

Life Sciences Strategy for the Stockholm region

Stockholm 2025: One of the top five life science regions in the world

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Hagastaden: Stockholm's life science cluster

Foreword

WHEN DISCUSSING INNOVATION, growth and job creation, we often focus on the classic core Swedish industries of forestry, mining and steel or the automotive and engineering industries. But the fact is that the life sciences, i.e., pharmaceuticals and medical technology, now far outstrip both forestry and steel in terms of their export value!

Life science is one of the most research-intensive and dynamic industries in the country, and in 2020 the pharmaceutical sector alone had an export value of over SEK 115 billion. There has been dramatic growth for several years, and the industry now employs tens of thousands of people across the country, the majority of whom work in the Stockholm region. In fact, life science is now the third largest business sector in the Stockholm region, making it an engine of growth and international attractiveness for both the capital and the country as a whole.

A significant proportion of all research and innovation in life sciences originates in the outstanding universities, colleges and research environments in the Stockholm region, a situation that is strengthened by ever closer collaboration between academia, industry and healthcare that attracts both talent and investment. Most importantly, this collaboration paves the way for more innovative therapies, new medicines and vaccines, as well as cutting-edge technologies that save lives and improve the health of all residents.

Stockholm has a very strong position as one of the leading regions for innovation and entrepreneurship in Europe and the world, but this position cannot be taken for granted and active, long-term efforts are needed to maintain and strengthen it further.

In 2018, therefore, the Region Stockholm Assembly decided to develop a regional life sciences strategy, through a broad collaboration with all sector stakeholders, with the aim of working systematically with the industry in a structured way to identify opportunities for, and obstacles to, the continued growth and development of the sector. By improving the international competitiveness of an already strong sector, we not only create more jobs and tax revenue to fund a more modern

“World-class research infrastructure, a healthcare system of a high international standard, a competitive economy and a dynamic climate for innovation are the main drivers of the strategy”.

welfare system, but we also create the tools healthcare needs to provide world-class care.

The Life Sciences Strategy that has now been agreed gives regional form to the government’s national strategy, and will help to make the Stockholm region one of the five leading life science regions in the world. Strengthening the development of healthcare and generating further economic prosperity requires concrete action in several areas. The Stockholm region is well placed to achieve this, but it is important that action plans are put in place to provide a clear and focused framework for the creation of favorable conditions for the sector.

World-class research infrastructure, a healthcare system of a high international standard, a competitive economy and a dynamic climate for innovation are the main drivers of the strategy.

Region Stockholm is determined to continue its development of these areas of strength. We want to continue in our role as an international leader in the shift towards precision medicine that is underway and to which the life sciences sector is a major contributor. The aim is to be one of the five leading regions in the world for life science by 2025.

Daniel Forslund

Chairman of the Innovation and Development Committee of Region Stockholm’s Executive Board

1. Introduction

LIFE SCIENCE ÄR is an interdisciplinary field of research devoted to the study of biological life and the internal and external potential for continued life. The scientific discoveries made in this field of research have practical application, including in the life sciences sector. The life sciences sector includes companies, universities and colleges, patient organizations and public actors at local, regional and national level whose activities contribute to the promotion of human health. It comprises research, higher education and innovation, the development of pharmaceuticals, medical devices and treatments, and prevention, implementation and monitoring.¹

The aim of the national life sciences strategy is for Sweden to be a leader in the field. The Life Sciences Strategy for the Stockholm region will help achieve this national aim and help Stockholm develop the sector both nationally and internationally.

A long tradition of work in the life sciences

What sets a leading life science region apart is excellent academic environments working closely with a high-quality healthcare system and an innovative business community. The Stockholm-Uppsala region is well positioned within several life science research areas. Studies show that, in several areas of research, we are comparable to, or stronger than, other European regions. However, we cannot yet compete with the leading life science regions²

in some of the national capital regions in Western Europe, Cambridge-Oxford, or other areas such as San Francisco and Boston. Strong regions are characterized by high-ranking universities, world-leading research and healthcare, a strong entrepreneurial culture, the presence of global headquarters and a strong ability to attract talent.

The Stockholm region has a long tradition of successful work in the life sciences that has contributed to Sweden's prosperity. It is home to outstanding research in medicine, science and technology, a uniquely high population of researchers, one of the world's most modern university hospitals for highly-specialized care, a highly-educated population, and a large number of life science companies. The Stockholm region has a wide range of industries and has long occupied leading positions in ICT and several other fields of knowledge, which is becoming increasingly important for success in life sciences. In addition to being at the forefront of international research and innovation, the Stockholm region has unique access to health data and National Quality Registers, sample collections, unique research and innovation infrastructures, and expertise in complementary areas such as ICT and biomaterials. There is a tradition in industry in the Stockholm region of world-leading development of new cutting-edge technologies and progressive business models in many sectors.

“The life science industry is central to the commercialization and exploitation of breakthroughs in research and innovation for the benefit of residents”.

¹From “Sweden's national life sciences strategy”

²State of Medicon Valley, 2019



“The capacity of the Stockholm region to take advantage of these new opportunities has implications for societal costs, health outcomes and competitiveness”.

Major importance for public health

The life science industry is central to the commercialization and exploitation of breakthroughs in research and innovation for the benefit of residents. The capacity of the Stockholm region to take advantage of these new opportunities has implications for societal costs, health outcomes and competitiveness. The success of the life science sector is also relevant to the realization of the 2030 Agenda on achieving sustainable development. A strong life science region in which the various actors know each other and work well together is therefore also important for both public health and the environments in which we live.



By facilitating the matching of leading research with high-quality health and social care within the region and stimulating a competitive business community, the Stockholm region will be able to develop a life science cluster that builds on its current strengths and at the same time sets the stage for the development of entirely new areas.

With the demographic trend towards an increasing proportion of people over 80 years old, developing health and social care for older people is an important element in the Life Sciences Strategy.

Healthcare for older people is hereinafter included in the concepts of healthcare and social care.

Region Stockholm has made a decision to create a more favorable environment for universities, colleges and businesses to undertake research, development and innovation and has brought its visions together in the Research Promise (LS 2017-1455). The objective of the Research Promise is to increase numbers of clinical studies and make the Stockholm region one of the world's leading regions for life sciences by 2023.

2. Purpose, implementation and monitoring

THE PURPOSE OF THE LIFE SCIENCES STRATEGY is to identify strategic development areas that will enable the Stockholm region to achieve its goal of becoming one of the top five life science regions in the world. No one actor has sole authority. To achieve this vision, action is required from several actors, working both individually and collectively. The Life Sciences Strategy will therefore be supplemented with action plans to ensure its objectives are realized. The action plans will also link to measurable objectives and clarify who is responsible for each action. The results will be monitored annually, and the data will be included

in the overall assessment of progress towards achieving Region Stockholm's goals. The action plans will also be presented at existing regional forums such as Karolinska Institutet's life science council.

Close cooperation with national actors and other regions on common issues and challenges is of strategic importance. This Life Sciences Strategy will interact with RUFSS 2050, the regional development strategy, and Region Stockholm's Business and Growth Strategy. The strategies cover challenges that the life science sector shares with other growth sectors, such as housing, accessibility, and funding.



3. Strategic direction

3.1 Quality and efficiency in health and social care

Health and social care are constantly evolving. The skills of staff and their understanding of the needs of patients and care are central to this, contributing to higher quality, reduced costs and improved health. With the costs of health and social care rising, it is becoming more and more important to find new ways to increase efficiency. Greater use of new ways of working, skills, materials and technologies will help reduce costs, raise quality and improve health. Having the right skills is essential for the sector's development. New skills

in areas such as the social sciences, engineering and other natural sciences alongside medicine are vital if we are to meet the health challenges of the future.

3.2 Collaboration for business growth and development

Reinforcing the collaborative culture in life science makes it easier for start-ups in the Stockholm region to stay and grow. Established companies will be able to conduct research and develop by partnering with other companies, universities and colleges, healthcare and social services.



Infrastructure contributing to this collaboration includes university competence centers and incubators, science parks, co-working venues, national research infrastructures and other shared platforms. A rapidly evolving culture and close contact between people with access to a wide range of skills and opportunities are ingredients that are attractive to global companies engaging in production and research.

3.3 Additional perspectives in research and education

Increased cooperation involving the various skills of the universities, industry, Region Stockholm and the county's municipalities will add new perspectives and raise the quality and relevance of research and education. This, in turn, can make it easier to compete for leading researchers, the best students and research funding and also facilitate the application of research outcomes through increased relevance and applicability, for the benefit of residents. Cohesive work on life sciences will

attract external funding for longterm research initiatives, investment in infrastructure and development, and increase the number of patents in the Stockholm region.

3.4 Development for the benefit of all county residents

The ability to listen to, and take on board, residents' interests and knowledge in respect of their health and care will be very important for the successful development of the sector. Taking on board the views of involved residents provides valuable feedback for health and social care. Broad-based patient involvement also leads to more and better studies. Overall, it provides a good basis for preventive work seeking to achieve better health and for care to be provided and developed on equal terms in response to the diversity of patients encountered within the health and social care systems. Including residents, patients and relatives at an intensive level enables safer diagnoses, sustainable care and improved public health.

“Involving residents, patients and relatives creates the conditions for safer diagnoses, sustainable care and improved public health”.



4. Strategic development areas

4.1 World-leading access to structured health and care process data

Background

The application of digitalization and artificial intelligence is enabling a paradigm shift in healthcare. The new options to use anonymized, structured health data³ are leading to more personalized prevention and treatment and improved health. The Swedish public is largely supportive of health data being used for research and healthcare development.⁴ This trust is unique and must be nurtured by ensuring that residents' data is processed responsibly and securely and that the privacy of the individual is respected. One challenge is developing effective technical tools and new regulatory frameworks for data sharing for research, innovation and development in health and social care. Opportunities for patients to donate health data to research and development are currently limited.

Regional strengths

In the Stockholm region, health data for more than two million individuals have been available since 1996. The region is also home to successful university healthcare facilities and other unique data collections and has access to national research infrastructures such as SciLifeLab, the PKU Biobank, the Human Protein Atlas and the Swedish Twin Registry. It also houses physical infrastructure such as the Karolinska Cell Therapy Center, GMP facility, BioClinicum including MedTechLabs, Biomedicum, CIMED (center for innovative medicine), Centrum för Molekylär Medicin (Center for molecular medicine), ANA Futura and Karolinska Trial Alliance. These provide the Stockholm region

with world-class functional and intellectual infrastructure. For over 100 years, the Stockholm region has been creating benefits along the entire value chain from basic research to life science companies operating in the fields of pharmaceuticals, vaccines and medical technology. By establishing the Stockholm Center for Health Data, Region Stockholm taken further steps towards making structured health data available for research and development securely and efficiently.

Where we want to be in 2023

The work of making available the Stockholm region's collected, structured health process, care process, outcome and real world data, and also biobank and image data, has taken clear steps forward.

There is considerable expertise in the Stockholm region in the analysis, storage and dissemination of health data. Clear processes are in place so that health data in the life sciences sector is disclosed and shared in a legally secure and ethical manner.

Development needs

In order for actors in the Stockholm region to become leaders in making structured health data available for research, innovation and development securely and efficiently, new methods for anonymization, analysis, secure storage and disclosure need to be developed. We will develop a systematic system for feeding back results into day-to-day health and social care. The work will take financial, legal and ethical aspects into consideration in close dialogue with stakeholders, including residents.

³ In this context, and in line with the definition of Real World Data in Sweden's national life sciences strategy, health data means "information on the treatment and health of individuals, found in registers and medical records, and lifestyle information collected through mobile applications and wearable technology."

⁴ Research! Sweden 2019. <http://www.forskasverige.se/wp-content/uploads/Opinion-survey-2019-ForskaSverige.pdf> (in Swedish)

4.2 Health and social care systems available for interaction with research and innovation and collaboration with business

Background

The Stockholm region has a well-developed, publicly funded health and social care system. Following the introduction of a freedom of choice system, the region has a diversity of providers with a high degree of skills and specialization. This development poses a challenge that needs to be addressed to avoid healthcare and patient-oriented clinical research being separated, as this complicates research, knowledge creation and dissemination. The number of clinical trials and the number of patients enrolled in clinical trials is decreasing. This can partly be explained by an increased focus on productivity in the healthcare sector in the Stockholm region and increased global competition.

The trend towards more highly-specialized care is leading to narrower patient bases in individual diagnostic categories. Clinical trials require a certain critical mass of patients, and so there is a greater need for intra-regional, national or international collaboration. This is hampered by the fact that channels of contact for requesting studies in health and social care settings are fragmented and unclearly communicated.

Regional strengths

Residents and patients in the Stockholm region are favorably disposed to participation in clinical trials. Region Stockholm has a research and innovation structure and expertise that is fully embedded in the healthcare system. Region Stockholm and the City of Stockholm have collaboration agreements with several universities in the Stockholm region and Region Stockholm has its own innovation fund. Collaboration between Karolinska Institutet (KI) and Region Stockholm in the areas of healthcare, research and education is governed by the national and regional ALF agreement.

As a leading medical university, KI is also keen to help improve the application of research outcomes. There are established innovation partnerships between Region Stockholm and a number of global companies. Similarly, universities work closely with global companies and support innovation inhouse and through their holding companies. The municipalities in the Stockholm region are actively engaged in innovation in the field of health and social care.

Where we want to be in 2023

Health and social care bodies collaborate and are available for research, innovation and collaboration with business where there is a clear operational and user benefit. Research, innovation, knowledge creation and dissemination take place within public healthcare services, whether operated inhouse or under contract. Where relevant, Region Stockholm sets out clear requirements for healthcare providers' participation in clinical research in healthcare agreements of various types. Research outcomes are effectively implemented in health and social care. Channels of contact to the test environments are communicated clearly and coherently. Opportunities to conduct clinical trials in the Stockholm region are more clearly communicated to all stakeholders. In fulfilling the objectives of the Research Promise, Region Stockholm Region is accepting of, and responsive to, the needs of research, whether the responsible authority for the research is a private or public entity. The region has a strong partnership with industry and academia in the life science field. Lessons from the Covid-19 pandemic have been applied and the whole sector is prepared for potential new pandemics, epidemics and other extreme situations.

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Development needs

Health and social care professionals may find it difficult to prioritize involvement in test beds, joint projects and/or clinical research.

Knowledge management needs to be tasked with creating systems to enable breakthroughs to be more quickly implemented in health and social care. Leadership, clear career paths and incentive structures for employees, and a functional infrastructure need to be developed, as do new business models, collaborative arrangements, remuneration

models, and socio-economic analysis. Workers' skills will be enhanced in order to increase the capacity of healthcare services to take part in research. The long-term development of a high-quality healthcare system for the future requires an environment that attracts and retains the best students and leading researchers. Essential in this context are a high standard of education, clear career paths, and good opportunities for joint research and innovation projects involving healthcare, academia and business.



Science City Flemingsberg

4.3 Precision medicine gives patients and residents access to high-resolution diagnostics and personalized prevention and treatment

Background

Precision medicine is making its entry into healthcare worldwide and involves diagnosis, treatment and monitoring tailored to the circumstances of the individual patient. Technological advances have made it possible to read the entire human genome quickly and at an ever-decreasing cost. Powerful gene sequencing techniques can be used to lend precision to healthcare. The methodology leads to new types of clinical trials, based on smaller, but better characterized, patient groups. Precision medicine's scientific advances have not yet been introduced into healthcare. In the Stockholm region, the sources of health data, which will be important for development in this area, are numerous and fragmented.

Regional strengths

There are areas of strength in the Stockholm region where research and healthcare are fully integrated in imaging, genomics, proteomics and microbiology. This means it is uniquely placed to spearhead the development of precision medicine internationally. The region is host to large numbers of leading researchers and clinicians and substantial infrastructure for molecular methods, an environment not replicated in many other places in the world. The health of the population in the Stockholm region is good, with long life expectancy and a well-educated population. The Stockholm region plays a leading role in the development of digital health tools.

Where we want to be in 2023

The Stockholm region is a leader in precision medicine and personalized healthcare. Health data sources are identified and readily available for research and monitoring purposes. Information about health in the Stockholm region is communicated to residents and businesses. Individuals are able to achieve the best level of health that their circumstances allow.

Development needs

Health services will take a stronger role as commissioners of diagnostics that lead to preventive interventions. There is a need for greater expertise around the possibilities offered by precision medicine. We need to develop methods for demonstrating the societal benefits of precision medicine. Solutions also need to be developed in areas such as data availability, technical and legal interoperability, storage, analysis, ethics, security and remuneration models for healthcare. There must be systematic involvement of residents and patient organizations, who must be invited to get involved in development work. Better conditions are needed to facilitate industry involvement in precision medicine, which could include introducing clear processes and facilitating collaboration with healthcare. Support, tools and opportunities will be developed and put in place to encourage individuals to make healthy lifestyle choices.



4.4 Interdisciplinary collaboration creates solutions to complex challenges

Background

The linkages between different fields of knowledge are becoming increasingly important and multidisciplinary collaboration brings significant learning benefits. In life sciences, traditional sub-sectors such as medical technology, biotechnology and pharmaceutical production need to interact with complementary sectors such as materials (biological/nanomaterials), electronics, mathematics, ICT, and engineering fields such as robotics and artificial intelligence, and also with the behavioral sciences, law, humanities and artistic practices. The actors in the Stockholm region have not joined forces around designated priority areas.

Regional strengths

The Stockholm region is home to world-leading research, with several research areas in the life sciences. There are three strong universities here, with Karolinska Institutet ranking particularly highly in medicine. The combined potential of the Stockholm trio (Stockholm University, Karolinska Institutet and KTH Royal Institute of Technology) is considered to be very substantial.⁵ The region is also home to national research infrastructures such as SciLifLab. This creates unique opportunities to identify interdisciplinary cutting-edge areas in life science where the Stockholm region can become internationally competitive. The region also has a unique breadth of business sectors, including a strong tech sector.

Where we want to be in 2023

There are development projects in the Stockholm region in designated cutting-edge areas that bring together traditional medical technology, biotech-

nology and pharmaceutical production with new areas such as materials, electronics, mathematics, ICT, robotics and artificial intelligence, and also including climate and environmental sciences, behavioral sciences, law, humanities and artistic practices. There is a clear process for external parties to gain access to these environments. Communication and marketing of the region's opportunities and its improved environment for life science have been intensified to attract more foreign companies and investment.

Development needs

Stockholm region stakeholders will jointly identify and prioritize cutting-edge areas where continued collaboration, investment and joint marketing can help further enhance the region's competitiveness. Region Stockholm, municipalities, universities and colleges, the business community, and representatives of patients and their families will continuously discuss, challenge and stimulate each other with new ideas and expertise to increase prosperity. This collaboration needs further strengthening as it requires a high level of understanding of the motivations and drivers in different sectors. The Stockholm region will exploit its strong position in IT and AI/Machine Learning, and, with its prominent position in life science, create unique synergies between sectors. Production skills for technology and digital innovations that have application in the life sciences need to be improved.

⁵ QS World ranking of universities 2019/2020. The University of Stockholm Trio How would they perform together in international rankings? (Gabor Schubert, Analyst, Stockholm University Library, 16/11/2017)

4.5 Life science companies research, develop and grow in the Stockholm region

Background

The Stockholm-Uppsala region together is responsible for approximately half of all those employed in the traditional life science sector, such as pharmaceutical development, medical technology and precision medicine. The Stockholm region has a well-developed infrastructure for research and innovation, but SMEs sometimes have difficulty accessing it. This is worrying because large companies are doing less and less research themselves and therefore rely on collaboration with small research companies. Another challenge is premature acquisition, with life science development companies moving abroad while still in their growth phase.

Regional strengths

The Stockholm region has a wide breadth of sectors with complementary skills and a strong start-up environment featuring a large number of new companies. There has been major investment in research infrastructure in recent years, in areas including Flemingsberg, Hagastaden and Kista, and initiatives are underway to increase access to this infrastructure. There are effective and well-designed innovation support systems⁶ that are under continuous development so as to provide optimal support to SMEs.

Where we want to be in 2023

Life science companies are starting up and growing in the Stockholm region and foreign companies and investors are being attracted to the region. The business communities in Stockholm's inner city, Hagastaden, Kista and the Flemingsberg area are collaborating seamlessly in the life science field. The Stockholm region stands out internationally as a multidisciplinary knowledge hub, offering unique conditions for the refinement of research and technology in a number of clear profile areas in life science.

Development needs

There must be a clear, well-communicated route for companies to access research and innovation infrastructure in the Stockholm region. We need to develop opportunities for SMEs to interact with large companies. Promoting investment will attract companies and value-add investors to the Stockholm region's life science companies.

⁶ E.g., KI innovations AB, Flemingsberg Science

