's universities and knowledge institutions need to overcome a number of barriers to improve their RDI performance. First, higher education R&D (HERD) in Poland and Wroclaw is low – about half of the OECD average. HERD financed by the private sector represents a marginal amount of funding, despite its relatively large share (10%). In addition, collaborative R&D is limited in volume. Second, universities' RDI is weakly aligned with Lower Silesia's key industries – the traditional and low-tech industries and service activities – that account for a significant part of the region's GDP. Third, university incubation and patenting activities remain embryonic, and spinoffs from university research scant when compared with leading knowledge hubs.

Part of the problem is the weak articulation of the business/industry demand for higher education services. A detailed investigation into the nature of innovation within Lower Silesia's firms, the barriers and problems faced, and the experiences of collaboration with universities could also help advance collaboration for local and regional innovation. Cluster development could be conceptualised across the industry-service divide to connect, for example, ICT with culture and tourism.

To facilitate knowledge transfer within the RIS and to bridge the gap between science and industry, a number of intermediary organisations have been created,

including three science parks and the Wrocław Centre for Technology Transfer (WCTT) within the Wrocław University of Technology. The universities' involvement in the parks and incubators remains unsystematic and needs better articulation. Many co-operations are project-based and cease with the end of the project. Dialogue and partnerships among universities also remain limited to political, rather than strategic, involvement in the loose higher education confederation. The EIT+ initiative, a science-based programme with a focus on advanced materials, nanotechnologies and biomaterials, can be perceived by universities as a competitor for the European and national funds. Collaboration with the EIT+ Research Centre is consequently weak, even if the main HEIs are stakeholders in the initiative. The lack of continuity and insufficient internalisation of collaboration could be remedied by the national government defining a framework for co-operation, using, for example, Stockholm's Science City Foundation as a benchmark.

The national government is placing greater emphasis on innovation policy, but Lower Silesia still lacks a comprehensive innovation plan. Cross-border development and international expansion are two areas that have been overlooked by policy makers and call for more careful and proactive treatment.

In the wake of Poland's science reform "Building on Knowledge" and the higher education reform "Partnership for Knowledge" the institutional changes of the national system have been introduced. The science budget has increased substantially and also the innovation policy mix has improved. Wrocław and Lower Silesia elaborated a development strategy for the period 2007-2013 within the framework of the European structural funds exercise. While the strategy identifies a number of weaknesses, including the lack of R&D investment, the low share of innovative SMEs and the excessive focus on technology imports in innovation spending, it fails to acknowledge and define the role of higher education in the RIS.

Poland and Wrocław are well placed to benefit from the European Structural Funds, but need to mobilise universities for regional development. The *ex-ante* conditions for the European Structural Funds 2014-20 programming period require national/regional innovation strategies for smart specialisation that will serve as a place-based economic transformation agenda. In Lower Silesia, this requires a thorough analysis of regional comparative advantages, clearly defined measurable objectives and defining the role of the higher education sector in regional development.

Wrocław's universities are slowly opening towards internationalisation of research and development, but without a clear sense of direction and a lack of targeting the neighbouring regions in the Czech Republic and Germany. Since Wrocław's universities lack an international research strategy, they are not very active or successful in capturing FP7 funds and ROP innovation money. Repercussions for Wrocław related to INTERREG programmes are also scant. The city of Wrocław has mobilised its research arm, the EIT+ Research Centre, to establish links with international academia. EIT+ also aims to participate more actively in the development of the Dresden-Prague-Wrocław triangle. The INTERREG IV C programme co-finances a number of projects in fields such as technology parks, energy efficiency and urban development, but these small scale projects do not involve the Czech regions.

National and local governments could more actively encourage international and cross-border collaboration involving universities. In the field of innovation, this could take the form of incentives to encourage more active participation in EU DG research programmes. It would also be useful to review Poland's bilateral agreements with relevant countries to see how these benefit Lower Silesia and Wrocław and to what extent local universities are involved in these collaborations. Connecting SMEs to international co-operation programmes should be actively pursued.

At the local level, two paths of action could be adopted to improve the internationalisation of Wrocław's RDI efforts. First, co-operation with neighbouring regions should be stepped up, better organised and more targeted. Second, the experience of the EIT+ programme's regional trans-border co-operation and agreements should be used as a springboard for inter-regional co-operation between universities. The Oresund cross-border collaboration between Sweden and Denmark could serve as a source of inspiration for developing the governance of inter-regional associations and committees.

Wrocław and Poland have a limited tradition of evaluating RDI projects. More efforts should be made to develop a robust evaluation culture.

The lack a robust evaluation culture in Poland and Wrocław makes it difficult to get feedback on projects, to monitor them and to improve their management. When building a more robust evaluation culture, much could be learned from the leading European countries whose evaluation of technology transfer schemes or networks includes the number of business ideas screened, the number of development products generated and complementary initiatives. In robust

evaluation systems, the indicators for university start ups, incubators and science parks include the capacity to set up large partnerships and to access private funds, which are expected to take over public funds after a few years, while the number of universities involved, and of firms and jobs created, are important elements of success. More sophisticated analyses also include questionnaires addressed to customers or cost benefit analysis of programmes.

The development of a robust evaluation culture is important given Wrocław's capacity to attract significant flows of public funding and the tendency of universities and the public agencies supporting RDI to measure their success in terms of acquisition of external funding. The risk is that the ability to attract public funding for an idea becomes the measure of success, rather than market success, which indicates the creation of products that people want to purchase and the amount of commercial return. The risks also include funding initiatives that are weakly aligned with the regional needs and innovations that are commercially not viable without subsidies.

Lower Silesia and Wrocław need to lift up their innovation profile to close the gap with their competitors in Western Europe. In the “race towards the top”, universities have a major role to play. This calls for stronger collaboration, co-ordinated and coherent initiatives in RDI and a strong regional innovation strategy.

Lower Silesia and Wrocław need to lift up their innovation profile to close the gap with their competitors in Western Europe. In the “race towards the top”, universities have a major role to play, not only as R&D providers, but also as agents of regional economic growth, by leveraging the regional potential, harnessing local talent and knowledge, and activating networks of stakeholders. Wrocław's universities have the capacity to enhance their consultancy offer, leverage knowledge from technology transfer and from marketing project outcomes, manage incubators and science parks, and establish public-private partnerships with large companies. This is particularly important in Poland and Wrocław, where a dominant share of the R&D is performed by the universities. Due to scattered initiatives and fragmentation of institutions and research, changes have been slow to materialise.

National, regional and local authorities can help catalyse these changes, providing that they adopt clear policy orientations and implement a coherent set of policy initiatives. Lower Silesia and Wrocław have been lacking a well-designed, articulated and comprehensive evidence-based innovation strategy that stresses the

role of the higher education sector. This calls for prioritisation of a limited number of activities and segments of supply chains where Wrocław and Lower Silesia have relative comparative advantage. It also calls for the development of a clear vision with measurable goals, milestones and metrics to determine whether the goals have been reached or not.

The following recommendations would promote regional innovation in Wrocław and Lower Silesia:

Recommendations for national and local policy

- (City and the voivodship) *Develop comprehensive, well-articulated and designed, evidence-based innovation strategies that clearly stress the role of the higher education sector as crucial in leveraging regional potential, harnessing local talent and knowledge and activating networks of stakeholders.* Focus attention on the contribution of universities to entrepreneurship, their capacities to provide services (consulting, transfer of technologies, placing), to develop efficient innovation infrastructure (incubators, science parks) and to increase their participation in seed capital funds and public-private partnerships. Prioritise a limited number of activities and segments of supply chains where the city and the region have relative comparative advantage, and make efforts to model the “ask” and “bid” market (Box 3.2). Build a vision for the future, set (measurable) goals and milestones, and establish a metric that will identify whether these goals are reached.
- (National government and the voivodship) *Strengthen collaborative research, develop the HEI business forum function and foster cluster-related policies.* University-industry co-operation (UIC) in research is an important vector of innovation and growth, and one of the avenues to foster a dynamic research sector while strengthening the “third mission” of universities. Poland’s share of UIC contracts in total FP6 contracts with Polish partners is 30%, i.e. smaller than that of the Czech Republic (42%) or Germany (38%). To enhance market-oriented, innovation-based R&D investment in Poland and Wrocław, consider granting special advantages or incentives to collaborative research projects. Promote universities’ “forum function” by providing a guide about experiences that have been developed in other countries, such

as helping to select animators in the clusters specifically in charge of the university/cluster interaction.

- (National government and the voivodship) *Link into appropriate European innovation support machinery, including Euro region and cross-border projects.* In collaboration with the universities, develop a robust internationalisation strategy for the university sector that embraces research, education and service in order to help capture FP7 funds and ROP innovation money. As the first step, prioritise co-operation with neighbouring regions by co-ordinating joint university efforts, building on the experience of the EIT+ programme which has strengthened regional trans-border co-operation and collaboration with the regional partners in Poland. Draw on world class examples of cross-border collaboration, such as the Oresund Science Region (see Box 3.3), notably in terms of governance arrangements (creation of interregional committees etc.).
- (National government and the voivodship) *Promote more a market-oriented business model of the technology transfer offices* and improve research project management and marketing. Improve the business model of technology transfer offices to make them more efficient and responsive to market requirements. Ensure (national and local governments) that sufficient assistance goes to the modernisation of Technology Transfer Offices in order to secure the recruitment of individuals with market experience and industry background.
- (The city and the voivodship) *Review and systematise collaboration among HEIs and boundary-spanning collaboration between research departments.* Upgrade the governance of the regional innovation system. Define frameworks for co-operation among HEIs, and between HEIs and key stakeholders that could remedy the lack of continuity and insufficient internalisation of collaboration, drawing on successful examples such as the Science City Foundation in Stockholm.
- (Government at all levels) *Promote a more robust culture of evaluation of RDI.* Learning from the well-developed evaluation practises of Germany, Finland, Sweden, the UK or the US, launch a general evaluation programme assessing the Polish innovation policy and build a methodology that could

help regional authorities to evaluate their own initiatives. Consider launching a pilot project in Lower Silesia.

- (City and national government) *Seek to encourage greater collaboration between universities through programmes, joint investments in R&D facilities and incentives.* Encourage university specialisation and promote international, national and regional networking.
- (City and the voivodship) *Clarify the roles of different institutions* (e.g. the Wrocław Agglomeration Development Agency, EIT+, Wrocław Technology Park, Lower Silesian Innovation Park and university-based technology transfer organisations and incubators) in the Wrocław and Lower Silesia regional innovation system.
- (National government) *In collaboration with universities, construct an overall monitoring and evaluation system that could cover a wide range of regional development issues with a special focus on innovation-relevant activities.* This should be supported by a coherent and informative system of indicators for the measurement of the regional contribution of universities. The system should be able to collect information at the organisational level, the university level and the regional level. Collaborate with the regional and local government and universities to improve the evidence basis for regional and institutional decision making through the collection, monitoring and analysis of robust data. Define common university indicators, guarantee transparency of results, strengthen monitoring and follow up the success of the programmes and improve the public dissemination of results.
- (National government) *To improve productivity and innovation in traditional industry and services, align the ongoing programmes of the national, regional and local governments with the region's needs and establish special mobility programmes to link students, graduates, post-graduates and academic staff with local businesses and industry in a more systematic way.* Models for linking postgraduate students with local industry include the Knowledge Transfer Partnership Scheme in the United Kingdom, which has improved the competitiveness of companies through the introduction of some form of innovation or new technology; around 75% of postgraduate associates are offered jobs in the companies.

- *(National government) Review the state of collaboration in the university sector to provide an opportunity for universities to rethink their priorities and to specialise.*

Recommendations to universities

- Develop a more comprehensive, differentiated view of the university's role in the local economy instead of one-size-fits-all approach to technology transfer. Develop the “forum function for industry” by organising conversations with local industries in meetings, conferences, industrial liaison programmes, standards forums, entrepreneur/investor forums, visiting committee discussions of departmental curricula, taking advantage of the co-ordination structures or member associations of existing clusters. Perceive creation of better jobs as the focus of innovation activities. Ensure that Technology Transfer Offices assume a wider role in collaboration with industry and fully play their role in cementing the value chain, strengthen them with professional staff.
- Align RDI activities to address the needs and demands of the existing and emerging local clusters, industries and a wider society. Develop a practical engagement with business and a collaborative way of referring enquiries from businesses and industry with the help of virtual and face-to-face collaboration.
- Develop an institutional strategy to internationalise research, development and innovation and to access a larger share of FP7 funds and ROP innovation money. Systematically strengthen international collaboration to improve RDI outcomes, building on the connections driven by individual academics and EIT+.

Towards creative economy and social cohesion

The city of Wroclaw has identified creativity and culture as central elements of its social and economic development strategy. It seeks to use the status of European Capital of Culture 2016 to achieve a step forward in its urban development trajectory and now needs to mobilise university resources to support this goal.

Mobilising university resources for the European Capital of Culture will help build a strong global brand for Wroclaw as a centre of culture and innovation in the crossroads of Germany, Poland and the Czech Republic. It will help develop the knowledge and skill base in the regional economy and attract and retain young creative workers and students to the region. For this to happen, the expertise in the arts and cultural field and community engagement needs to be pooled from a range of disciplines, universities and art academies to work with the public authorities, business and industry and civil society. This will require action in four fields: tourism, creative industries, social cohesion, and urban regeneration and space management.

The European Capital of Culture 2016 requires a long-term growth strategy for the tourism industry that can guide a comprehensive approach to skills development.

The challenges associated with the European Capital of Culture 2016 include effective policies and actions to maximise the positive impacts of tourism and its linkages with the emerging creative economy and higher education institutions. The city of Wroclaw and the wider region would benefit from a long-term growth strategy for the tourism industry that responds to the needs of the Capital of Culture and also long-term trends in tourism. Such a strategy should be designed in partnership with other levels of government, educational organisations, public and private sector employers and trade unions, and should guide a comprehensive approach to skills and competence development. Aligning education and training provision with industry needs requires a revision of curricula to include entrepreneurship skills, up-skilling of educators, work-based and experiential learning opportunities, linkages and pathways between vocational training and higher education, and new delivery models with greater flexibility for lifelong

learning. Joint efforts are needed to ensure that Wrocław's SMEs are able to capture a greater share of tourists' expenditures and that the local population will be able to participate and co-produce the diverse cultural offer. The city of Wrocław, in collaboration with the art academies and universities, could help develop a stronger base of creative businesses that are able to supply a sufficient quantity of quality goods and services to respond to the demand from the cultural tourism sector.

The European Capital of Culture can boost Wrocław's transformation to a Silicon Valley of Eastern Europe with a strong creative arts and media sector. This calls for university-industry collaboration, formal and non-formal training, and supporting a demand pull for creativity and innovation in SMEs.

As part of Wrocław's ambition to become the Silicon Valley of Eastern Europe, efforts are being made to tap into the entrepreneurship and innovation potential of the creative arts and media, which are now more accessible to young people thanks to digital technologies. Wrocław's rapidly growing gaming industry could provide a basis for the emerging cultural and creative industries, but is struggling to find skilled labour. At the same time, a large part of Lower Silesia's more traditional SMEs have limited exposure to digital technologies. To respond to the needs of the emerging industry, the city of Wrocław has supported the launch of the Design Accelerator and a multimedia hub Creativro, as well transversal skills development through a small scale multidisciplinary higher education partnership.

Moving forward, Wrocław could launch the Wrocław Cultural and Creative Industries Forum, which could create a shared understanding of the potential of the cultural and creative industries to identify mutual interests and benefits and to design a strategy and an action plan to move forward. This could help introduce interdisciplinary groups and alliances between design and technology to develop links between arts-based education/research and technological education, or between arts-based education/research and the natural sciences. In order to build a strong future for the creative industries, Wrocław could develop a creative curriculum and programming for schools and centres outside of the formal education sector. The Nerve Centre in Derry, Northern Ireland, could serve as an inspiration, given its long experience in the design and delivery of digital community relations resources for use in formal and non-formal learning. Finally, injecting innovation and creativity in the traditional SME sector could be achieved by encouraging SMEs to work innovatively with creative companies. The UK business-to-business (B2B) voucher scheme Creative Credits could serve as an example.

Wroclaw wants to use arts and culture to improve social cohesion and urban regeneration. Universities and art academies can promote this by creating a multi-pronged strategy to engage with the community and by joining forces in community development.

Wroclaw's rapid socio-economic development has contributed to growing disparities within the city and the wider region as well as between social groups. The city and its regional stakeholders see arts and culture as a tool to facilitate social cohesion, urban regeneration and regional development that can make Wroclaw and Lower Silesia more attractive to work and live in. Wroclaw's higher education institutions could support these goals by developing a multi-pronged strategy to engage with the community, ranging from widening access and youth empowerment to active performance programmes for the wider audience. By becoming more central to Wroclaw's economic, social and cultural life, universities and art academies can actively help to expand their audience and customer base, audiences for music, theatre and opera, purchasers of artefacts, and sponsors for arts productions and the institutions. Universities, art academies, the city of Wroclaw, the regional government and the industry sector could join forces to develop mechanisms to improve relevance of education through closer labour market linkages that nurture the cultural and creative talent of the regional population, attract creative talent from outside of the region and turn new ideas into cultural and social enterprises.

Wroclaw could also consider making efforts to transform emerging local community centres into creative community hubs in order to pool and mobilise the emerging academic expertise in community development that is currently spread across different departments and institutions. To pursue an economic development strategy that is both creativity-based and socially inclusive, Wroclaw and Lower Silesia could launch pilot projects in a few communities, such as Nadodrze, to leverage local resources. The creative community hub approach would capitalise on the existing organisations and knowledge of community issues and conditions, allowing programmes to be developed and adapted to individual neighbourhoods' specific needs and talents. The Point Community Development Corporation in New York City and Creative London's Hub Strategy address the needs of economically and socially disadvantaged communities and can serve as inspiration.

Universities and art academies are physical assets for Wroclaw's creative knowledge economy. There is need for greater

collaboration in space management and a long-term strategy to address the design, proliferation and duplication of higher education facilities.

As a city that aspires to become a creative knowledge metropolis, Wrocław will need a range of facilities that support collaboration, encourage knowledge exchange, attract talent and contribute to social cohesion in the community. While Wrocław's universities and art academies have important physical assets that make a contribution to civil society, there is no shared vision between the universities and the city for the future strategic management of the physical assets in the broader urban context. Access to the EU funding and the backlog of modernisation work have contributed to a higher education building boom with potentially unsustainable outcomes when institutions are constructing new buildings for similar functions in close proximity to each other. Spatial environment of a fragmented set of learning environments does not sufficiently support creativity and knowledge exchange. Many departments or faculties are housed in heritage buildings that are expensive to maintain, need continuous maintenance and lack flexibility because of legal restrictions.

One way to move forward is to extend Wrocław's physical regeneration strategy to universities. Wrocław has embarked on a long term regeneration strategy to exploit its assets of historical buildings under the motto "Wrocław - the meeting place" through which the city seeks to draw attention to its historic role as the place of interchange for goods and ideas. Wrocław's physical planning department has the responsibility for the urban regeneration strategy and could better take into consideration the universities that have buildings or zones in the regeneration area. Local plans could focus on developing a "cultural quarter" that could engage not only the university estates departments, but also the arts and humanities departments as well as art academies, in the same way that WTC and the Pracze Science Park link with science and engineering.

Finally, creating a long-term strategic plan that is relevant to creativity, learning, research, business and society and seeks to bring together academia, industry and the general public, could serve as a basis for redefining how the physical environment of the city of Wrocław will support the diverse needs.

The following recommendations would promote the move towards a creative economy and social cohesion:

Recommendations for the national government

- Develop Poland's creative economy by promoting targeted action plans at all levels, from the community to the cities to the national level. Reconcile the national cultural and social objectives with instruments of education, trade, technology and tourism.

Recommendations for the local and regional governments

- Support cultural and creative industries. In collaboration with universities and other educational institutions and the public and private sector, increase efforts to support creative and entrepreneurial skills among students and graduates and provide better further education opportunities. To provide a robust knowledge base for the Wrocław creative economy, support multidisciplinary collaboration across the higher education sector and different institutions by encouraging the establishment of joint institutes, departments and institutions. In collaboration with the Wrocław universities, sponsor an observatory on the creative sector. Establish a Cultural and Creative Industries Forum to bring together the arts academies and key stakeholders to further develop this sector, and provide a vehicle for common purpose.
- In order to embed the European Capital of Culture within the fabric of the city and region, and to use the arts as a vehicle for regeneration and social cohesion, support the development an active engagement programme that involves the universities, arts academies and the community, building on and celebrating traditional skills and broadening participation in and appreciation of contemporary arts. In collaboration with the Fine Art Academy, explore developing craft as a vehicle for widening participation by building on and celebrating traditional skills.
- Build a strong global brand for Wrocław as a centre of culture and innovation in the crossroads of Germany, Poland and the Czech Republic, to develop the knowledge base in the regional

economy and to attract young creative workers and students to the region.

- To realise the full potential of Wrocław’s creative enterprise, provide specialised entrepreneurship support and business skill development for cultural and creative industries; expand existing small business and entrepreneurship programmes to provide specialised support for creative industries; develop sector support initiatives to serve creative industries more effectively; consider Creative Credit type voucher schemes to inject innovation and creativity into the traditional SME sector; create vehicles for sales development, business-to-business forums for investment and business matching to support the creative industries sector; and provide incubation space and services for creative businesses, including space to conduct business, access to shared prototyping equipment, workshops and courses on business planning and marketing, and access to potential investors.
- In collaboration with universities and art academies, undertake a review of the social and economic implications of/and opportunities offered by the cultural and creative industries in Wrocław and Lower Silesia. This should include a review of the academic direction of arts education in light of international experience and the socio-economic strategy for local and regional development. The review should identify new educational pathways and career opportunities for “cultural workers”. It should:
 - consider the structure of arts/media education, and establish clear articulation routes from secondary and post-secondary education to higher education – embracing the full breadth of ISCED 5A, 5B and 6 provision with attention to access, accreditation and credit transfer between the arts institutions, but also in partnership with the other universities in Wrocław.
 - examine training and retraining provision in order to make available new and/or alternative career pathways.
 - identify the current and future opportunities offered by the emerging cultural and creative industries and the labour market, e.g. for cultural workers in micro-business, homework, freelance/casual, arts organisations; determine what level of skill or knowledge will be required in the future and what are the implications for the arts in

terms of education, institutional organisation, pedagogy, curriculum, research, training and engagement.

- In partnership with other levels of governments, educational institutions, public and private sector employers, and trade unions, develop a long-term growth strategy for the tourism industry that responds to the needs of the Capital of Culture and also the megatrends in tourism, and guides a comprehensive approach to skills development. The outcome should be the alignment of industry needs with detailed competency development in education. Bridging the gap between the education provision and industry needs requires revision of curricula, including entrepreneurship skills, up-skilling of educators, work-based and experiential learning opportunities, linkages and pathways between vocational training and higher education, and the provision of new delivery models with greater flexibility, especially for lifelong learning and up-skilling of workers.
- Connect university research to the community by supporting challenge-driven research through competitive calls. In order to make the connection between the current research focus and community engagement, “translational research” could be adapted to address the critical issues in Wrocław and Lower Silesia. In addition, university leaders could develop initiatives supported by small research grants to encourage faculty to undertake research activities that connect with community agendas.
- Transform emerging local community centres into creative learning centres and community hubs to pool and mobilise the emerging academic expertise in community engagement that is spread across different departments and institutions. Linking creative community programming to local economic development and revitalisation of at-risk neighbourhoods through co-production in which the local community is engaged in the development and implementation of projects. Launch pilot projects in communities such as Nadodrże and the suburbs to leverage local resources, capitalising on the existing organisations and knowledge of community issues and conditions.
- Extend Wrocław’s regeneration strategy to universities and art academies by developing a “cultural quarter”. Promote greater

collaboration in space management and a collaborative long-term strategy for Wrocław's physical environment that is relevant to creativity, learning, research, business and society. In collaboration with the higher education institutions, develop a city-wide strategic plan for the coherent development of facilities for learning and research that supports the needs of individual universities and the business and community, and creates a connected, city-wide learning environment. To achieve this: develop a shared vision with the range of stakeholders; map the current uses of buildings and public spaces across the city, landmarks, and vistas and the transport infrastructure; design alternative scenarios for development; select a scenario that meets the needs and expectations of the stakeholders; and create a strategic framework that identifies the mix of different environments and uses, a coherent transport infrastructure, the massing and character of the city, a time frame for overall development and transition, and public and private investment needed.

Recommendations for arts academies and universities

- Review the curriculum and develop RDI capacity and capability of the art academies in order to modernise and enhance their academic mission and labour market relevance in the context of international developments in collaboration with the representative bodies for creative arts and media education.
- Develop interdisciplinary and practice-led research capacity and capability in order to strengthen the academic and international profile of the art academies and to open up new opportunities for graduates, as the creative and cultural industries are knowledge-intensive sectors.
- Contribute to the social and cultural inclusion of the local and regional population through university arts and humanities programmes that include creative contributions by various population groups.
- Contribute to the development of the local and regional creative economy by developing and expanding multi-disciplinary programmes and programmes in entrepreneurship and non-profit management, both in formal degree programmes and through outreach efforts.

- Develop university knowledge and technology transfer programmes to focus on the potential for development of productivity enhancing product and process innovations in cultural and creative fields in Wroclaw and the wider region, particularly in design.