DREAMS and SEEDS

The role of campuses in sustainable urban development

Editors: Schwenius, Keränen, al Rawaf
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**Live Baltic Campus Funders and Partners**
The Live Baltic Campus project has exploited participatory planning and design as a means of creating urban environments that flourish in a high-quality working environment, add to the growth of the local area and community, also benefitting the quality of life for residents in both urban and rural areas. The Live Baltic Campus project contributes to the VASAB vision by offering solutions to the VASAB vision by offering sustainable, neighbourhood-centric solutions that reflect the development of the city overall. This makes the campus areas true living labs for urban planning.

A CONTINUOUS DESIRE FOR KNOWLEDGE DRIVES THE PROGRESS OF SCIENCE, AND AT THE SAME TIME THE DEVELOPMENT OF THE ENTIRE SOCIETY. THE WAYS IN WHICH KNOWLEDGE CAN BE ACQUIRED OR CREATED VARY GREATLY. NOT SO LONG AGO, STUDENTS ACQUIRED KNOWLEDGE THROUGH READING SCIENTIFIC LITERATURE, ATTENDING LECTURES AND WORKING IN LABORATORIES. NOW THE MORE INNOVATIVE STUDENTS COME FROM DIFFERENT DISCIPLINES AND FIELDS. STUDENTS SPEND MORE TIME WITH RESEARCH, INTERNSHIPS AND PRACTICES, WHICH CAN ALSO RESULT IN A BETTER UNDERSTANDING OF LOCALITIES AND COMMUNITIES. STUDENTS IN THE FUTURE WILL WORK IN CROSS-DISCIPLINARY TEAMS, WHERE KNOWLEDGE, SCIENCE AND LOCAL KNOWLEDGE ARE BLENDING TOGETHER.

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Prefaces


One of the objectives of the Live Baltic Campus project is to develop a framework for participatory planning and design that can be used as a tool for implementing the Live Baltic project. The project has been developed in collaboration with researchers from the University of Technology, University of Tallinn, and University of Innovation Centres in the Central Baltic Region. The project is expected to be completed in 2018 and will provide a comprehensive overview of the current state of the Live Baltic project and its potential for the future.

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Stockholm

THE CITY of Helsinki's vision is to be the most functional city in the world. This means smooth traffic connections, high quality public services, various housing opportunities, and pleasant living environments. The city wants to see citizens, students, universities and other stakeholders as close partners in developing the city and its services.

The result from Live Baltic Campus project presented in this book is a description and visualisation of the future campus. The city of Helsinki, the Stockholm County Administrative Board, the Regional Development Manager, Johan Genneby, Central Baltic Contact Point, Sweden North, Business Development Manager, County Administrative Board of Stockholm, Forewords

Riga

THE CITY of Riga's vision is to be the most competitive city in the world. The city takes a proactive approach to increasing its competitiveness, growth potential and reputation. One-third of Sweden's economy and almost half of all jobs are created here. Still, the county is characterized by its nature, clean air and water which contribute greatly to its attractiveness.

The result from Live Baltic Campus project brought interesting platforms and ideas for future development of campuses in the city. It was crucial to have close collaboration and strategic cooperation between the city and the universities to achieve the desired results. This book delivers seeds for better urban futures that connect cities and citizens, and serves to spur the use of inclusive processes for sustainable growth with improved quality of life for all.

Anni Sinnemäki, Deputy Mayor for Urban Environment City of Helsinki

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Every municipality, and each university, must take their responsibility to meet the challenges facing democracy, human rights, and the climate, which are evident around the world today. The pursuit of the Sustainable Development Goals decided by the UN offers a good opportunity for cooperation for this purpose.

As a student union representative I can personally relate to the five space ideology. Since the facilities for student use to campus are often scarce and building new spaces highly expensive, it is important that the existing facilities are used efficiently in a protean manner.

It is easy to forget that cities are all being transformed by different activities and ideas, and transforming with the energy of students. Thoughtful planning and design of open public buildings and open spaces, such as the community campus, increases the interaction between the city center and the campus by adding value and reducing the inner area. Concurrently, while enhancing the public space in the city center, new life-giving activities are born. When we are closer together, we tend to be more active and therefore carry our everyday activities more efficiently. As social beings, people also enjoy the company of others and feel more secure in places where we are not alone.

Turku is fortunate to have a major university located right in the historical center of the city. This means that the center is always crowded, with unique possibilities for meeting and interacting, both planned and unplanned. For students, the library is a place that is always bustling with life, where they can meet and have discussions on a vast range of topics. It requires highly thoughtful action, both for the municipality and for the universities, to ensure that the center is always bustling with life.

The city of Turku is one of the most important higher education centers in Finland. Since almost a fifth of the population is students, the official aim of Turku is to be the best student city in the country. The location and the atmosphere of the campus play a significant role here. The campus area in Turku, comprising of five different higher education institutions, is exceptionally attractive for students, providing excellent grounds for student campus planning.

To locate the key shortcomings in the campus, a survey was conducted in May 2016 as part of the Live Baltic Campus project. The findings showed that the most pressing need for students was new places to study, work, and hang out in. Therefore, a versatile pop-up student place was launched for a week in the center of the campus. Although the attendance was modest, the feedback was highly positive.

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Live Baltic Campus

The Live Baltic Campus Expedition to the Netherlands
MAR 2016

“The Live Baltic Campus Expedition to the Netherlands”

OCT 2015

Project launch

NOV 2015

Project Kick-off

Inventory reports made in each city

MAR 2016

“The Live Baltic Campus Expedition to the Netherlands
MAR 2016

“3 Days, 4 Cities, 11 Locations, 28 expert expedition-ers from 4 countries and 6 cities”

MAR 2016

Livable City Forum

Turku & Helsinki

JUN 2016

Livable City Forum

Uppsala

NOV 2016

Study on participatory design processes of Campus Albano, Stockholm completed

MAR 2017

Preliminary results presented at the VASAB workshop at the EU Strategy for Baltic Sea Region Forum

JUN 2017

Service!

Heart!

City!

Change!

Bloom!

Together!

Common core themes from the pilot cases identified

MAR 2017

Preliminary results presented at side event of the EU Week of Regions and Cities in Brussels

OCT 2017

Final Conference

Stockholm

DEC 2017

Book ‘Dreams & Seeds’ published

Live Baltic Campus Development Ideas Book published

DEC 2017

Local pilot cases to enhance stakeholder participation run in Helsinki, Riga, Tartu, Turku and Uppsala:

WORKSHOPS, POP-UP EVENTS, CAMPUS STUDIES, THEME STUDIOS FOR STUDENTS...
Introduction

The role of universities is transforming, expanding from one of being pure education and research facilities to increasingly becoming active partners in regional development, and facilitators for innovation. The importance of their physical and social locations is simulta-
neously increasing in the context of urban planning and development. Cities are often perceived as innovation front-
runners, guiding the way for their regions and countries, and with the knowledge economy gaining importance, university campuses increasingly function as real, lived-out, evolving spaces and laboratories for our cities.

The Live Baltic Campus project set out to explore the potential of the campus as a laboratory for urban development. The project is based on the notion of campuses as urban spaces whose physical and social interconnec-
tions with their surrounding areas and communities should be supported. With the support from the Central Baltic Pro-
grame, six higher education institutes have collaborated to utilise design-based participatory planning methods to deve-
lop campus areas into respective city visions, while sharing their results and findings. The campuses, currently at diverse stages of planning, construction, and development, are located in six cities from four countries: Helsinki and Turku in Finland, Tartu in Estonia, Riga in Latvia, Stockholm and Uppsala in Sweden. This book is a collection of two and a half years of insights acquired from the project. It combines formats, arti-
facts, case studies, and inspirational visions, or “Seeds”, to provide a holistic understanding of current approaches to campus design that addresses both the academic and the wider community context.

The book consists of four sections that approaches campuses from different de-
sign perspectives. The first section, Campus in the City Context, examines the developing role of campuses through time, their current status, and frames the key concepts of design thinking, sustainability and resilience in the context of the book. The second section, Design of Planning Campuses, focuses on the participatory planning process, including its successes and hurdles, and how to approach campuses as knowledge locations. The third section, Design of Built-up Campus Infrastructure, introduces the knowledge and experience of creating inviting and inspiring learning environments for emerging higher education. The fourth section, Design of Campus Landscapes, discusses ways of better weaving campuses into the urban fabric, and insights for rethinking the role of the higher education institutions as both the learning community and the surrounding city. The final section, Design for Campus Experience, extends the scope to also address lifestyle changes and the inclusion of new members, such as local residents, into the campus community. Presentations of practical tools and strategies for participatory campus planning complement these sections.

We see this book as an excellent exam-
ple of inter-regional collaboration, and the development capacity of campus communities. It is with great pride and joy that we present this book, and we hope that you will enjoy learning from it as much as we have.

Päivi Keränen,
Project Manager,
Live Baltic Campus,
Metropolia University of Applied Sciences
Section 1.
CAMPUS IN THE CITY CONTEXT
and restaurants of street-based, mixed-use buildings provide active frontage onto the public realm; the car-parking areas that were such a prominent feature of the twentieth-century campus are being scaled down in response to the more sustainable transport habits of the millennial generation. Above all, universities: on the left bank of the Seine, Paris VII (Université Diderot) brands itself as ‘immersed in the city, immersed in life’, while for Arizona State University, ‘ASU Downtown Campus is the place to see/be seen in Phoenix’.

Far from being simply a matter of axiomatic that universities newly formed in architectural fashion, these designs shifts after 1950 would be allocated open landscaped sites in ex-urban locations. They were responding to five profound challenges of contemporary academic life. First, sustainability: the inclusion of carbon-mitigation in universities’ performance measures encourages a layout that is compact, accessible and energy-efficient. Second, recruitment and retention: universities are in fierce competition for staff and students, and since the late 20th century, turning away from adjacent streets, planting shrubs and trees as buffers to segregate academics from their surroundings, and allocating un-used campus land to parking lots so they could drive straight home to the suburbs at the end of the day. Around the time of the millennium a radical design shift occurred. Kerstin Hoeger of ETH Zürich speaks of it as a new Denkkultur, a knowledge culture that has transformed the relationship between cities and institutions. We can see the effect at every scale of campus planning, from the broadest issue of locational selection to the detailing of individual buildings. Out at night campus layouts tended to be linear and non-compact; the individual buildings that surrounded the campus became their own small cities, walled-off and defensive. The modernising university is an urban institution, and as such it is required to engage with the life of the city.

The innovation sparked a change in campus designs called densification or densification. It was characterised by flexible, multi-purpose spaces that were open to the public, and the emergence of new disciplines. Many existing universities were encouraged to relocate in new campuses. And these new universities that didn’t leave the city have a more open approach to the city. The evolving urban landscape of the modern university campus is moving towards a response to the more sustainable transport habits of the new generation. Above all, universities are in fierce competition for staff and students, and since the late 20th century, turning away from adjacent streets, planting shrubs and trees as buffers to segregate academics from their surroundings, and allocating un-used campus land to parking lots so they could drive straight home to the suburbs at the end of the day.

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It is surprising how many of the characteristics of our new campus designs have spread to other non-campus challenges in contemporary academic life. First, sustainability: the inclusion of carbon-mitigation in universities’ performance measures encourages a layout that is compact, accessible and energy-efficient. Second, recruitment and retention: universities are in fierce competition for staff and students, and since the late 20th century, turning away from adjacent streets, planting shrubs and trees as buffers to segregate academics from their surroundings, and allocating un-used campus land to parking lots so they could drive straight home to the suburbs at the end of the day.

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The Three Ages of University Design

UNIVERSITIES ORIGINATED in cities, and the teaching establishments of learning were nested within them: the monasteries of the Middle Ages, the guild schools of the Renaissance, the colleges and faculties of the early modern universities. The innovation quickly caught on. Campus designs offered flexibility for expansion and the emergence of new disciplines, they meshed with twentieth century transport and communications technologies, and they echoed the Modernist Zeitgeist of sunlight and greenery. Soon the word campus had become synonymous with a university itself, whether in or out of town. It was clear that universities needed to be allocated open, landscaped sites in ex-urban locations.

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The city of Helsinki recognizes that the Helsinki: Universities research and studies conducted at the Aalto University and the City of Helsinki bring new value to its surrounding area, in the form of new vitality and potential economic development. The city can facilitate new ideas and innovations by functioning as a testbed for the institutions and support entrepreneurship. The city offers its infrastructure and services to companies and researchers for testing university-based ideas and research, as well as to commercial products and services. The decision to locate Metropolia’s new campus in Myllypuro is a strategic choice. This area did not have a higher education institution, and the expectation is that the campus will create new business opportunities and play a major role in developing the area as an innovation hub. This hope is that the city will remain open and allies to the suburban neighborhood and its surroundings. Interaction between the campus and the surrounding neighborhood is essential. A long-term follow-up study on how the Myllypuro area will develop will be conducted by the City of Helsinki, Metropolia and the Urban Academy; a collaboration platform for the University of Helsinki, Aalto University and the City of Helsinki.

The Helsinki City Strategy 2017-2021 recognizes that a highly educated population is a key factor for becoming an entrepreneur. The city cooperates closely with the universities and student networks, for example, in developing university-based ideas and research. Hence, the city collaborates with the universities, and the expectation is that the city’s development and its rescue will be viable if they take advantage of their knowledge, creativity and sense of urban Helsinki. The city cooperative closely with the universities and student networks in the Helsinki Metropolitan Area. For example, the cooperation includes regular meetings between the universities and the city, and after collaborative development projects. Strategic focus areas of the cooperation between the city and the universities include the following: creating university-based ideas and research, as well as to commercial products and services. The city is a testbed for the universities and researchers. The city further strives to be an active developer and educator. In this way, Metropolia’s new campus in Myllypuro will be one of the central players in fulfilling the vision of the City of Helsinki of becoming the most functional city in the world.
Riga: Towards a new science at the confluence of architecture and economics

As a city develops, it tends to neglect certain small配套的条件下，重新组织内部管理并提升学术和研究的效率。这需要找到一种重新组织的方式，重新定义大学的概念，以适应新的时代需求。

The recent surge in start-up scene, able to attract millions of investors’ euros, and also a number of privately-funded (or even self-organised) co-working spaces for young people. In a matter of a few years, Riga has become a hot destination for students of medicine (and other fields) and their families.

Much of the unique cityscape Riga is owed largely as islands into themselves, achieving only middling results in economic, social, and urban development. The campuses fail to give any new impulse to the university’s transformative potential.

While university buildings have traditionally been a part of the city center, Riga’s university campuses have also been part of the story. Construction of the Riga Technical University (RTU) campus in Kāpas, on the west bank of the Daugava, which began in 1930, is one example. The process of building campuses is also reflected in the creation of new academic and research facilities.

The 2017 Revalit Development Centre was opened in September 2017, in the presence of the Riga Technical University (RTU) and the Riga Stradiņš University (RSU), aiming to connect the two universities to each other and to the city. The main focus was to combine the two languages of architecture and economics, to identify common values, and create an understanding of how good design and architecture can create economic value. Creating value is a long-term process, often requiring more than just a single project, but it is not easily contained in a city quarter or a defined set of policies; there is no simple solution, and it requires a more complex and multi-disciplinary approach.

Riga is a leading tech hub, with a start-up scene that is attracting millions of investors’ euros, and also a number of privately-funded (or even self-organised) co-working spaces for young people. In a matter of a few years, Riga has become a hot destination for students of medicine (and other fields) and their families.

Much of the unique cityscape Riga is owed largely as islands into themselves, achieving only middling results in economic, social, and urban development. The campuses fail to give any new impulse to the university’s transformative potential.

While university buildings have traditionally been a part of the city center, Riga’s university campuses have also been part of the story. Construction of the Riga Technical University (RTU) campus in Kāpas, on the west bank of the Daugava, which began in 1930, is one example. The process of building campuses is also reflected in the creation of new academic and research facilities.

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Design Thinking: On campus experiences and development

Design Thinking is what creative people in all disciplines have always done. Nevertheless, the design community has recently raised an awareness of design thinking as a method to solve problems. Design Thinking is more than a set of techniques or a model for solving problems. It is a mindset and a way of working that helps individuals and organizations to create products and services that improve people’s lives.

Design Thinking is a collaborative and multidisciplinary approach that involves empathy, experimentation, and prototyping to understand and solve complex problems. It is not just about creating new products or services; it’s about finding new ways of thinking about problems and possibilities.

**Human-Centered Approach**

Design Thinking is often described as a human-centered approach. It begins with understanding the needs and perspectives of the people who will use the product or service. This involves empathy, observation, and research. Designers use techniques like interviews, surveys, and observations to gather insights about the people they are designing for.

**Empathy**

Empathy is a crucial component of Design Thinking. Designers need to understand the emotional and social needs of the people they are designing for. This involves not just what people say, but what they feel and experience.

**Empathy Mapping**

Designers use empathy maps to visualize the experience of the user. This involves mapping out the customer journey, identifying pain points, and understanding the emotions and thoughts of the user at each step.

**Prototyping**

Prototyping is a key part of Design Thinking. It involves creating prototypes of concepts and ideas to test and evaluate them with potential users. This can be done using a variety of methods, including physical models, digital simulations, and user testing.

**Collaborative and Multi-Disciplinary Working Style**

Design Thinking is a collaborative and multidisciplinary approach. It involves bringing together people from different backgrounds and disciplines to work together. This can include designers, engineers, researchers, and users.

**Prototyping**

Prototyping is a key part of Design Thinking. It involves creating prototypes of concepts and ideas to test and evaluate them with potential users. This can be done using a variety of methods, including physical models, digital simulations, and user testing.

**Rapid Prototyping**

Rapid prototyping is a technique used in Design Thinking to quickly create and test ideas. It involves creating low-fidelity prototypes to explore ideas and test concepts with users.

**Collaborating**

Collaboration is a key part of Design Thinking. It involves working together with others to create solutions. This can include working with teams, communities, and stakeholders.

**Testing**

Testing is an important part of Design Thinking. It involves testing ideas and prototypes with potential users to evaluate their effectiveness and identify areas for improvement.

**Design Thinking by Doing**

Design Thinking is often described as a process of **thinking by doing**. It involves creating and testing ideas in a cyclical and iterative process. Designers use this process to create new ideas, test them, and refine them until they are ready for use.

**Design Thinking in Education**

Design Thinking has become increasingly popular in education. Design Thinking programs are being offered in schools and universities around the world. These programs aim to teach students how to think like designers and solve complex problems.

**Design Thinking in Industry**

Design Thinking is also being used in industry. Companies are using Design Thinking to create new products and services, to solve complex problems, and to improve existing products.

**Challenges of the Design Problem**

Designers often face the challenge of delivering solutions to real-world problems. This involves thinking creatively and using a variety of techniques to find new and innovative solutions.

**Conclusion**

Design Thinking is a powerful tool for solving complex problems. It involves thinking creatively, working collaboratively, and testing ideas in a cyclical and iterative process. By using Design Thinking, designers can create products and services that meet the needs of real people.
Resilience and Sustainable Development

RESILIENCE is being used as a buzzword, but what does it actually mean? How can it be used to foster sustainable development as defined by the World Commission on Environment and Development (the Brundtland Report)?

Resilience building and campuses

Resilience thinking has been proposed as a tool for planning and designing sustainable cities. Universities are unique institutions with a high capacity for adaptation and learning and can be used as laboratories for new sustainability thinking. At the 2003 Beijer Institute of Ecological Economics and Sustainable Development workshop in Stockholm, participants, including government representatives, campus developers, and different local stakeholders, called for inclusive participatory design processes, taking advantage of inevitable crises and change, and being adaptable by fostering diversity and redundancy. In this way, we can increase the adaptive capacity of our economies, societies, and biosphere and truly meet the needs of the present without compromising the ability of future generations to meet those needs.

A sustainable system is one that maintains or regenerates itself. In ecological terms, sustainable means avoiding extinction and maintaining good long-term productivity. This means that we need to protect and cherish our natural resources, and that we need to find ways to live in harmony with nature. A sustainable system is one that adapts to change without compromising the ability of future generations to meet their needs.

Sustainable development

Sustainable development is a process of change that meets the needs of the present without compromising the ability of future generations to meet their needs. It is based on an understanding of the interactions of the natural world, and the need to avoid major disruptions and collapses, and to hedge against instabilities and discontinuities. Sustainable development is a method for planning and designing sustainable cities.

Sustainable development thirty years ago: “development that meets the needs of the present without compromising the ability of future generations to meet their own needs?”

A sustainable system is one that adapts to change without losing their functions, structure, and interactions (Figure 2). In other words, the Canadian ecologist C.S. Holling defined resilience as “a measure of the capacity of a system to absorb or resist stress without losing the identity of its function, structure, and feedbacks – to have the same identity.” With the good properties of the component which act in the system of sustainable development, a resilient system allows for local self-organization, and an external capacity for cross-scale interactions. These characteristics are similar to the resilience function of the human immune system, which holds the capacity for continuous learning, and maintaining high levels of exposure to pathogens, in turn allowing the immune system to learn and respond to future pathogens.

The design processes that resulted in a new vision for Campus Albano, in Stockholm, used resilience thinking as an umbrella metaphor, and it was self-organized and included civic stakeholders as well as city officials. The result was a triple helix of urban form, ecosystem services, and social institutions that helped translate novel research insights into a dynamic and creative environment. In the case of Campus Albano, both the participatory design process and the actual campus environment hold elements that are able to perform the same basic tasks, so that if one element gets wiped out, others can fill in.

Resilience is being used in the Beijer Institute of Ecological Economics and Sustainable Development’s “resilience in the Live Baltic Campus project” but what does it actually mean? Does it differ from sustainability and sustainable development as defined by the World Commission on Environment and Development (the Brundtland Report)?

Sustainable development and resilience

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The University of Latvia, one of the largest universities in the country, and the Baltic States, is located in Riga, the capital of Latvia. Riga plays a major role in the Latvian economy, contributing more than half of the country’s GDP, and being the home base for 40% of the total number of Latvian enterprises. In this context, the University of Latvia has great potential to develop partnerships and collaborate with enterprises, NGOs, public sector institutions and other stakeholders.

Since 2010, the University has been developing and building a new campus in Riga. The University of Latvia House of Nature is the first building completed at the Campus Tornakalns. Creating Riga’s leading campus

CASE RIGA: TORNAKALNS CAMPUS

COOPERATION ON CAMPUS

The University of Latvia, one of the largest universities in the country, and the Baltic States, is located in Riga. The university has great potential to develop partnerships and collaborate with enterprises, NGOs, public sector institutions and other stakeholders. Since 2010, the University has been developing and building a new campus in Riga, which will be finished by 2021. The new campus will bring together most of the university’s faculties and institutes, creating a modern study and research facility, and extending and increasing university collaborations within the university, with partners from public and private sectors, and with society in general. Moreover, the new campus is located on the left bank of the River Daugava, which is a part of the city called the ‘Science and Innovation Centre’ in Riga’s strategy for sustainable development.
side of cooperation are some of the barriers to collaborating mentioned in discussions with faculty representatives. Representatives of companies, NGOs, and municipalities feel there is also a lack of clear external motivation for cooperation with the university. There is a state of inertia within the university as well; University of Latvia employees are not informed about the services and expertise available from other faculties, institutes and other internal partners. Daily contacts with colleagues in other faculties. The new campus, with its modern environment and open space, is expected to create new partnerships among different institutions and among different domains of knowledge.

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WHAT?
Puzzle-like tool for identifying key campus services. The interviewee selects the services personally considered the most important, then the second, and finally the third. The choice is mainly made from pre-defined service ideas, but the interviewee has the opportunity to provide their own ideas.

WHY?
The campus puzzle works well for collecting relatively large amounts of information from campus users and citizens about which services they prefer on campus. The puzzle-like interface is easy and fun to engage with and spurs conversation.

WHERE AND WHEN?
The tool works for assessing user value on pre-selected campus services. It can also function as a social ice-breaker to initiate communication with new campus development participants. One interview takes approximately five minutes.

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Section 2.

DESIGN OF PLANNING CAMPUSSES
**Participatory planning: Tricky for good reasons?**

Although the body of literature on stakeholder collaboration and participatory planning has grown remarkably during recent years, empirical findings about its outcomes and environment are inconsistent and sometimes puzzling. While research has shown that participatory planning can lead to more robust and innovative ideas about democratic accountability, its outcomes are inconsistent and sometimes puzzling. It is done in conjunction with a hierarchical implementation structure for the execution of political decisions. Top-down hierarchic implementation structures are both a search for appropriate procedures rather than innovative policies and plans. Such structure is the actual implementation game from participatory planning to an institutional level and may be any institutional context in collaborative networks. Against such a backdrop, the idea that participatory planning and representative democracy are self-implementing is naive, and therefore counterproductive. The ambition to integrate “horizontal” accountability relations into representative systems of democracy risks being the cause of such institutional costs, and the reason why innovative plans are difficult to implement.

**FIGURE 1.** Representative democracy and participatory planning.
In the last decade, the idea has gained ground that companies should not only be located inside the city, but that companies also need to be located outside the city. This chapter classifies and explains these trends, and highlights a considered emerging trend regarding the planning of urban knowledge hotspots.

The classification of companies and other knowledge hotspots

In figure 1, these hotspots are divided along two axes: below, we have urban-based ones that are integrated in the city and above, we have Greenfield hotspots, built outside the city at a greenfield location; to the right, we see mono-functional hotspots, with only one function such as offices, labs and working spaces; to the left, there are the mixed-use hotspots, with a mix of functions such as housing, retail, leisure, etc. Our research over the last few years suggests that the urban in the urban-intensive ones is strongly pronounced and it is the knowledge economy that is becoming more urban, integrated with city life. This happens in two ways. First, functional and non-functional zones are being urban-integrated, and third, knowledge-intensive zones are urban-integrated as well. New functions are added, such as 24-hour open spaces, business facilities and cultural facilities. It is a trend to transform places outside the city into high-quality residential areas, to open a secondary school, or to build an additional campus where students can work on innovative environments that fit their needs best. Urbanisation of campuses and knowledge hotspots: city planners realise that technology, design, finance, science-quarters offer a variety of environments that facilitate serendipity and networking places. Innovation is not planned or managed; it “emerges” in this dynamic urban cocktail. Proponents of this new model call for mixing functions and spaces that facilitate urban life, bringing a lot of amenities on its first floors, and it attracts many people at lunchtime. Recently, plans were drawn up to further urbanise the area: plans to build a high-quality residential quarter, to open a secondary school, with a technological profile, and to build an additional campus where students can work on innovative environments that fit their needs best. Urbanisation of campuses and knowledge hotspots is a blessing.

What is behind this shift towards urbanisation and knowledge hotspots?

A number of factors are discussed:

- The rise of open and extended innovation practices where companies and knowledge hotspots are integrated together and work in a variety of alliances: applied research.
- Urbanisation of campuses and knowledge hotspots: city planners realise that technology, design, finance, science-quarters offer a variety of environments that facilitate serendipity and networking places. Innovation is not planned or managed; it “emerges” in this dynamic urban cocktail. Proponents of this new model call for mixing functions and spaces that facilitate urban life, bringing a lot of amenities on its first floors, and it attracts many people at lunchtime. Recently, plans were drawn up to further urbanise the area: plans to build a high-quality residential quarter, to open a secondary school, with a technological profile, and to build an additional campus where students can work on innovative environments that fit their needs best. Urbanisation of campuses and knowledge hotspots is a blessing.

Development challenges

Developing a campus as urban knowledge hotspot is a complex challenge. Firstly, there is a number of developers involved in the planning and management of the development process, and many of the developers have different goals. Secondly, the developers need to take into account the needs of the companies and the knowledge economy. However, this often leads to conflicts of interest and delays in the development process. Finally, the urbanisation of campuses and knowledge hotspots is a blessing.
We identified a number of policy instrument errors that can help to turn the knowledge-creating city into a new innovation catalyst.

Central to this process is to some extent to ensure that essential synergies may emerge.

Design options exist to initiate an environment with the right balance between openness and privacy, with spin-off and co-creation spaces, meeting places, etc. that foster interactions.

A flexible facility design, setting up business models to share (proposed) facilities (mass success formulas), and the facilitation of (strategic) partnerships in shared spaces to their own advantage, is crucial for the success of urban innovation hotspots. Sports and leisure facilities can be shared between campus users and others that live in the neighborhood.

Promote the formation of communities to give people a sense of belonging and to foster recognition. This can be done through events, by organizing lectures, etc.

When a campus has developed a good reputation as an innovation hub, it’s status speed cannot be set in motion. It’s in the nature of developers’ almost bottom-up approach. This is what the research director of Philips Research told us, when the Eindhoven High Tech Campus (HTC) was ready. The cancer center turned out to become a driver for the HTC.

The Digital Hub, Ireland

In Dublin, the famous digital entertainment example how to deal with heritage and the surrounding community. The Digital Hub, formerlypatrick’s Tower has developed over the years into the Digital Hub and the neighboring working class area. The end result is a complex, which gives rise to a number of challenges: how to deal with the heritage, the shared use of public spaces. Managing the two sides of the development is an innovative approach. It’s a win-win situation for the Digital Hub and the neighboring working class area. The end result is a complex, which gives rise to a number of challenges: how to deal with the heritage, the shared use of public spaces. Managing the two sides of the development is an innovative approach.

THE CAMPUS AS CITY DEVELOPMENT OR REDEVELOPMENT

The development of a knowledge hotspot is a form of city development or redevelopment. What is problematic in this case is that the campus is developed within the dense urban fabric, and that the campus would not be a success; a recent study showed that innovation in a new campus development merely attract the expected (and universities or big companies are not used to work or think in this way).

Some dilemmas and challenges

Planning urban innovation hotspots is complex, and every situation is different. Some dilemmas and challenges that urban planners face:

URBAN PLANNING FOR INNOVATION

It is problematic, in its own right, to see a campus to be a success, if the environment is not enough to attract people and businesses. What is the nature of the knowledge economy, and what is the nature of the location? And last but not least, what is the balance between the city and the campus?

OPENNESS VS SECRETETY AND PROTECTION. Do all stakeholders want to create an environment where innovation takes place in an innovation by default, or do they want to protect the knowledge economy? How should the knowledge economy be protected, and at what extent is the new campus attractiveness versus interaction through technology?

Some dilemmas and challenges

Planning urban innovation hotspots is complex, and every situation is different. Some dilemmas and challenges that urban planners face:

Comparing the HTC case and the Dublin case, we found that the HTC case has a stronger image as innovative company. Philips Research told us: when the Eindhoven High Tech Campus (HTC) was developed, the surroundings are much more attractive to the HTC than the Digital Hub in Dublin (and universities or big companies are not used to work or think in this way).

Issues of planning and management

The Waterbed Effect. Does the new campus development merely attract activities from elsewhere in the city, or does the new campus generate new activity and attract new entities? Does the new campus development merely attract activities from elsewhere in the city, or does the new campus generate new activity and attract new entities? Does the new campus development merely attract activities from elsewhere in the city, or does the new campus generate new activity and attract new entities?
Experiencing the Knowledge City

MARTINŠ ŠMEIČIS is a young Latvian with a background in the studies of Social Sciences and New Media. He has recently started working as Head of Tourism Product Development Department of Latvia. However, to name a few, he is quite an active citizen. As someone who explores the city of Riga, as a local, he has to learn about his home city and to share insights with others. He discusses the concept of a Knowledge City, a city where the knowledge economy is a subtle place thatTrackers social media, and attention and historical images. He assesses that the city centre is a quiet city, a particular noise will emerge: the sound of political and social activism. Maybe, when cities quiet down, the people’s voice can be finally heard?

ME: When describing a “good” tour-ist, I have a saying: authenticity appears first-hand, what do you think makes a good Knowledge City?

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CASE STOCKHOLM: CAMPUS ALBANO

SOCIAL-ECOLOGICAL, INTEGRATED PLANNING AND DESIGN

The rise of a new Campus and a new planning and design approach

Social and ecological services design

making the campus a living landscape.

Passageways designed for walking and bicycling enhance accessibility and connectivity. Illustrations: BSK Arkitekter

CONSTRUCTION OF Campus Albono - the newest addition to Stockholm University in Sweden - began in 2015 and is expected to welcome its first tenants in 2020. It stretches over 150,000 m² out of which 50,000 m² will be built-up area, and include over 1000 student housing apartments in addition to teaching facilities. It will dramatically improve the connectivity and exchange between the existing institutions of higher education in Stockholm, which together form the Science City: Stockholm University, Karolinska Institute, and the KTH Royal Institute of Technology.

The campus is located in the Stockholm National Urban Park, one of the modernist solutions of the park, which has strongly dictated the project’s design throughout the process took more than fifteen years (1999-2014) from the start of the construction.

DESIGN OF PLANNING CAMPUSES   47
While the approved zoning plan has kept several of the elements in the vision originally developed by the Patchwork Group, several of the more innovative proposals for green and blue elements, along with the focus on connectivity, were disregarded. The design process continues, however, even as construction of Campus Albano commenced in 2015, and the final details were expected to be completed by 2021. Together with Akademiska Hus and Svenska Bostäder (the real estate owners and prospectors) a Reference Group including, among others, members from the Patchwork Group, The Ecopark Association (FFE), a local allotment association, and a landscape architect has continued to work actively to finalise the challenges of enacting the zoning plan. Hence, Campus Albano is a good, real-world example of a truly collaborative design process.

The original Patchwork vision for the spatial elements of Campus Albano was that when possible – and all should support both social and ecosystem services. The buildings were designed to be an extension, rather than a disruption, of the natural landscape in the National Urban Park. A strong focus was on multi-dimensional connectivity: transport routes were designed to encourage bicycling and walking, and to provide connections within the campus, between the institutions of higher education, and between the city and the surrounding national park. The inclusion of nature-based solutions consisting of native biodiversity was strongly supported ecological connectivity between the campus site, the surrounding national park, and the nearby campus. The planner of spatial elements of Campus Albano was that – when possible – each and all should support both social services in the physical design of buildings and outdoor spaces. The final designs by the Patchwork Group, and the City Architect’s team, respectively, were merged into one zoning plan proposal presented in 2012, and accepted in 2015. While the approved plan has kept several of the elements in the vision originally developed by the Patchwork Group, several of the more innovative proposals for green and blue elements, along with the focus on connectivity, were disregarded.

The design created by the Patchwork Group drew on resilience thinking and on social-ecological urbanism, which strive to integrate ecosystem services and nature-based solutions at par with social services in the physical design of buildings and outdoor spaces. The final designs by the City Architect’s team subsequently were merged into one zoning plan presented in 2012, and accepted in 2015.
The new ITC building planned at the Polacksbacken area in front of the Ångström Laboratory, which presently houses the Department of Information Technology (ITC), and the Ångström Laboratory which had its third and latest part erected in 2006. A fourth part, which will accommodate the ITC in the future, will be constructed north of the laboratory.

Today a campus in the Uppsala outskirts; tomorrow constituting a vibrant urban nexus.
The transformation of the Polacksbacken campus is taking place in the context of intensive urban development in the surrounding areas. Moving the ITC opens up opportunities to bring new activities to the old barracks, with the aim to better connect the university to the surrounding city. It also encourages the citizens to explore and use the campus as a public space.

In the near future, the campus will become the geographical link between the new Södra staden and the city center of Uppsala. Plans for the area where the campus is located include improvement of the public transportation from the city center to the Universitetssjukhuset (University Hospital), the Biomedical Center (BMC), Uppsala Science Park, and the Polacksbacken campus.

Polacksbacken is also surrounded by the three recreational areas of very high ecological value. The Kronåsen area (Glacial Till Hill, which provides for the main ground water supply of Uppsala) together with the Geijer's Valley and the Kronparken forest. The Kronparken Forest, which is nearby, is second largest area of 25 ha, is the second area and is one of the oldest forests in Sweden. It connects Stadsskogen (the City Forest), the third area of 100 ha, with the river Fyris and the Årike Fyris nature reserve, located at the river banks south of Uppsala.

In the near future, the campus will be a case study for campus planning. At the same time, the campus transformation will attract additional local actors with aims and concerns far beyond academic research and teaching. In Polacksbacken, we may assume that campus planning will become a case study of wider city politics.

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The very heart of our eight step stakeholder analysis approach is the ambition to go beyond dominating discourses about campus development and urban renewal; and to combine more holistic-oriented procedures with the articulation of specific group interests, such as researchers, service providers, property owners, and students. The ultimate aim of the method is to provide a more comprehensive and nuanced map of stakeholders and stakeholder positions in relation to campus development.

**Steps of actor-centered stakeholder analysis**

**STEP 1** Critical analyses of general discourses and ideas on campus development in policy documents, handbooks etc.

**STEP 2** Constructing survey questions based on step 1.

**STEP 3** Survey 1 on ideas about the role of campuses in the city and inter-dependencies in relation to campus development.

**STEP 4** Selection and distribution of dialogue participants to workshops (based on survey 1).

**STEP 5** Dialogue treatment: one "agonistic workshop" and one "consensus-oriented workshop".

**STEP 6** Survey 2 poses the same questions as in Survey 1 to participants in workshops.

**STEP 7** Analyses: Mapping interests and interdependencies in city and campus development.

**STEP 8** Reflexive analysis: dominating discourses, missing interests and "representation capacity".

Design Thinking doesn’t start with a given design brief or problem, but instead begins by seeking to understand the context and subjects, often through inclusive and participatory design activities such as brainstorming sessions and user interviews. Once this has been achieved, designers are then free to define the problem space. This requires the general context and the specific needs and interests of the people involved in the project to be understood. From this initial analysis, a series of potential solutions are then developed, tested, and refined. The act of creating prototypes further refines these solutions, and once sufficiently representative of a final product they are ready to be tested in real-world settings to ensure they meet the needs of the users. If a proposed solution makes it this far, it can be considered ready to proceed to full implementation. If not, design teams can return to previous stages in the process to refine or reformulate solutions, or even conduct further consultations with users in order to redefine the design problem. It is through these six stages, which typically define the concept of Design Thinking, that innovative and user-oriented solutions can be found to intractable design problems.

**Design Thinking Methodology**

**EMPATHIZE** with its subjects, often through inclusive and participatory design activities such as brainstorming sessions and user interviews. Once this has been achieved, designers are then free to define the problem space. This requires the general context and the specific needs and interests of the people involved in the project to be understood. From this initial analysis, a series of potential solutions are then developed, tested, and refined. The act of creating prototypes further refines these solutions, and once sufficiently representative of a final product they are ready to be tested in real-world settings to ensure they meet the needs of the users. If a proposed solution makes it this far, it can be considered ready to proceed to full implementation. If not, design teams can return to previous stages in the process to refine or reformulate solutions, or even conduct further consultations with users in order to redefine the design problem. It is through these six stages, which typically define the concept of Design Thinking, that innovative and user-oriented solutions can be found to intractable design problems.
Multi-stakeholder conferences can be especially helpful in identifying specific points of disagreement and compromise, for understanding the larger issues and concerns involved, in mapping the power landscape, and perhaps even re-evaluating a project's needs and criteria.

In the case of the Albano Resilient Campus*, the contentious location legally permitted within Stockholm’s National Urban Park, and opposition by local stakeholders and environmental protection NGOs, frustrated the planned expansion of Stockholm University’s Albano campus for more than 15 years. What finally broke the impasse was an interdisciplinary coalition of administrators, architects, and researchers studying the social-ecological effects of the nearby allotment gardens, known as the Patchwork group. They seized a window of opportunity, a legal review of the latest campus proposal, to form a working group and propose their own alternative vision, the Albano Resilient Campus, with many of its elements ultimately being incorporated into the final design proposal of what is to become Campus Albano.

Involving stakeholders in the development process offers designers and developers opportunities for tapping an invaluable cache of local knowledge, and soliciting novel ideas from future inhabitants. It simultaneously forms the key relationships and trust building that are integral to projects’ social-ecological resilience and sustainability.

Multi-Stakeholder Conferences

*The initial name of the Patchwork’s alternative vision of what later became Campus Albano, presented in the publications Principles of Social-Ecological Urbanism by Barthel et al., 2013. Available online.

AUTHOR:
.Rawaf al Rawaf,
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ALBANO IN THE FUTURE URBAN LANDSCAPE.
CREATIVE ACADEMIC ENVIRONMENT.
ALBANO IN THE ECOLOGICAL LANDSCAPE.
ALBANO IN THE CONTEXT OF HISTORY AND ART.
ENVIRONMENTAL FRIENDLY BUILDINGS.
Section 3.

DESIGN OF BUILT-UP CAMPUS INFRASTRUCTURE
Another opportunity of the crisis was that, the “new” building was 15% smaller than the old building (what allowed the teams to reduce the footprint). At the same time the faculty was growing: when the project team chose a heritage – after the fire – for university buildings of the future, building over a new building (also in the long term), the faculty community was more enthusiastic than expected. With so many designers among the users, the building would have unique qualities.

Lesson 1: Design the building in situ

The teams decided to use this crisis as an opportunity to test transformation concepts and experiment with new ways of working. In the new BK City, function and form were interwoven.

Lesson 2: Reduce m² - trade quantity for quality

The teams decided to use this crisis as an opportunity to test transformation concepts and experiment with new ways of working. In the new BK City, function and form were interwoven.

Lesson 5: Avoid individual preferences

The teams decided to use this crisis as an opportunity to test transformation concepts and experiment with new ways of working. In the new BK City, function and form were interwoven.

Lesson 6: Reduce m² - trade quantity for quality

The teams decided to use this crisis as an opportunity to test transformation concepts and experiment with new ways of working. In the new BK City, function and form were interwoven.

Lesson 8: Invest in visible quality

Due to the extremely tight time schedule, after a fire, the teams had to act quickly and efficiently. The teams decided to use this crisis as an opportunity to test transformation concepts and experiment with new ways of working. In the new BK City, function and form were interwoven.

Lesson 9: Invest in visible quality

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Lesson 10: Avoid individual preferences

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Lesson 11: Avoid individual preferences

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Lesson 12: Avoid individual preferences

The teams decided to use this crisis as an opportunity to test transformation concepts and experiment with new ways of working. In the new BK City, function and form were interwoven.
was the biggest challenge: how to avoid the sense of home. This was considered work in shared spaces, BK City has been working on to solve this problem in the BK City building, while still creating a building that users needed to compensate with extra quality and unique character. Additionally, with a rapidly increasing international population, the faculty real-...
Building Relationships: Inside the walls of sustainable campuses

Adaptable learning environments enable a diversity of teaching strategies and provide space for students to take an active role in their learning, with the teachers acting as facilitators of the process. Flexible design in the interior infrastructure of the buildings allows for the needs of the campus spaces to be changed, allowing for adapting the interior space to changing needs. Formal and informal learning spaces complement each other, providing possibilities in different contexts. The campus spaces are also designed for continuous measurements across disciplines and clubs. Students with advanced skills in communication, collaboration and technology have standard rooms and technology that is flexible. The campus building is a motivational learning tool, where each space functions as a learning space. The interior design premise is authentic, rough, and has a casual atmosphere. The lively color scheme functions as orientation and recognition cues. The architecture is respectful to the users, and users behave respectfully in the spaces.

A healthy working environment aims to decrease feelings of stress, and enhance both physical and mental wellbeing. The design of the working space focuses on supporting a positive, or lowering a negative environmental impact. The design solutions can further reduce the risk of falling ill, the maintenance costs, and increase mental stimulation and energy efficiency.

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A future-proof campus is a modern, sustainable, and healthy campus building. A well-designed modern campus building enhances the university experience by stimulating activity and engagement, both physical and mental health. The design of the working space focuses on supporting a positive, or lowering a negative environmental impact. The design solutions can further reduce the risk of falling ill, the maintenance costs, and increase mental stimulation and energy efficiency.

**Mariana, Metropolia University of Applied Sciences**

Illustrations: Sistem Interior Architects Ltd

Illustrations: Sistem Interior Architects Ltd
Let cities come to life!

DESIGN OF BUILT-UP CAMPUS INFRASTRUCTURE

Urban areas are typically shaped by non-natural landscapes that disrupt the natural ecological flows of marine and terrestrial flora and fauna, and through emissions polluting land, water, and air. With the introduction of concrete, and later with an increasingly complex technological infrastructure, came the idea that the urban landscape could be controlled and even functionally optimised, a notion that is at odds with ecological dynamics and a world constantly undergoing change.

Large-scale, global changes also have specific regional and local effects. In the Nordic countries, some of the most notable changes include changing temperatures and seasonal patterns, which alter the composition of the biodiversity, lead to more frequent but unevenly distributed heavy rain events, and rising sea levels. These changes are expected to have knock-on effects like new diseases and problems with fresh water provision.

Meanwhile, cities are also facing social issues such as an increasing number of people leading unhealthy lifestyles, characterised by unhealthy diets, sedentary lifestyles, and increased socioeconomic disparities. These combined changes are calling for cities to build social and ecological resilience, i.e. to increase their capacity to mitigate and adapt to changes while retaining their core functions or their identities. Strategic resilience building also opens a window of opportunity to redirect development towards sustainability.

The multifunctionality of ecosystems, or the capacity to perform several functions or services simultaneously, is central to the idea of trying to find green or blue solutions to problems conventionally dealt with by engineered, technical alternatives. Space in cities tends to be contested, especially during phases of rapid urbanisation, and elements that only cater to a particular interest or user group tend to be outcompeted or conflictual. It is easier to argue their claim to space by making sure that green spaces, and necessary functional components like water treatment units, serve multiple purposes.

Cities hold largely untapped potential and promise. Especially old cities have a long history as gradually changing cultural landscapes where human society and local biodiversity have developed together over time. The most striking are types of green areas, such as public urban gardens, central parks, and larger green spaces that provide people with access to nature and contribute to richer biodiversity than can be found in the surrounding, agriculture-dominated landscapes. Conscious design to meet the present day’s demands can also have positive effects for biodiversity and ecological functions.

Since the beginning of industrialisation, cities have increasingly become concrete and concrete-dominated landscapes. Less space and opportunity for hunting and collecting natural resources within the cities themselves, coupled with continuous urbanisation have made the cities increasingly dependent on large-scale systems such as global food trade. Cities are today one of the main drivers behind global system changes such as climate change.

Nature's evolution over millions of years has resulted in a capacity to perform functions that are crucial for human wellbeing, and indeed for our survival. An urban landscape designed and governed to allow nature to perform those functions holds several opportunities to promote both social and ecological resilience. This potential, in a time when multiple emerging changes threaten to scale up to insurmountable challenges, is vital and calls for some reflection.

Urban gardening in Helsinki. Photo: City of Helsinki

Maria Schewenius, Stockholm Resilience Centre

SUPPORTING THE WELLBEING OF NATURE AND HUMANS BY CULTIVATING GREEN INFRASTRUCTURE AND ECOSYSTEM SERVICES IN THE URBAN LANDSCAPE.

Nature's evolution over millions of years has resulted in a capacity to perform functions that are crucial for human wellbeing, and indeed for our survival. An urban landscape designed and governed to allow nature to perform those functions holds several opportunities to promote both social and ecological resilience. This potential, in a time when multiple emerging changes threaten to scale up to insurmountable challenges, is vital and calls for some reflection.
Ecosystem Services

**THE TERM** ecosystem services refer to the full range of beneficial outputs resulting from the natural and social systems and ecological processes and functions, many of which are provided by nature, the urban environment, and society. The concept of urban green and blue infrastructure refers to the inclusion of the full range of designed and natural green and blue elements inside a built-up area. They are increasingly recognized as central features in urban ecosystems.

Green and blue infrastructure ways to make the cities more liveable and sustainable. In doing so, we can improve the balance of the global and local systems that was disrupted wholly or partly by the establishment of today’s modern cities.

Ecosystem services, while still principle forces behind ecosystemic processes and functions, have to be turned into actual benefits for people. Even though the prevailing image of a city is that of a concrete jungle far removed from its green equivalent, the city is much more than that. It is also a part of, and interconnected with, a vast natural environment.

The experiences from Albano, and other examples of today are but the first early steps towards the design of the next generation cities, guiding a continuous search for innovative solutions and integration of social-ecological values. Three great challenges or possible starting points, for constructing the needed design and planning approaches are; a) how to construct or enhance functioning ecosystems to support biodiversity and crucial ecosystem functions such as pollination, food production, and biodiversity; b) how to manage urban sprawl and urban green and blue elements in our now human dominated world; c) how to relate local and global processes and technological systems. By consciously incorporating green and blue elements in our cities, the city itself manifests many of the features of the natural elements, and of the human and ecological interactions – we can start to bring back ecological functions into our cities and explore ways to make the cities more healthy and sustainable. In doing so, we can promote the balance of the global and local systems that was disrupted wholly or partly by the establishment of today’s modern cities.

The baseline for making sure we continue to have ecosystemic services in our cities is to ensure that there is a space for biodiversity to thrive and put high quality care to the green and blue infrastructure, both throughout the city. An example can be found in the Campus Albano project (see texts 3.2 and 3.5), and even more so in the Albano Nature Campus (see text 3.5). The experiences from Albano, and other examples of today are but the first early steps towards the design of the next generation cities, guiding a continuous search for innovative solutions and integration of social-ecological values. Green and blue infrastructure is an example of complementary measures designed to be ecological counterpoints which makes the campus accessible to the public, and connects campuses that are taken part in the city, while supporting biodiversity.

**Maria Schwenius, Stockholm Resilience Centre**

**Erik Andersson, Stockholm Resilience Centre**

**Stockholm Resilience Centre**
CASE TURKU

IDENTIFYING USER PREFERENCES FOR THE RENEWAL OF A CAMPUS CLUSTER

Turku, a city in south-west Finland with more than 180,000 inhabitants, is located by the coastline on Finland's southern coastline. The city has a number of educational institutions and a growing number of higher education institutions. Today, the city hosts a number of higher education institutions and developments. The city is estimated to attract more than 30,000 students and 5,000 staff. In this text, we discuss some of the emerging trends of higher education campus development as experienced in Turku.

FIELD NOTES ON A CHANGING CAMPUS DESIGN

Demand for modern facilities

A main challenge that campus managers, developers, and planners have to face is the demand for modern facilities that can support cooperation with a wide variety of users. In many cases, the existing campus infrastructure is not adequate for the current needs of the campus community. Therefore, it is important to identify user preferences for the renewal of a campus cluster. This can be achieved through a series of workshops and surveys that involve a range of stakeholders, including students, faculty, and staff. The results of these exercises can then be used to inform the design and development of new campus facilities.
of academia in Turku. This generally applies to buildings that were built or renovated before the 21st century. In addition to their architectural design, many educational buildings are open to conversion to more adaptable use, and are often indicated in terms of space and energy efficiency.

However, some of the old buildings represent the identity of these higher education institutions and also serve as landmarks and architectural highlights of their time. Significant buildings, like the headquarters of the University of Turku, are thus being maintained.

Another visible trend in the modernisation of campus areas is the opening and optimisation of local transport network. For example, the Turku University of Applied Sciences has recently moved its headquarters from the outskirts of the campus cluster to a more central location, and these the two mainly Swedish-speaking units in town closer together.

Joint planning for liveable spaces

Service design methods can allow us to identify user-friendly campus designs but sustainable campus design also needs rational planning and identity creation. Turku would benefit from a stronger and shared vision for the continued development of the campus cluster. Yet, the strengths of service design methods are in enabling the translation of public policies into personal involvement and action. This is one of the key goals in transforming Turku into a more central location, and these the two mainly Swedish-speaking units in town closer together.

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Tall spruces, pines, birches and aspens along a small creek — this beautiful little mixed forest hid the busy highway from Myllypuro mall and Metro station. A long time ago, the neighborhood people spent time in this green forest, they picked berries, had picnics, kids played and climbed up the trees. These trees are now on the Metropolia campus site, they have seen Myllypuro for decades, and all their hidden stories are still in the wood cells.

This valuable material will have a new life inside the campus building. From Forest to Campus is a design project for Metropolia students. It is about learning the life cycle of wood, recognizing wood species, processing the local material and transforming the material into some functional wooden artefacts. The local material and the history inspire designers. The aim is to design items that are random and joy for the users when picking up the story of the wood.

The project started in the autumn of 2015. Students went in the forest with time, chose the grandest trees and tagged them for the project. While the lumber is drying and resting in outdoor storage for 2 years, the students have time to ideate and design utility articles and interior elements. There are already concept ideas for wall paneling, luminaires, swings, stools and serving dishes. These concepts are under design development process and we are looking forward to see the final outcome at Metropolia campus which will be finalised by 2019.
Students re-thinking student housing

The Foundation for Student Housing in the Helsinki Region, Hoas, plans to build three new apartment buildings close to the campus of Metropolia University of Applied Sciences currently under construc-
tion. Invited to this Baltic Campus, Hesar
metropolia design students to pre-
pose ideas for the coming project.

One group focused on designing and iden-
tifying the best locations for shared recre-
tional and co-working spaces: the ground
floor for a garden, event and academy area,
and the top floor for a sauna, gym, game-
rooms. An online application for making invita-
tions was also 
availed. The open, modern design aimed to create an atmosphere, welcoming atmos-
phere for the building. The same concept
will be applied in older buildings to create
social areas in the building for college stu-
ents, for example by removing
walls from the ground floor, enlarging
spaces, and

DESIGNERS
COMMUNAL SPACES:
Tia Aitola, Oona Auramo and Heli Koskinen

REDESIGN OF SHARED
APARTMENTS:
An Duong, Edit Heikkinen and Vilma Kukkonen

TUTORS:
Juha Ainoa and Pasi Pänkäläinen

The second group designed a service con-
cept of shared apartments including an
exchange for shared apartments, and a person hav-
ing a passion for living in the building responsible for minor re-
pair work. Multiple suggestions on how to
increase the level of comfort of the living
spaces, organise joint activities among the
residents, and run a marketing campaign to
spread the concept were also intro-
duced.
Map-based participatory design workshop

WHAT?
A modular mini-toolkit poster that can be used as an instructional tool for facilitators.

WHY, WHERE AND WHEN?
The method is intended for use in the initial user research phase of design challenges dealing with urban development contexts. The method aims to collect human-centered insights about the local environment, and creating new concepts for cooperation between local stakeholders.

DESIGNER: Jalmari Sarla
TUTOR: Juha Ainoa

The tool is available in Sarla’s BA thesis ‘Development of a Participatory Design Workshop Concept for Solving Urban Challenges.’

Photos: Jalmari Sarla
Photo: Juan Sebastián Covarrubias
Section 4.

DESIGN OF CAMPUS LANDSCAPES
Experimental study for planning Tartu campuses based on mobile phone tracking

Suburban campuses increase mobility needs and traffic load.

A city is a complex organism under constant spatial change which influences the movement of people and mobility choices of people. Good urban planning is a difficult task, since every resident, visitor, or employee of the city has his or her own taste and values. Sensing and understanding these values is essential for creating a good city.

Digital data is rapidly growing as a source of population data, such as people’s preferences in the urban landscape, means of travelling, and transport routes. Digital means such as electronic questionnaires, social media forums, and mobile-phone-based participatory methods allow for a quick collection of data. A Facebook poll or an analysis of transport companies’ travel databases can be performed within days, whereas conducting a traditional survey takes at least half a year.

Tartu is a relatively small town in Estonia with around 35,000 residents. One of the primary spatial planning tasks since the last half of the 20th century has been to determine whether to keep the higher education institutions in the central city, or to locate planned complementary research and educational campuses at the fringe of the city. While the city centre benefits from the historical campus area (Figure 1), it is more feasible to establish new facilities in more distant areas. In an attempt to create a balanced solution that fulfills the city’s and suburban campus areas’ needs, the Mobility Lab of the University of Tartu has conducted an experimental study for planning Tartu campuses based on mobile phone tracking.

FIGURE 2. Location of places of residence and work of respondents before and after the workplace was relocated from the central city to the urban fringe. Source: Mobility Lab of University of Tartu.
Within the Live Baltic Campus project, the Department of Geography of the University of Tartu, in cooperation with social planners, city and municipal officials, and environmental and economic scientists, conducted a pioneering space-time research study on people’s use of urban space, mapped out by smartphone tracking. The aim of the study was to identify the impact of smart workplaces on the space-time use of urban space within Tartu. In particular, the study aimed to map the impact of urban planning decisions and cultural transitions on:

- people’s mobility use of transport, and their environmental consequences;
- people’s use of the city center;
- people’s spatial awareness and experienced places of activity in the city;
- people’s time use for various activities and handling;
- people’s satisfaction with the location of their workplace and working conditions.

The experimental study was conducted among students and employees of the University of Tartu, employees of the Estonian National Archives and Estonian National Museum. The latter institutions both faced workplace relocation from the central city to the fringe of the city during the research period.

The study covered 260 individuals, and data collection lasted from March 2016 to October 2017. Smartphone GPS sensors were used to map out the use of urban space, visited locations and the preferred mode of transport of respondents. Smartphone data were complemented by semantic information from individual interviews.

The initial results of the study showed that the relocation of institutions in Tartu increased the employees’ median home-to-work distance from 1.5 km to 3.1 km (Figure 2). Both car and public transportation use increased at the cost of decreased light traffic.

Large, visually unappealing parking areas around the new workplaces contributed to creating a negative impression of the research, educational, and cultural institutions (Figure 3).

Smartphone tracking showed that the employees at relocated workplaces spent more time in the city center and its close vicinity (Figure 4). However, relocation significantly increased the frequency of transits through the city center due to the need to surpass the bridges over the River Emajõgi, and traffic via the main transportation routes around the city center. Detailed results of the study will be announced in late 2018, and these will be involved in the spatial planning decisions of the city and the continued development of university campuses in Tartu.

New research methodology and software solutions for space-time research, based on smartphone data, were developed within the study. Interest in applying the results to other cities and programmes was expressed, for example by Riigi Kinnisvara AS (the State Real Estate Ltd.), which supported parts of the project with funding. Riigi Kinnisvara is developing a state housing programme in Estonia, which will significantly change the location of workplaces in several Estonian cities.

The study aimed to further the science of digital data-based research methods and to use the results to benefit other socio-economic regions of the Baltics, the region and Europe. The study was carried out by a research team in cooperation with the Smart City Institute of Shanghai University.

Rein Ahas, Ago Poom, Anto Aasa & Siiri Silm
Department of Geography, University of Tartu
Albano – a role model for sustainable urban design

The development of Campus Albano takes place in harmony with the environment and seeks to create a sustainable urban development. Long-term consideration to the environment is evident throughout the project development. It incorporates everything from material choices to the design of buildings and landscaping environments. Research on sustainable urban development has been integrated into the planning process, and the University of Stockholm, the KTH School of Architecture and the Ramboll Research Center are involved in the project. The development is a coherent urban area where the University of Stockholm and KTH Royal Institute of Technology will be the main employers. The development is located in the south of the Hagastaden area and the Hagaparken National Park, providing a rich natural environment and a diversity of wildlife for researchers to study.

As the University of Stockholm and KTH Royal Institute of Technology (KTH) develop, new modern premises are needed, where the universities can work and collaborate with each other and the surrounding society. In November 2015, the ground was broken for the construction of Campus Albano. On the site that previously consisted of an abandoned golf course and the northern University (Scandinavian Hall and Friendship Hall), new office buildings will be constructed.

Timeline
- November, 2015: Ground breaking for the construction of Campus Albano
- 2020: Planned first occupancy of the accommodation

The Albano Street will become one of the most important pathways. The buildings are planned to be the university buildings such as offices, seminar rooms, and lecture halls. These pathways are planned to connect important structures and open green areas, allowing for the easy flow of traffic. The sustainable design of the pathways includes green roofs, rainwater harvesting systems, and cycling facilities. The buildings are designed to be energy-efficient and have a low carbon footprint.

As Albano emerges, the focus is on creating a vibrant and dynamic urban environment that promotes social and cultural interaction. The development is designed to be a role model for sustainable urban design, incorporating green spaces, recycling systems, and renewable energy sources. The goal is to create a healthy, sustainable, and socially integrated urban environment.

LOCATION
- A stone’s throw away from the Hagastaden area where the Karolinska Institute is located to the west.
- 100,000 square metres of sustainable space
- 3,000 student apartments are built, along with more designated for restaurants, cafés, and other commercial services.
- The development is located in the Hagastaden area, which will contribute to a lively city environment, where students and researchers will be able to live and work.

Sustainable urban design
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When the University of Latvia opened its first academic campus in Pardaugava, an area on the west bank of the city of Riga, in 2015, it marked the beginning of an unprecedented shift in the city’s academic geography. The campus is the first step of a much larger project: around the year 2022, all of the four largest academic institutions in Latvia will be concentrated in Pardaugava, in close proximity to each other. The University of Latvia will build two new campuses, and three of the existing academic institutions in the area are renovating and adding new facilities.

Co-designing four universities into a collaborative network
to improve the existing infrastructure and to accommodate the growing needs of the region.

The proposal includes both national and municipal development plans, which envision the territory of Pardaugava becoming a Science and Innovation Centre (SIC) by the year 2030. However, while there are several ongoing academic and infrastructural initiatives in the area, a detailed plan has yet to meet these goals. Challenges include the need for better planning and more focus on the sustainability of the initiatives. At the same time, the region is seeing a decline in academic and cultural activities, while the competition for spaces and resources grows.

To this end, the chapter explores the design proposition of joining the four large academic campuses into an integrated Knowledge Mile. The concept proposes an imaginative spatial planning and development of the area where the campuses will be located. First, the geographic proximity between the campuses allows them to move beyond formal boundaries and focus on a more connected knowledge network. The aim of connecting the campuses is to support comprehensive and interconnected knowledge, which in turn allows for better learning and exchange across the campus and the city. Second, the proposal suggests an open and accessible campus, where the public is welcomed and the campus is open to the public. Third, the proposal focuses on the creation of a more connected and interactive environment, where the public is encouraged to engage with the academic community.

The design studio analysed the demographic and spatial characteristics of the area, and the design proposal was developed to address these needs. The proposal attempts to create a more connected and interactive campus, where the public is encouraged to engage with the academic community. The design makes use of the geographical scope of the city and the regional context, creating a more connected and interactive environment.

The expansion of the academic campuses into a single location means that the cost of land and the density of the campuses can be reduced. The design proposal aims to form a more compact, interconnected knowledge centre. The aim of consciously designing the Knowledge Mile is to create a more connected and interactive environment, where the public is encouraged to engage with the academic community. The proposal attempts to form a more connected and interactive environment, where the public is encouraged to engage with the academic community.
The historic university campus is an integral part of the central town and contributes to a vibrant urban environment, while the newer suburban campus brings the need for better connectivity and new transport options to the local development agenda.

The University of Tartu has long been an integral part of and driver behind the development of the City of Tartu. The first compact university campus was founded in the beginning of the 19th century during the Age of Enlightenment, when architect Johann Wilhelm Krause planned a complex of buildings at Dome Hill and the first University of Tartu. During that time, the downtown area also experienced a massive renewal impelled by a previous fire, resulting in a compelling complex of classical style buildings mixed with greenery. This beauty has been preserved, and today still constitutes the core of the university and the old town of Tartu.

The needs of the university have evolved over time, and a wider arc of buildings associated with the university has been gradually established towards the southern part of the city. In 1911, the university received the fields of Maarjamõisa manor as a gift from the state. This led to the establishment of a second campus, located 2.5 km south-east from today's downtown area. The Maarjamõisa campus is dedicated to medical and natural sciences, and hosts a nationally leading university hospital as well as labs, clinics, and general study areas. The campus is located in a low-rise residential district, together with Tartu Health Care College, Tamme Gymnasium, and the Estonian National Archives.

CASE TARTU: THE CENTRAL CAMPUS, AND CAMPUS MAARJAMOISA

CAMPUSES AS INFLUENTIAL ACTORS

The main building of the University of Tartu is located in the city center of Tartu.
The town’s agenda is, however, even more ambitious. The recently adopted comprehensive plan foresees a tramway to Tartu, which is notable considering the town only has 100,000 inhabitants. The idea of the tram has received considerably high support, while the exact route is still undefined. The tramway should interlink Annelinn, the main high-density residential district, via the Maarjamõisa: one of them is loaded with heavy traffic, and both of them suffer from complicated railway crossings.

It is of vital importance to the University of Tartu to provide students, staff and visitors with a smooth spatial connection of the campuses from classical to modern, with a focus on connectivity, accessibility, and integration. The University of Tartu, the Maarjamõisa campus and the suburban Maarjamõisa campus, serve largely the students of the faculty of Medicine, and the Maarjamõisa campus. The accessibility of the Maarjamõisa campus is especially relevant since the university class serves as the primary health care centre for the whole of Southern Estonia.

Connecting the central tramway with the Maarjamõisa neighborhood includes several elements that need to be addressed, such as extending access to the former railway station and improving overall transport safety.

The current situation is about to change, as railway crossings and parts of the connecting routes for the campuses are about to undergo major reconstruction work. The main railway tunnel on Riia Street, also the main artery of Tartu, will be reshaped into a more spacious, comfortable, and safe crossing for pedestrians and cyclists (Figure 3). The main railway tunnel on Riia Street, also the main artery of Tartu, will be reshaped into a more spacious, comfortable, and safe crossing for pedestrians and cyclists (Figure 3).

The tramway should also integrate and complement the spatial area of both local district and central rail stations. The tramway should interlink Annelinn, the main high-density residential district, via the Maarjamõisa: one of them is loaded with heavy traffic, and both of them suffer from complicated railway crossings.

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The most influential spatial decision by the University of Tartu in the year 2016 was on how to find the best location for a new IT study complex, later named Delta. The main question was whether the university was going to move its IT-related units away from the central town to the Maarjamõisa science-and-technology-oriented campus, or let the units remain in the town centre where the IT study complex could be developed together with its business-and-practice-oriented extension.

The city government together with IT enterprises strongly favoured the location in the centre, where the historical university campus is tightly interwoven with the central town. The university administration initially favoured the Maarjamõisa campus. The local community near the central campus was concerned about the need to fell trees at the fringe of a park to make space for the new campus. A compromise was made, placing the Delta study complex on the west bank of the river Emajõgi, in an area that has struggled to recover since it was destroyed during the Second World War. This location connects Delta to the town centre while it simultaneously densifies and revitalises the local neighbourhood.

The prominent position of Delta being adjacent to the town centre required the arrangement of an architectural competition in order to determine the most suitable design for the new campus. The guidelines of the competition stated that the complex had to provide a welcoming and contemporary urban space to tenants and visitors alike, encourage activity on the river bank via an open design, and retain the visual corridor to the old town; particularly to the town hall that is located on the other side of the river.

The winners, the architects from the company Arhitekt11, situated the complex between the neighbouring university campus to its left and the town centre to its right, designing it as a pedestrian-friendly urban environment with high quality landscape architecture that addresses both aesthetics and social and ecological functions. The spatial arrangement and technical settings of Delta also support low carbon energy and transport solutions.

The multifunctional interior environment will provide inviting, comfortable studying and working. In addition to traditional lecture or seminar halls, labs, and office spaces, the study complex will involve a variety of flexible and open workspaces, and recreation areas, allowing various activities such as office, education, cooking, or relaxing, for both students and staff. Delta is being designed as a joint centre for education, research, innovation, businesses, and student activities; a heart for the university on the left bank of the river. Suitably, the IT study complex became “Delta” as a result of a public naming competition.

Delt is planned to open in 2019. It will host the Institute of Computer Science, the Institute of Mathematics and Statistics, the School of Economics and Business Administration, related student systems, an innovation lab and a large number of IT firms. It is expected to attract 5,900 students and about 600 staff members. This cooperation with the IT sector enables spatially and structurally integrated study and practice options for students throughout their studies, from bachelor to doctoral level, with strong incentives for future entrepreneurship.

Age Poom, University of Tartu
Tõnis Arjus, City of Tartu
In the neighbourhood of Myllypuro, Helsinki, a new public square is about to form between the main entrance to Metropolia’s future campus, the metro station, and the sports hall ‘Liikuntamylly’. Inspired by the study visit destinations included in the Live Baltic Campus inspiration tour to the Netherlands in 2016, the City Planning Department invited Metropolia students and staff to co-ideate possibilities for the square. Following the brief of establishing an inviting public space and a landmark for the neighbourhood, Metropolia’s design students took on the challenge and created concepts for The Place to Be in Myllypuro.

**DESIGNERS:** Amanda Ainesmaa, Anna Lehtonen, Laura Vaisto, Noora Vartiainen and Robert Ylihoikka

**TUTORS:** Juha Ainoa and Pasi Pänkäläinen

**The Place to Be – Myllypuro Campus Square**

The student propositions for the space focus on functionality and cosiness: the design ‘Puro Park’ revolves around urban gardening, and the design ‘Kulma Park’ provides a campus yard especially suited for the skateboard community. The greyness of the buildings surrounding the square can be balanced with colourful murals. The light grey wall of the box-like sports hall also has potential to serve as a screen for the planned outdoor cinema events.

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Tool IV

Space-Activity User Kit for active interviews

WHAT?
A puzzle-like tool for mapping out stakeholders views on preferred campus services and facilities, the spatial aspects and connections of the services and facilities, as well as preferred user groups.

WHY?
The tool enables the interviewee to play with different alternatives, simulate setup and visualise ideas.

WHERE AND WHEN?
A tool mainly intended to be used during interviews with external stakeholders, such as companies and sectoral agencies who have strong collaboration potential with the campus community. One interview takes approximately 30-45 minutes. In addition, it serves as a tool in facilitated workshops, where groups of different campus users can build common visions of the future campus and its services.

DESIGNERS: Sini Mäkinen, Kati Pihko, Matias Lehmusjärvi, Sipi Rossi, Noora Vartiainen
TUTOR: Juha Ainoa

Photos: Stiina Ruusuvuori
On lifestyle considerations in campus planning

In their book from 2007, Campus and the City, editors Höger and Chris-tiaanse list a series of recommendations that should be followed when planning, designing, and developing a campus. Relying on guidelines from a variety of urban, cultural, economic, environmental, and social perspectives, these authors emphasize the importance of creating a campus that is accessible, sustainable, and livable. The guidelines highlight the need for a strong emphasis on transport and mobility (connectivity, accessibility, flexibility), and how this interacts with the spatial context. Today’s modern campuses are more than just university and college-related buildings and infrastructures, such as offices, laboratories, libraries, and lecture halls. They also involve a mixture of other functions, such as student residences, student centers, recreational and park-like settings. Campuses are also very diverse, whether located on or outside the city boundaries, scattered or concentrated, green- or brownfield, high- or low-tech, corporate or public. The campus can no longer exist in isolation; Campuses have an impact on the local environment, and the local environment also affects the campus. The campus is a city, and the city has become a campus. Both play an important role in shaping each other. That said, developing and planning a campus has a lot to do with developing and planning a city, and what holds for one also applies to the other. In both cases, the ultimate goal is to create more livable and sustainable communities. Hence, policies and investment strategies need to be linked. This means encouraging safe, reliable and economical transportation options, promoting equitable and affordable public transit, and enhancing economic competitiveness. It also involves creating an environment that fosters learning and learning communities, promoting healthy, active, and walkable environments, and enhancing economic competitiveness. In sum, campus planning concerns a variety of dimensions that need to be taken into account, dimensions ranging from social, cultural, economic, to landscape, natural and psychological.

Clearly, there is a strong relationship between how cities and urban regions envision sustainable development, and how the campuses of the future see this. Both use the same tools. So besides trying to answer the question how infrastructure, architecture and urban design can be used to consciously stimulate and create social, cultural, and economic life and how the interactions and corporate centers we also need to understand what kinds of strategies can strengthen these dynamic synergies needed to create sustainable centers of knowledge and learning.

In their edited book published in 2015, Adaptive Mobility, A new Policy and Research Agenda on Mobility in Horizontal Metropolises, Boelens, Lauwers and Witlox state that developing a sustainable policy implies that governments have to focus on creating high-quality, liveable cities with acceptable standards of access to goods and activities. Such a sustainable urban development area also needs to shorten distances between locations and reduce the need for motorized vehicles. The core feature of such a sustainability policy is the reduction in the use of motorized vehicles, including both cars and...
trucks. Although numerous incentives exist that contribute to creating a more sustainable mobility in the short term, there remain insufficient incentives that arise from addressing individual and societal needs. This, according to Van Acker, is part of the issue of creating a more sustainable urban mobility. In his paper, Van Acker argues that it is not enough to only focus on reducing the social and environmental impact of growing mobility, but it is also important to address the socio-spatial and mobility planning aspects. Instead, the focus is on the hardware part of the issue, such as infrastructure, vehicles, and public transport means. As a consequence, attention is hardly paid to how the infrastructure can be used better.

Clearly, sustainable planning involves promoting not only mobility, but also the human experience of travel. This requires a shift in thinking, shifting from the hardware to the software, and understanding the social and policy-making dimensions. Van Acker concludes that policy and planning need to consider the importance of the individual and their lifestyle. Lifestyle research in travel behaviour is not new, but it often focuses on the concept at the stage of life or household composition, which means that the socio-cultural characteristics of each person are being analysed. However, a comprehensive concept of the lifestyle concept in terms of urban planning and environmental sustainability focuses on a more behavioural orientation, such as attitudes and preferences. Instead, the focus should be on how these factors are influenced by the built environment (i.e., the 3D’s: density/diversity/design), the socio-economic-demographic (SED) variables, and car ownership. The same holds true for the impact of lifestyle considerations in campus planning. Campus planning is closely related to urban planning, culture, and the environment, which is in turn influenced by the campus. But the lifestyle itself also needs to be considered in campus planning.

The lifestyle dimension should be central, as it can influence travel behaviour. However, lifestyle does not necessarily influence travel behaviour in isolation but is also influenced by the built environment. Lifestyle has a direct impact on travel behaviour, but it is also indirectly influenced by the built environment (i.e., the 3D’s: density/diversity/design). The socio-economic-demographic (SED) variables and car ownership. The same holds true for the impact of lifestyle considerations in campus planning. Campus planning is closely related to urban planning, culture, and the environment, which is in turn influenced by the campus. But the lifestyle itself also needs to be considered in campus planning.

FIGURE 1. Based on Van Acker et al. (2011)
Campuses of the future should put life before lectures

With students now able to attend classes and perform many other academic tasks online, university campuses have become less about traditional lecture-based teaching and more about learning the softer skills needed in an ever-changing world. The campuses thus need to adapt to meet the changing needs, demands, and uses in a time when virtually all information is readily available online.

Many existing campuses are still designed around a traditional model of higher education in which students primarily attend lectures. Now, however, campuses are primarily places of interaction where students exchange ideas and form social relationships. Campuses also play an important role in helping students to learn and practise the skills and abilities that are increasingly valued in today’s world, namely: emotional intelligence, empathy, and problem-solving.

This article summarises four of our key insights as design professionals about the changing role of campuses. The insights are based on interviews with university students in Finland, and on our own experience of working with campus design:

1. Invite campus spaces

The Cave Room concept has gone from idea to execution in the new Aalto University Harald Herlin Learning Centre. It’s a place to focus and immerse yourself in knowledge you want to instil, feedback you need to process, or new ideas you want to instil. Kuudes designed the space by co-creating new service concepts with students, faculty members and other staff.

Photo: Kuudes Helsinki

2. Talking, listening, and bonding

In addition to creating meeting hubs, events, and locations that encourage people to connect, spaces should also support and encourage teamwork.

Photo: Aalto University School of Business, Silla Virmajoki

3. Campuses should be welcoming and inviting

Before WiFi became virtually ubiquitous, the most popular cafes were those that offered it for free. People would stay longer if they could surf the internet for as long as they wanted.

A similar principle applies to campuses today. Walk around inside the buildings and common areas of any academic institution, and you will see that students gather in spots that offer printing, comfortable seating, power sockets or affordable coffee. These have become basic needs, and a must for attracting students to the campus.

“Campuses should embrace the behaviours for creating different types of venues, events for different types of socialising, charging laptops, and finding a quiet place for studying.”

4. Campuses should put life before lectures

Not only does everyday life make more sense, it can even be the foundation for building knowledge and business relationships.

Campuses should be designed for building the communities that can grow out of them, with spaces and activities that encourage people to connect. Above all, the campus environment is an important role to play in forming the

WITH STUDENTS

The team became interested in the changing role of campuses. University campuses have become less about traditional lecture-based teaching and more about helping students to learn and form social relationships. Campuses also play an important role in helping students to learn and practice the skills and abilities that are increasingly valued in today’s world, namely: emotional intelligence, empathy, and problem-solving.

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Campuses should be designed for building the communities that can grow out of them, with spaces and activities that encourage people to connect. Above all, the campus environment is an important role to play in forming the
sense of belonging and pride that any successful community feels. "While of course I remember the principles, theories and other information learned during my studies, without a doubt the most crucial part of my academic experience was the network of hundreds of people that the school has given me access to," Alumni

3. Campuses should inspire you to experiment with multi-disciplinary solutions

Higher education is not just about obtaining an academic degree. For many students, it’s also a way to explore their passions, which progressive academic environments should be equipped to support. We tend to stretch our abilities and work harder when we are inspired and motivated. Success often comes when we are given the freedom and support to do what we do best. Campuses should facilitate this by creating an environment where students have the support to experiment, and with the goal of helping them to find purpose and fulfilment in their professional lives.

As an increasing variety of professions demand multidisciplinary skills, campuses should be designed to blur the line between faculties, thus inspiring and encouraging students to explore cross-disciplinary solutions to academic and societal challenges. "I truly found my motivation to study only when I realised what I really wanted to do. Now I’m just focused on that goal," Student

4. Campuses should help students to get a taste of the working life

Our research has shown that very often students focus solely on what’s going on within their own faculties. This inwardly-focused mindset can indeed prevent students from being open to ideas from other disciplines or sharing their own ideas with others. Campuses can help to bridge this gap by encouraging cross-disciplinary interactions between students and faculty members. When people are proud of something, they are more likely to communicate about it. Communication is, in turn, essential for students to understand the academic environment, develop a sense of belonging, and eventually build a network that will be of value later in their professional lives.

As an increasing number of professions demand multidisciplinary skills, campuses should provide students with the opportunity to explore cross-disciplinary projects outside the classroom. This will not only help students to build a network of colleagues but also enable them to develop skills that are increasingly in demand in today’s workforce.

Open communication is also important in creating a bridge between the academic life and the business world. For this reason, it is crucial for campuses to create environments that encourage cross-disciplinary interactions and provide students with opportunities to learn from one another. Students should be encouraged to share their experiences, ideas, and challenges with others in a way that promotes collaboration and innovation. "If you want to be a researcher, there is no substitute for personal relationships. So, I always try to meet as many people as I can found on local events that could benefit my career," Student

What do we take away from this?

University campuses and their locations will continue to play an important role in shaping a student’s identity, encouraging collaboration and innovation, and building links between the inside world and the business world through digital channels. The shift in the way we work, and the change in the skills we need, has been so quick that many campuses have not yet adjusted to this reality. A campus should be a place where knowledge, lifelong learners and businesses meet in an environment in which students naturally want to immerse themselves. A campus should embody the vision of the institution it is home to, be visually and spatially expressing the institution’s values and culture through every aspect of the physical environment.

As the next generation of university campuses begins to emerge, the time is right to explore the vast range of design options these new environments demand and inspire.

Susanna Ollila & Tiina Toivola, Nordic insight, strategy and design agency Kuudes Helsinki

4. DESIGNED CHALLENGES

A randomly selected challenge-based hackathon, organized together with companies, is one of the new learning formats helping students to get connected to the business world.

Photo: Veeti Haapsamo, City of Helsinki

3. INSPIRATION TO EXPERIMENT

The concept for the new Think Corner at the University of Helsinki was created in close collaboration with Kuudes, in close collaboration with the university and its stakeholders. The Think Corner aims to get students, researchers and partners from different fields together in order to create a space where they can share their ideas and challenges.

Photo: Kuudes Helsinki
and the implementation of education for sustainable development thus needs to be addressed through holistic and systemic thinking. A number of declarations, charters, and partnerships have been developed to foster education for sustainable development. These started with the Stockholm Conference in 1972, where education was formally recognised on an international level to play an important role in fostering environmental protection and conservation. Other important milestones have included: the Talloires Declaration, the Swansea Declaration, and the Barcelona Declaration. More than 1,000 university leaders have ratified their commitment to advance this work by signing the initiatives. In addition to signing declarations, charters, and partnerships, other efforts have ranged from involvement in regional development, to the reduction of greenhouse gas emissions, and to leaders’ perceptions of the topic. A number of tools have been developed to assess and report about sustainability in universities, including the Audit Instrument for Sustainable Higher Education (AISHE), the Graphical Assessment of Sustainability in Universities (GASU) tool, the Campus Sustainability Assessment Framework (CSAF), and the Sustainability Tool for Assessing Universities’ Curricula Holistically (STAUNCH®). A key area driving education for sustainable development has been its inclusion in curricula. The inclusion has ranged from adding some coverage of environmental issues and material in an existing course to a specific course on sustainability, sustainable development intertwined in regular courses, sustainable development as a specialisation, and to entire degrees.

A paradigm revolution is needed to break through existing knowledge barriers and current unsustainable mental models, and to foster metanoia, a shift of mind-set or lifestyle, for sustainability. New ways of learning are needed, which actively and consciously engage in the use and protection of natural resources, and the upbringing and improvement of societal well-being, in the promotion and fostering of sustainable education for sustainable development. Much of modern education is based on the Newtonian and Cartesian approaches of rationality, causality, mechanistic interpretation, silo thinking, and reductionism. Although such approaches have revealed their limitations, they are still predominant in development and administration, leading researchers to engage in engineering and ignoring emotions. This has led to an unsustainable present and threatened future.

During the last three decades, an increasing number of higher educational institutions have become engaged in embedding sustainable development into their systems, including education, research, campus operations, community outreach, and assessment and reporting. In 2013, some colleagues and I had the fortune to complement these elements with a proposal on collaborating with other universities to make sustainable development an integral part of the institutional framework, encouraging leadership, and reporting in a comprehensive evaluation programme. It is important to recognise that higher education institutions are complex systems, and the safeguarding and improvement of societal well-being, for this generation and future ones, has to be based on holism (i.e., considering a whole from multiple and inter-related perspectives while it is evolving); transdisciplinarity, systemic thinking, and long-term thinking; and collaboration and inter-connection of perspectives and stakeholders. Most of the education for sustainable development has been in universities. The contribution has ranged from adding some coverage of environmental issues and material in existing courses to a specific course on sustainability, and embedded in entire programmes of study. It has evolved from a tradition of conducting case studies to critical questioning, framing, and re-developing tools, methods, and theories. It can thus be claimed that education for sustainable development has become a new science.

Rodrigo Lozano, University of Gävle Organisational Sustainability, Ltd.

Education for Sustainable Development: The rise of a new science
CASE UPPSALA: KOLLABORATORIET

AN EXPERIMENTAL SPACE FOR COLLABORATION

A new space in the centre of Uppsala, encouraging boundary-crossing collaborations

The Uppsala Collaboratory (Kollaboratoriet Uppsala) is a pilot project in Uppsala University’s urban campus environment. The aim is to create new collaborations between academia and civil society, between art and science, and to support social innovation with a focus on social and environmental challenges. The Collaboratory is located in Uppsala University’s buildings in the city center, and being a public space, accessible to the public. The space is designed to accommodate up to 40 people in an area of about 80m², and flexible furniture options allow for many types of activities and group sizes. The Collaboratory space is open to the public, or by invitation, and events can be hosted by the management team or independently by those who use the room.

The Uppsala Collaboratory opens up a new space for possibilities in a time of complex and rising social, economic, and environmental challenges. Learning, collaboration, and innovation across boundaries are increasingly important approaches for managing the challenges.

A collaborative garden on the sidewalk outside Kollaboratoriet Uppsala
Photo: Sanna Gunnarsson
The Uppsala Collaboratory draws inspiration from several sources, including the boundary crossing, transdisciplinary, multidisciplinary and trans-methodological character of the Center for Environment and Development Studies (CEMUS); a joint center between Uppsala University and the Swedish University of Agricultural Sciences, and part of the Uppsala Live Baltic Campus group. The Collaboratory seeks to support new pathways for social and technical innovation as a way of meeting the challenges and complexity of achieving sustainable societies. On April 21, the event Bike Town, a competitive innovation day on mobility, was held at the Uppsala Collaboratory. Teams of students and citizens jointly developed ideas and innovations on how to improve the situation in four different cases. The outcomes of the event were presented to the groups involved.

Examples of events held at the Uppsala Collaboratory

All events at the Uppsala Collaboratory should connect to at least one of its three themes:

1. Opening new, valuable channels between academia and civil society
   - The goal is to open up new channels between the university and civil society, encouraging the participation of various societal actors in events and discussions concerning sustainability issues, and together find new ways for their engagement.

2. Crossovers of science, art and culture in the shadow of global challenges and transitions
   - Artists, activists, authors and performers are invited to communicate on social and environmental issues in ways that people in universities, including professors, researchers, and students typically don’t. The aim is to create spaces and opportunities for artists, researchers, educators and experts in the public spaces of the city; and Sacha Kagan (2015), author and founder of the arts and science network Cultura 21, who argues for a great need of ‘spaces for possibilities’ in the wider society. Continued development has been carried out in dialogues between the university, local stakeholders, the Live Baltic Campus project partners, and visiting scholars from Bergen where similar spaces are being developed.

3. Supporting new pathways for social innovation and action towards sustainable futures
   - The Uppsala Collaboratory seeks to support new pathways for social and technical innovation as a way of meeting the challenges and complexity of achieving sustainable societies.

The interest in the Uppsala Collaboratory has been steady, with over 300 events being held during 2017 (counted mid-November). Events have included art exhibitions, public seminars, an innovation day, theatre performances, network meet-ups and panel conversations. To think about the next step and potential booms of the Uppsala Collaboratory’s work, its founders have been holding a seminar in March 2018. A number of events have been announced to the continuation of the activities and opportunities that the Uppsala Collaboratory has seeded and discussions concerning its future are ongoing.

Space

The conceptual development of the Uppsala Collaboratory was guided by workshops and dialogues with various local actors over a period of seven months between September 2016 and March 2017. The first event of the idea was planted when Katerva, Professor of Educational and Social Futures at the University of Helsinki, invited in September 2016 for a lecture and open workshops in Uppsala. From shared ideas and research on working with new ways of organizing the collaboration between scientists, artists, students and practitioners, it was decided to engage a wide audience. Continued development has been carried out in dialogues between the university, local stakeholders, the Live Baltic Campus project partners, and visiting scholars from Bergen where similar spaces are being developed.

The event Bike Town, a competitive innovation day on mobility, was held at the Uppsala Collaboratory. Teams of students and citizens jointly developed ideas and innovations on how to improve the situation in four different cases. The outcomes of the event were presented to the groups involved.

Examples of events held at the Uppsala Collaboratory

All events at the Uppsala Collaboratory should connect to at least one of its three themes:
A CAMPUS COMMUNITY IN THE MAKING

Campuses have a certain magic about them. As places for learning and discovery and just as importantly, for questioning and challenging, they guide the way into the future. Campuses should be seen as more than mere buildings and study environments for the students. They are also communities.

The construction of the new campus in Myllypuro, which will host part of the Metropolia University of Applied Sciences, has a pioneering streak. The campus will be the second higher education establishment situated in eastern Helsinki, and the very first to be accessible from the residential neighbourhood to an aspiring learning community.

CASE HELSINKI: MYLLYPURO CAMPUS

From residential neighbourhood to aspiring learning community

Visualization of the Future Myllypuro Campus of Metropolia University of Applied Sciences. Illustration: Lahdelma & Mahlamäki Architects, Architects LPV.
The campus can also boost the vitality of the neighbourhood. Currently, the majority of Myllypuro residents are over 40 years of age, and every fifth resident is over the age of 65. The local mean income is lower than the Helsinki average. The area calls for younger, educated people to balance out and strengthen the local economy and community. In response to this, three new student apartment buildings are to be constructed in the area within the next few years. As a practical contribution to local everyday life, the students will be able to provide the residents with accessible wellbeing services, such as physiotherapy, podiatry and osteopathy, as part of their studies. Participation in joint activities involving both the campus and the neighbourhood can further increase the overall liveability, and boost the already high community spirit.

In order to fulfill the potential of the future campus, connections between the existing Myllypuro and the new Metropolia campus need to be fostered, thereby establishing a foundation for a new campus community. The Live Baltic Campus project has approached this by bringing people together and facilitating joint development. The main outreach event was the “Pop-up Metropolia Campus”, which brought campus information, activities, and people to the busy Myllypuro Mall for a two-week period. The spatial concept of the Myllypuro Loop creates a vision of an inviting urban space between the future campus, the city centre, Sports Hall and metro station. A main outreach event was the “Pop-up Metropolia Campus”, which brought campus information, activities, and people to the busy Myllypuro Mall for a two-week period. The spatial concept of the Myllypuro Loop creates a vision of an inviting urban space between the future campus, the city centre, Sports Hall and metro station. In order to fulfill the potential of the future campus, connections between the existing Myllypuro and the new Metropolia campus need to be fostered, thereby establishing a foundation for a new campus community. The Live Baltic Campus project has approached this by bringing people together and facilitating joint development. The main outreach event was the “Pop-up Metropolia Campus”, which brought campus information, activities, and people to the busy Myllypuro Mall for a two-week period. The spatial concept of the Myllypuro Loop creates a vision of an inviting urban space between the future campus, the city centre, Sports Hall and metro station. In order to fulfill the potential of the future campus, connections between the existing Myllypuro and the new Metropolia campus need to be fostered, thereby establishing a foundation for a new campus community. The Live Baltic Campus project has approached this by bringing people together and facilitating joint development. The main outreach event was the “Pop-up Metropolia Campus”, which brought campus information, activities, and people to the busy Myllypuro Mall for a two-week period. The spatial concept of the Myllypuro Loop creates a vision of an inviting urban space between the future campus, the city centre, Sports Hall and metro station. In order to fulfill the potential of the future campus, connections between the existing Myllypuro and the new Metropolia campus need to be fostered, thereby establishing a foundation for a new campus community. The Live Baltic Campus project has approached this by bringing people together and facilitating joint development. The main outreach event was the “Pop-up Metropolia Campus”, which brought campus information, activities, and people to the busy Myllypuro Mall for a two-week period.
The nearby Comprehensive Service Centre is one of the established local connections, providing public elderly care and rehabilitation; a specialisation shared with several of Metropolia’s degree programmes. Based on the shared interest, practical collaborations with internships, classes conducted in the Centre, and tailored continuing professional education have been mapped out and initiated, with the aim to ensure the development of an empirical service learning, a domain that also abounds globally. This Centre will be located on the Myllypuro campus.

In the 1970s, the design theorists and other contemporaries of the Macy group, i.e. the Tavistock Institute of Human Relations and the Connecticut State Inter-racial Commission, were also researchers Horst Rittel and Melvin Webber developed a two-class categorisation of design problems: 1) Determinate problems, including a series of design from problems characterised by a clear problem definition and, where applicable, a single “right” solution; and 2) Indeterminate problems which have a single “wrong” answer, and whose solutions are iteration and open-ended. The latter type of problems tends to be of a higher, more complex order, and includes the traits of complexity: 1) Whole System dynamics and building interdisciplinary collaboration, which adopt a complex adaptive systems perspective and focus on finding solutions to broader challenges, like climate change or poverty; and 2) Design Labs, emphasizing prototyping and innovation, which tend to focus more narrowly on product or service design, and user experience. The term “Wicked” problems which have a single “wrong” answer, and whose solutions are iteration and open-ended.

The participatory “New Myllypuro!” workshopped further investigated the capacity of the area to become a hotspot for wellbeing. Based on input from the local community, an initiative from the User Kompassi collective together with Länsi-Radi Campus, a combination created the vision and spatial concept of “The Myllypuro Loop”. This concept connects the local communities public actors and the future campus, thus forming a shared brand, thus increasing the participants’ visibility and accessibility. The notion of the architect as facilitator in the status of the stakeholder participation allowed for translating the ideas and processes into spatial urban visions. Other factors, such as increasing awareness that the number of inhabitants increases the need to create space for knowledge exchange and to spread and react fast campus activities within the surrounding district.

Design Thinking – History

“Everyone designs who devises courses of action aimed at changing existing situations into preferred ones.”

– Herbert Simon

AUTHOR: Anna Elisabet Skoog, Stockholm Resilience Centre

In the 1970s, the design theorist and founder of the New Work and Metabolism Wackland developed a two-class categorisation of design problems: 1) Determinate problems, including a series of design from problems characterised by a clear problem definition and, where applicable, a single “right” solution; and 2) Indeterminate problems which have a single “wrong” answer, and whose solutions are iteration and open-ended. The latter type of problems tends to be of a higher, more complex order, and includes the traits of complexity: 1) Whole System dynamics and building interdisciplinary collaboration, which adopt a complex adaptive systems perspective and focus on finding solutions to broader challenges, like climate change or poverty; and 2) Design Labs, emphasizing prototyping and innovation, which tend to focus more narrowly on product or service design, and user experience. The term “Wicked” problems which have a single “wrong” answer, and whose solutions are iteration and open-ended.
WHAT?
A simulation of campus activities outside of campus premises, organized with the purpose of sharing and collecting information on and from the local communities and the future campus users, and enabling the future users and other stakeholders familiar with each other to meet face to face.

WHY?
Pop-up Campus is a useful tool for community-building. Personal encounters and discussions build mutual trust and understanding, which are prerequisites for the co-design of campus development. Spending time at the location offers insights into the future campus in a way that otherwise would be difficult to obtain, valuable for the planning of the campus and its activities.

WHERE AND WHEN?
The activities organized within the Pop-up Campus determine its most suitable timing. The location and accessibility for people in the area to participate are important key ingredients.

In the two-week Pop-up Metropolia Campus event, the emphasis was on bringing the staff and students to the site of the future campus, Myllypuro. The aim was to provide the local community with initial insights on the activities, services, premises and people the future campus will host. The pop-up space consisted of a poster exhibition and flexible furnishing to allow organisation of different types of sessions. Coffee proved to be a good way to lure people in and start up conversations.

VISUAL AND SPATIAL DESIGNER OF POP-UP METROPOLIA CAMPUS:
Sara Sirenberg

ORGANISERS:
Petra Lassenius, Päivi Keränen, Katariina Saarela, Juha Ainoa and Juha Kyyrö

Photo: Katariina Saarela
MAPS, blogs, news, concepts, minor reports - working together to explore the participatory design methods for campuses while simultaneously conducting local pilots in the six Live Baltic Campus partner cities has produced a vast amount of outputs and insights. A data analysis of the information produced by the project partners led to the identification of 44 sub-themes, which in turn were grouped into six themes. Together, these themes or perspectives that are important for understanding both how more sustainable and inviting campuses can be created, and how they can inspire more sustainable urban development overall. The themes are presented in more detail below.

The Great Sextet - City, Change, Together, Bloom, Service and Heart

The core theme ‘City’ deals with a campus in its wider context, including the surrounding city and region. The information gathered in the Live Baltic Campus project shows that accessible and community-centric key aspects for its sustaining the campus with the exciting urban structure, and that these and resources must in combination have a significant effect on happiness and ecological sustainability. The surrounding city also presents limitations to campus development with existing buildings, infrastructure, and protected natural areas. At the same time, the city provides unique opportunities.

‘Change’ is a constant and increasingly present element in our urban societies. For example, the need to adapt to climate change, or to meet the demand for digitalisation can both represent a challenge to campus areas, and provide new opportunities. Structures and systems, both physical and spiritual, need to be adaptable and flexible. Resilience, or the capacity of a system to absorb changes while maintaining its core functions, supported by adaptability and flexibility, is key for tackling the ever-changing contexts.

‘Together’ highlights the importance of collaborations across sectors and levels, and embarking synergies. In a campus context, it means to support transdisciplinary student-staff collaborations, programs with international reach, and engaging the local community and businesses in learning and innovation processes.

‘Bloom’ focuses on establishing the view of campus areas as places for knowledge distribution, sources of acceleration for the local economy, and guides to more sustainable lifestyles. Campus areas can be places for open-minded and failsafe innovation that benefits society. Generating business and innovations should be a way to work new opportunities to deal with current challenges, in harmony with nature and the environment.

‘Service’ refers to the student services and physical infrastructures that support the studies, and the free-time functions for students, staff, and visitors. Services such as cafés, gyms, Wi-Fi, and study places bring life to the campus area, and help ensuring the area is also a social hub for a wider community.

‘Heart’ emphasises that people are the base of every community and form the core of the campus. Face-to-face meetings remain important, even with the emergence of new digital media. A campus area also needs to offer opportunities for informal gatherings in both small and large groups, and in the form of live performances, guided lectures or evening parties.

The full result of the mentioned process is presented in the Live Baltic Campus Development Idea Book, which aims to guide the continued activities of the Live Baltic Campus participants and their local partners. It is a model book that mirrors the results from the Live Baltic Campus pilot project.

The Development Idea Book is produced by the designer collective Uusi Kaupunki.

Aleksi Rastas, Uusi Kaupunki
Päivi Keränen, Live Baltic Campus

Visualization of how the core theme ‘Heart’ could be applied in the urban space in Myllypuro. Illustration: MUUAN, Uusi Kaupunki Architect Collective
CAMPUS IN THE CITY CONTEXT

The Three Ages of University Design


Further reading

References and references

Campus Polacksbacken: Location, surroundings and stakeholders

For a partial redocking, pgs. 2016. For further information, see partial redocking. See reference: https://www.uu.se/contentassets/5f3760e185b842b6b3a4015954907460/Innovationsatcampuspolacksbacken.pdf

DESIGN OF CAMPUS PLANNING

The Campus Innovation Herbert and city development catalyst


Further reading

CAMPUS IN THE DESIGN OF CAMPUS

Further reading

References and references

DESIGN OF BUILT-UP CAMPUS INFRASTRUCTURE

Other Campus Urban Inequality


Further reading

Designing the campus


Further reading

Further reading

DESIGN OF CAMPUS LANDSCAPES

Experimental study for planning Parks programs based on reality travel building

Further reading

References and references

Further reading

Further reading

Further reading

Further reading
5 DESIGN FOR CAMPUS EXPERIENCE

On lifestyle considerations in campus planning


The Live Baltic Campus funders and partners

References and further reading
The role of universities is changing, expanding from being purely education and research institutions towards one of being active partners in local and regional urban development. As incubators for knowledge development, critical thinking, and innovations, universities and campuses are becoming increasingly important for identifying, designing, and implementing pathways to sustainable urban development.

The project Live Baltic Campus has explored how university campuses can serve as local living labs and guides for new planning and design approaches. The project has aimed to build capacity in urban planning and design to harness the potential of changing social, ecological and financial contexts. Six higher education institutes in cities around the Central Baltic area have collaborated to utilise participatory design methods in developing their local campuses, and to share their results.

Campus development, much like urban planning in general, relates to the concepts of dreams and seeds: visions of the future, and a continuous flow of, often small, actions and decisions required for bringing the visions into reality. This book is a compilation of the insights, perspectives, and practical examples stemming from the two-year joint exploration to find the necessary ingredients and local measurements for sustainable urban campuses.