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New Challenges Require New Strategies ▫ Open Arenas Help Build Better Cities

WORKSHOP 2 - STPs, science cities and urban strategies

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2 Introduction

Figure 1 The Greater Gothenburg region

The Greater Gothenburg region is situated in the south-western part of Sweden. It consists of 13 municipalities and has about 1 million inhabitants (Figure 1). It is the country' s second largest metropolitan area, after Stockholm. The area is traditionally dependent on trade and industry and was a centre for shipbuilding until the 1970' s. Today, the area is home for automotive and manufacturing industry (Volvo, SKF) pharmaceutics (AstraZeneca), ICT (SAAB, Ericsson) and petrochemicals. The blue collar jobs are gradually being replaced by jobs in other sectors, primarily in service.

There are two universities in the area, Gothenburg University (about 25,000 students) and Chalmers University of Technology (about 10,000 students), both internationally renowned. Sahlgrenska University Hospital, one of Northern Europe' s largest hospitals, serves as a teaching and research institution for the medical professions. There are three Science Parks in Gothenburg, described in greater detail below.

As an urban area, Gothenburg faces several tough challenges that need to be addressed in the near future. Many of these challenges can be found in cities and urban areas all over the world, and thus the solutions may be of interest to many policy makers and stakeholders engaging in urban development.

This paper will deal with three specific challenges, and how they are met by applying the Open Arena Concept in Gothenburg' s three Science Parks.

- Sustainable Urban Development

Gothenburg is one of the least dense cities in Europe, and there is great focus on densification of the urban environment. At the same time, traffic intensity and car usage need to be kept under control, which requires new thinking when designing new housing or office districts. Segregation is another issue that needs to be addressed. The city has tended to become divided in high-income and low-income residential areas, where in the low-income areas there is weak integration with society leading to social problems, unemployment and alienation. Last but not least, new developments must be ecologically and economically sustainable, regarding both construction as well as operation.

- Transport and logistics

The coming decades will see large infrastructural and city development in Gothenburg, which will put high pressure on the need to find new and more efficient ways of transporting goods and people. Innovative transport and logistics solutions are key elements to sustainable city development both economically and environmentally, as well as for the general well-being of the population.

- Improving healthcare by innovation

Sweden is facing an old-age boom. By 2040, 25 % of the population is expected to be above 65 years of age. An aging population requires a well-functioning healthcare system. In Sweden most of the healthcare is operated by the regional government and regularly faces budget cutbacks. It is important to be able to meet medical needs despite limited resources. Innovation and improvement are therefore necessary.

3 Gothenburg’ s Three Science Parks: Roles and Rationale

3.1 Johanneberg Science Park

Johanneberg Science Park was founded in 2010 and is situated on the Johanneberg Campus of Chalmers University of Technology. The Park is co-owned by the University, the City of Gothenburg and six industrial owners. Johanneberg Science Park’ s main focus areas are Urban Development, Energy and Materials/Nano science. The Park’ s activities mainly centre on setting up Open Arenas within these focus areas and on developing the Campus area by providing office and lab facilities in the new buildings being erected on campus. Today, there are 140 companies situated on campus with a total staff numbering about 1,000. By 2023, the number is expected to reach 5,000. Johanneberg Science Park also operates a Growth Platform for small and medium sized enterprises (SME) which offers strategy and business development support to established firms in the region.

3.2 Lindholmen Science Park

Lindholmen Science Park is an international Science Park focusing on three areas:

- Intelligent Vehicles and Transport Systems
- Information and Communication Technology
- Modern media and design

Within the Lindholmen environment, stakeholders from business, university and public sectors collaborate. The projects carried out within Lindholmen Science Park are characterized by cross-border cooperation, both in terms of competence, organization and between countries.

3.3 Sahlgrenska Science Park

Sahlgrenska Science Park is tasked by Business Region Göteborg, the Region Västra Götaland, the University of Gothenburg and Chalmers University of Technology with further strengthening of the already robust innovation system in the life sciences field in West Sweden. To succeed in this assignment Sahlgrenska Science Park gives strategic business and matchmaking support to promising business ideas so that they can be developed into successful companies. Interaction with healthcare and academia is also a very important part in helping Gothenburg become an international and attractive centre in the field of life science.

4 The Open Arena Concept – Private, Public and Academia Working in Unison

One of the main guiding principles for the founders and leaders of Gothenburg’ s Science Parks has been the Open Arena concept (Figure 2). Open Arenas are, by definition, neutral meeting environments permeated by the spirit of collaboration between industry, university and society. In Open Arenas, researchers, business people, students, designers, project managers and many more meet to take advantage of the meeting spaces, test beds, labs and other infrastructures that are available.

Key attributes for the Open Arena concept are:

- Cooperation
- Neutrality
- Openness
- Application orientation

The Open Arena concept has several dimensions. One is the physical dimension including test beds (simulated or real environments), labs, and facilities for workshops, meetings, and conferences. Another is the operational dimension including thematic and more specialized arenas or programs, representing knowledge domains where different organisations co-operate in research and development. A third dimension is the methodological dimension where concepts such as project brokerage, open innovation, and living labs are central.

Figure 2 The Open Arena concept

Lindholmen Science Park has, during its more than ten years of existence, successfully developed and refined the Open Arena concept and today hosts nine projects within the Open Arena, some of which are Arenas themselves. Johanneberg Science Park has recently launched its first Arena, the Urban Development Arena.

Success factors based on experience from developing the Open Arena concept:

- Organization and infrastructure – Science Parks as organizational bodies offering a neutral collaboration platform. Access to indoor as well as outdoor facilities and test plants, etc.
- Strong industrial interest – industrial partners provide market knowledge and have the ability to take commercial risks
- Nationally and internationally prioritized focus areas – activities in prioritized areas meets the interest from both the academia, industry and the societal spheres
- Complementary collaboration partners – cross-fertilization between organizations and individuals from different background and competence areas
- Agile way of working – flexibility and agility in management and implementation to reach the best possible results
- Neutrality and “ non-profit” – key characteristics for successful shaping of open research and development co-operations

5 Three Cases: Challenges and How They Are Met

Thanks to their structure and governance (University, Industry and Government), Gothenburg’ s Science Parks have unique possibilities of addressing the complex

challenges of shaping the new city in a tangible and hands-on manner. Additionally, Region Västra Götaland actively supports the building of a regional innovation infrastructure by co-funding and co-ordinating the Region' s six Science Parks. While the Region does not dictate the content or activities of the Open Arenas, it will offer its strategic perspective and strive for the Arenas to be aligned with the regional Innovation Strategy.

In this section, three projects that each tackles a distinct urban challenge will be briefly described. Each is managed by a Science Park and includes participants from all parts of the Triple Helix .

5.1 Sustainable Urban Development – Riksbyggen Positive Footprint Housing

70 % of the world' s inhabitants are living in cities. Creating a sustainable urban environment is one of the most vital and pressing challenges of modern society. Johanneberg Science Park, one of Gothenburg' s three Science Parks, specialising in urban development, energy, materials and Nano science, has become a node for sustainable urban development in West Sweden.

An important aspect of Johanneberg Science Park and its sibling parks is the nature of their governance. Johanneberg Science Park is co-owned by Chalmers University of Technology, the City of Gothenburg and several businesses, creating a Triple Helix environment that starts right in the boardroom.

Among the co-owners are also Riksbyggen and HSB, Sweden' s largest co-operative housing organisations, together providing housing for about a million Swedes. Both these organisations were started in the era between the1920s and 1940s to provide the means for ordinary people to obtain housing, of which there was a great shortage at that time. Both organisations have pioneered the development of functional and affordable housing in Sweden, albeit neither organisation had had previous involvement with academic research before joining Johanneberg Science Park.

It is therefore of particular interest that both Riksbyggen and HSB have launched Open Arena projects under the auspices of Johanneberg Science Park, both with strong focus on sustainability. This section will examine Riksbyggen' s project, entitled " Positive Footprint Housing"

Figure 3 Positive Footprint Housing, architect's image

5.1.1 Background and Aim

The idea behind Positive Footprint Housing (Figure 3) was conceived in 2011 through collaboration between researchers at the department of Architecture at Chalmers University of Technology, the department of Social Work at University of Gothenburg, Johanneberg Science Park and Riksbyggen. The project will result in a housing estate situated on the outskirts of Johanneberg Science Park, and several research projects will be conducted in parallel during the construction of the new houses. The research collaboration is expected to continue even after the houses are finished, allowing researchers and students to study and to conduct experiments in the unique environment of Positive Footprint Housing.

Initially, it was decided that the main success factors of the project would be:

- To be an internationally recognised model for sustainable housing
- To design expressly from a sustainability perspective
- To maintain interaction with the public throughout the project
- To employ new technology and innovative materials
- To build new knowledge about sustainability
- To contribute to the development of the district
- To pave the way for Riksbyggen' s inclusion of sustainability in future projects

The ambitious goal of the project is to show that Swedish housing can once again be world leading with respect to current and future demands for sustainability. By close collaboration between advanced research, innovative development and higher education the project aims to:

- Become a landmark example of innovative and holistic thinking in the fields of sustainable housing and urban development
- Show that sustainable construction is possible with respect to resource and energy usage, design, materials, technology, processes and management and that the finished housing project can have a positive net energy balance and is financially viable
- Focus on human needs through flexible solutions that facilitate a sustainable life style for the residents and social acceptance from the neighbours
- Promote social sustainability by specifically catering to children' s needs and to strive for a mix of generations and backgrounds among residents
- Radically reduce the need for private cars
- Be a key project that vitalises and strengthens the development of Campus Johanneberg and its surroundings by adding architectural quality and creating the conditions for a more dynamic neighbourhood
- Manifest a long term collaboration, where the project will serve as a full scale laboratory for research, development and education for at least three decades to come
- Assume an active role in learning, public dialogue and knowledge development concerning sustainable housing

5.1.2 Stakeholders

The Positive Footprint Housing project gathers a broad representation of stakeholders from different parts of society. Apart from Riksbyggen and Johanneberg Science Park, Chalmers University of Technology, University of Gothenburg and the City of Gothenburg make up the project group. Numerous other stakeholders are also connected to the project, including SMEs and larger companies, interest groups and NGO' s.

5.1.3 Activities

While the construction project is still in the planning and design stages, the research work is well under way. Undergraduate and graduate research projects are being carried out on the following themes:

- Behavioural and social aspects of housing
- Sustainability
- Quality
- Control and monitoring
- Energy efficiency
- Materials and technologies

In order to stimulate interest from the industry, particularly from small and medium-sized companies, workshops have been conducted where companies from within and outside of the building sector could present ideas and innovative technologies that could be incorporated in the project.

The project is expected to be finished by 2016.

Figure 4 Positive Footprint Housing - Interfacing with the surrounding green area

5.1.4 The Science Park' s Role

With respect to the PFH project, it is clear that the Science Park' s role has been crucial and that the project would in all likelihood not have been conceived if it were not for Johanneberg Science Park and Riksbyggen' s stake in the Science Park. Riksbyggen as an organisation had no previous experience of academic research or of contacts with academia, but were introduced and guided by Johanneberg Science Park to the right connections in the Positive Footprint Housing - research community. To summarise, the following constitute some important roles of the Science Park in this project.

- Ownership structure (incorporating academia, industry and government)
- Introduction of new actors in the system
- Guidance and support in interactions academia-industry-government
- Facilitation of meetings
- Communication of project results

5.2 Secure and efficient transports

5.2.1 Background and aim

Transportation constitutes a major future challenge for the cities of the world. In order

for cities to function, goods and people must flow efficiently within and between cities. In finding future-proof transport and logistics solutions lies the key for sustainable cities. This challenge must be met by a cross-organizational approach involving all needed stakeholders, and therefore a Science Park has a clear role to organize and host all key players addressing these challenging needs.

5.2.2 Stakeholders

The stakeholders involved in the secure and efficient transport projects represent public, industrial, and academic partners. From the public side actors such as the Swedish Road Administration, VINNOVA and the Swedish Customs are represented. Industrial partners include Volvo Logistics, Volvo Technology, Stena Line, and others. Participants from the academia include among others Chalmers University of Technology and the Viktoria institute.

5.2.3 Activities

5.2.3.1 Secure and efficient transports through ports

Ports play a critical role for the global goods trade. There is a clear long-term trend that the volume of goods passing through ports will increase in combination with new international security regulations, which involves major challenges to transport efficiency and to a port's daily operations. The transport system is characterized by a continuous need for information. The information is often inadequate and it is received with varying delays due to extensive manual handling. There is a great need of finding new solutions that can make the goods flow more efficiently at the same time as new security requirements are met.

Presented with this challenge, the project "Secure and efficient transports through ports" was initiated and has been performed within the area of societal critical transports at Lindholmen in Gothenburg. The logistics concept has been based on actual trailer transports between Volvo Logistics' cross-dock terminal and Stena Line's port terminal in Gothenburg, Sweden (Figure 5). The project has been coordinated by Volvo Technology and involved several government agencies as well as stakeholders from industry.

The concept shows that focus can be spent on value-adding activities instead of on waiting time at ports. During the project, the transport time was reduced by 25% concurrently with the period a trailer is left unattended being eliminated instead of adding up to 20% of the total transport time, which it was previously. Increased efficiency creates increased security since the possibilities for malicious activities can be reduced. The pilot project clearly indicates how problems with increasing needs of efficiency and security can be met in a way that supports all stakeholders; an approach which is necessary in order to attain end-to-end transport efficiency and security.

Figure 5 Port of Gothenburg

5.2.3.2 Go:smart and Sendsmart

Furthermore, efficient urban transports have been addressed from both passenger and freight perspectives in Gothenburg by Lindholmen Science Park. The sister projects ” Go:smart” and ” Sendsmart” are local projects financed by VINNOVA and are gathering a large variety of interest groups, stakeholders and actors in those areas in order to find and establish solutions for the challenges that the city will be undergoing during the coming years. The Go:smart project focuses on seamless, rewarded and electrified everyday travel by development and testing of innovative integrated services which will be tested in a Living Lab during 2013.

For freight transport operations it is acknowledged that it is not only distribution that should be considered when talking about urban freight transport, but also waste management and construction deliveries. The “ Sendsmart” project creates sustainable freight transport in urban areas. The innovative and sustainable solutions will reduce the impact of transport on climate, noise levels and the health of those living in the city, resulting in a more attractive and competitive city. A major challenge in the project is to find technical solutions as well as solutions that focus on cooperation between different actors. The goal is to create viable logistic solutions. Clean, energy-efficient and quiet vehicles together with logistics for increased consolidation of flows are in focus. Business models, policy and regulation are tools used.

Collaboration is crucial in the projects, both within the projects between partners, but also between the projects themselves, in order to secure a holistic approach that includes both freight and passenger transport in the overall transport planning of the urban area. This will ensure that synergies can be obtained and the result is expected to be a long-term plan with commercially sustainable solutions for both freight transport and passenger transport. In order to do so, the projects work with evaluation, visualization and marketing with a holistic approach to all areas of the two projects.

5.2.4 The Science Park’ s role

As mentioned before the Science Parks have a key role in facilitating these activities. Being the neutral co-operation partner in these multi-stakeholder projects, the Science Parks are the natural brokers that can make it happen. The Science Parks contribute with:

- Connecting companies with scientists
- Offering the platform for meetings and planning activities
- Financial support and advice
- Overall project management and dissemination

5.3 Innovation in Health Care

Since healthcare quality is important for all citizens, the Science Parks Open Arena concept helps to build better cities ready for future challenges by stimulating innovation in the life sciences field. Gothenburg is a strategic life science area and as the following sections will show, Science Parks are excellent tools for a city or a region to implement innovation strategies in practice.

5.3.1 Background and Aim

Region Västra Götaland is responsible for most of the hospitals and healthcare facilities in Western Sweden and is also one of the owners of Sahlgrenska Science Park. With the number of elderly people rapidly growing, it is recognised that increasing demands will be placed on the healthcare system, both in terms of quantity and in terms of quality. Meanwhile, the demographic changes may lead to a stagnation or even decrease in tax incomes as a higher proportion of citizens become old-age pensioners. Therefore, there is a great need for innovation and creativity in terms of increasing efficiency and flexibility of the system, something which calls for a mobilisation of the entire work-force in coming up with new ideas for improvement.

The regional administration has identified some deficiencies or at least limitations in the innovative capacity of the healthcare system in terms of the availability of new, better solutions for the citizens in the region. The well-being of citizens is important and a long term goal is to better meet the needs from patients.

The Swedish government has highlighted that healthcare innovations are important and has provided seed money to start special Innovation Gateways in a few places in Sweden, in order to capture and develop ideas from healthcare employees. The Innovation Gateway in Västra Götaland is one of these unique initiatives.

The concept of the Innovation Gateway builds on having selected a number of employees to act as Idea Transporters, who will act as interfaces between the workforce and the selection and prioritisation committees that will decide which ideas will progress to commercialisation. In this way, submitting an idea should be easy and informal, and adequate support for developing and eventually commercialising the idea will be offered by the project.

The project will strengthen the link between healthcare, industry, academia and the Västra Götaland innovation support system, of which Sahlgrenska Science Park is a very important part. The regional administration (Region Västra Götaland) is the initiator of this specific Innovation Gateway and Sahlgrenska Science Park is a natural partner in this long-term cooperation. In order to capture relevant ideas from healthcare employees such as doctors and nurses, Sahlgrenska Science Park provides professional advice and experience at an early stage, working in the selection committee that assesses all ideas that are submitted to the Innovation Gateway.

5.3.2 Stakeholders

The Innovation Gateway projects gather a broad representation of stakeholders from different parts of society. Apart from Region Västra Götaland and Sahlgrenska Science Park, there are representatives from the Sahlgrenska University Hospital and ALMI . Research and Development and Intellectual Property expertise are also represented.

5.3.3 Activities

During the spring of 2013 Sahlgrenska Science Park has actively tried to stimulate the creative vein of health professionals by arranging special Innovation seminars for all employees, most of them nurses, from the Thorax clinic at the Sahlgrenska University Hospital in Gothenburg. Healthcare professionals in this category do not usually consider themselves innovators. But they often work hands-on, directly with patient care and they definitely have great competence and a lot of valuable ideas based on their knowledge of patient needs. The seminars were arranged by Sahlgrenska Science Park in cooperation with the Innovation Gateway and the healthcare

professionals were inspired by questions like: What can be done better, faster and safer?

Ideas from health professionals often come about by chance, when people get annoyed by something that does not really work. Passion and compassion can be excellent starting triggers. And it doesn´t have to be difficult to become an inventor – An organisation such as Sahlgrenska Science Park can help to formulate the idea and provide business support all the way to the market.

In general, researchers do not usually think about commercial opportunities but those who do often find it both exciting and fun. It can attract attention to their research and if the ideas result in a product it may create a real benefit for patients and create new job opportunities in the region. Driving changes in this way is a challenge and a win-win situation with numerous benefits, commercial advantages and potential for knowledge expansion. Sahlgrenska Science Park is well suited to assist in this work as it has a significant network - regional, national and international – and collaboration partners in relevant areas.

Innovation and change always start with an idea. Even though in many cases the ideas submitted are only embryos to solutions, it has definitely proven that contacting the Innovation Gateway is worthwhile. For instance, a Smartphone application for unusual dental diagnoses is a project that has been initiated and developed through this long-term process. It is presently on the market and appears to have great potential. It will also receive international exposure through this autumn' s presentation at a congress in Melbourne, Australia.

Figure 6 Smartphone app for dental diagnoses

Sahlgrenska Science Park now plans to assume even greater responsibility in the process of evaluating new and usually very relevant ideas coming through the Innovation Gateway. Sahlgrenska Science Park focuses on commercialisation of valuable life science ideas and innovations with a particular interest in healthcare innovation. New ideas and creative thoughts about improvements also drive future development for the city, the region and the country.

5.3.4 The Science Park' s Role

In this project, the most important roles of Sahlgrenska Science Park are:

- Evaluation of submitted ideas
- Verification through the Science Park' s network of experts
- Development and commercialisation of positively evaluated ideas
- Facilitation of collaboration between project members from different spheres

6 Results

To summarise, the projects above have contributed to some very tangible achievements in the joint effort of preparing Gothenburg for the future. In line with the Open Arena concept, stakeholders from all parts of the innovation system have collaborated to produce state-of-the-art, yet practically viable and politically feasible solutions.

Some examples of results that have come from the work in the projects described in this paper are listed below.

“ Positive Footprint Housing”

- The conception of a long-term cross-disciplinary collaboration between co-operative housing organisation Riksbyggen, two universities and the City administration to pursue advances in social, economic and ecologic sustainability in housing

- The start of an ambitious building project, which will result in a residential complex that is a model of sustainability in all aspects

- The introduction of new concepts in urban development such as “ Car-Free Living” and “ Children’ s Consequence Analysis”

“ Secure and efficient transports”

- Creation of new cross-disciplinary networks of people and organizations

- “ Proof-of-concept” of new methodology, services and technology for the transport industry

- Significant reduction in transport times for goods traffic through ports

- Innovative solutions for goods transports in urban environments

“ Innovation Gateway”

- The project has shown how to simplify the way new ideas for the healthcare system in the region are taken advantage of. For instance, the Innovation Gateway process has helped a Smartphone application for unusual diagnoses to quickly develop from idea to a product on the market.

- The Innovation Gateway is strengthening the link between healthcare, industry, academia and the innovation support system. The cooperation has become an excellent way to further stimulate the creative innovation climate. Among other activities, seminars for Thorax clinic professionals have increased the awareness of the importance of innovation

- The project has put commercialisation of life science ideas on the agenda in Sweden and highlighted the role of the Science Parks in Triple Helix collaboration.

7 Conclusions

Even though much work remains to be done and the Open Arena concept is still not fully developed in all of Gothenburg’ s Science Parks, some conclusions may readily be drawn from the work described in this paper:

- Open Arenas driven by Science Parks are excellent tools for a city or a region to use to put innovation strategies to practice

- Science Parks may then assume active roles as coordinators, initiators and catalysts in a Triple Helix-driven process where they may also act as mediators between the different stakeholders