NORDIC CITIES BEYOND DIGITAL DISRUPTION

– A NOVEL WAY TO DEVELOP CITIES

#smartcity #urban #transformation #renewal #foresight #cocreation #testing
#smartups #services #energy #retrofitting #startup #walkability #nordic

DEMOS HELSINKI

KTH VETENSKAP OCH KONST

”I think this is the key way to go.....rather than thinking of Songdo as the model.”

– **Saskia Sassen**,
Robert S. Lynd Professor of Sociology at Columbia University,
author of *The global city: New York, London, Tokyo*.

”I agree with everything I read. I am grateful that you (and apparently others) believe that the your existing urban structure and building stock form the foundation for growth. Ah, how we humans have evolved!”

– **Jeff Speck**,
City Planner & Urban Designer,
author of *Walkable City: How Downtown Can Save America, One Step at a Time.*

”*Nordic Cities Beyond Digital Disruption* provides an innovative approach to thinking about smart cities and digitalisation by focusing on retrofitting the existing building fabric.”

– **Savvas Verdis**,
Infrastructure Economist at Siemens,
Senior Research Fellow at LSE Cities

”I love the idea of *Nordic Cities Beyond Digital Disruption* because of its approach of our cities largely already being built, certainly in the western world. We need a 21st century solution for 21st century cities.”

– **Dan Hill**, Associate Director at Arup

”That’s super cool. Especially interested in your testbed approach....Many of the solutions conceived, prototyped, tested and refined within your testbeds will have global application, spurring civic entrepreneurship whether or not that was the intention.”

– **Jase Wilson**, CEO, Neighborly

”The broad take of the *Nordic Cities Beyond Digital Disruption* offers tons of knowledge and inspiration to succeed in this endeavour – going far beyond the misconception that building is just about concrete.”

– **Bernhard Huber**,
Municipal Councillor, Solna, Sweden

”*I for one hope Nordic Cities Beyond Digital Disruption becomes a model from which we all can learn.*”

– **Charles Landry**,
Author of The Creative City:
A Toolkit for Urban Innovators

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NORDIC CITIES BEYOND DIGITAL DISRUPTION

URBAN DEVELOPMENT is not the same as it used to be. In many cities in the Western world, urbanisation continues, while compromising on a building stock in dire need of renovation. Radical changes in structures of economy and work, our need to drastically cut our greenhouse gas emissions, the emergence of the sharing economy, and many other strong drivers are changing the way we live, faster than ever before.

This report is one of the products of a Nordic project called Smart Retro. It demonstrates how built environment actors can use emerging trends to their advantage – steering the development of our cities in a desirable direction. In our framework, cities are pushed onto a new path of success by improving their inhabitants' experience of the urban space through incorporating a new wave of smart urban services in the existing built environment.

Smart urban services are essential to new urban development, as they improve quality of life. Many urban areas – both structural buildings and services and urban activity – are dilapidating. Smart urban services provide new jobs and make cities more livable: the strongest urban vitality often derives from the engagement of locals, the existence of good services and suitable infrastructure.

"Cities are pushed onto a path of success by improving the experience of the urban space."

Furthermore, the sustainability requirements of the coming years dictate that greenhouse gas emissions must be cut by a large margin and that resource efficiency needs to be radically improved. Smart urban services enable us to harness the available resources in new ways, and, thus, carry great potential in helping us reach those targets.

In contrast to many smart city projects that focus on building new, Smart Retro takes the existing stock of buildings and infrastructure as its starting point. Building entirely new stock does not address the challenges and needs of our existing cities: in 30 years' time, the majority of urban dwellers will still live in neighbourhoods built in the 20th century. Smart solutions must therefore be integrated in the existing built environment.

Creating a smart city using existing built environments requires experimentation that brings together incumbent actors, who control and shape the urban space and its building stock (such as city governments, real estate companies, construction companies and retail), with startup companies, who work on new digitally driven services. In the Smart Retro project we conducted a number of practical experiments with the goal of creating a new model for urban development in the digital era.

"We bring together actors that shape urban space and its building stock with startups"

This report is comprised of three sections. The first section provides an account of how Nordic cities currently operate and what challenges they face in developing further. It also outlines a theoretical framework for the conceptualisation of urban change. The second section offers three backcasting scenarios, which shed light on what the coming decades could offer cities and their old and new practices. Section three gathers lessons learned from experimentation work conducted through acceleration and matchmaking of startups and traditional urban actors. A final chapter summarises and provides nine recommendations for actors of the built environment.

This research report is authored by Demos Helsinki and KTH CESC. The aforementioned organisations are solely responsible for its content.

PRAISE FOR NORDIC CITIES BEYOND DIGITAL DISRUPTION

Everyone knows that the world is changing dramatically so that it feels like a paradigm shift. Yet cities confront both their fragility and vulnerability, especially in relation to the sustainability agenda, with the potentials of a digitizing city, and we know too that the business as usual approach will not work.

This is where Smart Retro comes in as a real life laboratory – trying things and testing them, developing prototypes for products, processes and services so helping a new world emerge. This world is based on a different dynamic where individuals and groups operate in new ways as only together can a new civic culture evolve.

I for one hope Nordic Cities Beyond Digital Disruption becomes a model from which we all can learn.

– **Charles Landry**, author of *The Creative City: A Toolkit for Urban Innovators*

I share most of the views in Nordic Cities Beyond Digital Disruption. I also like the backcasting approach that opens many opportunities for a better future.

– **Domenico Rossetti di Valdalbero**, Principal Administrator, European Commission DG Research and Innovation

It's smart, well-written, and beautiful. I look forward to learning more about the next steps and hearing whether it results in changes at all scales.

– **Rolf Pendall**, Director, Metropolitan Housing and Communities Policy Center at Urban Institute

Nordic Cities Beyond Digital Disruption appears to address one of the great stupidities of the "smart" city: its prejudice for technologies of surveillance and control. By utilizing the built-in intelligence (and resistance) of historic buildings, infrastructures, and habits, the work of Demos Helsinki seeks to use technology to advance flexibility, informality, diversity, sustainability, humanity, and locality. An excellent agenda!

– **Michael Sorkin**, Director of the Graduate Program in Urban Design at the Bernard and Anne Spitzer School of Architecture, City College of New York

Nordic Cities Beyond Digital Disruption is an excellent example of the city of ideas. The future city is the outcome of everybody's right to urban life, an urban life that is not only meaningful but also playful, filled with creativity and dialogue,

– **Peter Ache**, Professor, Nijmegen School of Management, Radboud University

I very much like this idea of Nordic Cities Beyond Digital Disruption and I see its applications in so many developed world cities, where people are either abandoning the city (and thus redundant spaces need to be re-purposed or reimagined) or flocking to it (in which case spaces need to be denser and more flexible).

– **Julia Thayne**, Director of Siemens North American Center for Cities

The Smart Retro Futures Report accomplishes what very few publications anywhere have: it connects existing built environments, new economic and community models and digital technology, and traces through how we can use them together across macro-to-micro scale initiatives to address the challenges of the 21st century. An eye-opener for me, and a report that I'll be sharing widely.

– **Della Rucker**, Managing editor, Engaging Cities. Author of *Crowdsourcing Wisdom: a guide to doing public meetings that actually make your community better.*

I truly believe Smart Retro is a promising and important project. We see so many interesting initiatives in cities today. But most of these are small scale and independent and never reach the broader mass.

– **Anna Viggedal**, Researcher, Ericsson

The built environment has great inertia against change. This is an obstacle against necessary change – i.e. urban sustainable development. One Window-of-Opportunity-reducing inertia is the smart application of ICT. This gives better control of e.g. energy and ventilation systems. ICT also enables new forms of information exchange and of persuasion on sustainability issues – between residents and with real estate owners, energy providers and other local actors.

– **Örjan Svane**, Professor Emeritus in Urban Sustainable Development in KTH

[The report] echoes many of my thoughts and demonstrates clearly that 'bits and atoms' coming together can make a difference. Co-production is a term that is in the air here in Leeds, but we are much further behind than you!

– **Rachael Unsworth**, Geographer in Future Directions

SECTION 1: A NOVEL WAY TO DEVELOP CITIES

THE FOLLOWING SECTION PUTS URBAN TRANSFORMATIONS IN THE CONTEXT OF WHAT IT TAKES TO BE A SUCCESSFUL CITY IN TODAY'S WORLD. THROUGH A GLANCE AT HISTORICAL AND PRESENT-DAY EXAMPLES, IT ILLUSTRATES THE POTENTIAL OF NORDIC CITIES AS FORERUNNERS OF URBAN CHANGE. IN THIS SECTION, THE READER WILL FIND A FRAMEWORK FOR URBAN TRANSFORMATION, ALONG WITH A SUMMARY OF THE FACTORS THAT POTENTIALLY HINDER CHANGE IN CITIES.

"Renovation projects hold great potential for the revitalisation of local economies."

THIS IS NOT A SMART CITY

URBANISATION is one of the most important megatrends to shape global society of the 21st century. However, urbanisation puts a strain on the quality of life in cities, as well as the management of big infrastructure systems, such as city traffic and energy usage.

The Smart City approach is the paradigm of urban development in the 2010s. It promises to combat these challenges with new technological solutions; information technology can help to bring about new kinds of co-operation and to enable the interweaving of different city elements (energy, buildings, transportation and users). In this way, infrastructure can be used more efficiently with fewer resources, and the growing needs of cities can be satisfied.

The stories of places like Songdo in South Korea or Masdar city in Abu Dhabi fit the classic Smart City mold: technologically highly advanced, newly built cities, planned in a top-down manner by leading architects and technology companies. Great exhibitions of advanced technology, and destinations for experts of urban development from all parts of the globe.

This, however, is not the reality in which most of us urban-dwellers live: our cities are old.

A substantial number of neighbourhoods in Europe were built between the 1950s and 80s. Around one-third of the Finnish, Swedish and Danish residential building stock was built between 1946 and 1970, with around one-fifth erected in the 1970s. These buildings comprise a significant part of their country's wealth, but are now in dire need of renovation. The populations of these neighbourhoods are becoming impoverished and demographically biased, as many areas are overlooked by the middle class and well-to-do families despite their good urban location and decent access to public transport.

In the past, problems like these were solved by improvements in infrastructure: large-scale investments in state-of-the-art energy and water supply systems, train and subway networks, wider streets and avenues, and replacement of existing building stock. Today, however, such projects face many economic and political obstacles that make their execution difficult. This is why countries like Sweden, Germany or Italy won't build smart cities in the style of Songdo or Masdar City.

How, then, can we increase, or at least conserve, the future value of the capital embedded in our built environment? What besides for renovation is required to bring about better energy efficiency, or a cleaner appearance of buildings and public spaces?

We now need newer, more innovative and smarter ways to manage urban growth.The

urgent need for renovating the ageing mid-20th century building stock opens a window of opportunity: renovation projects allow for improvement of the technical performance, and also hold great potential for the revitalisation of local retail and service economies, thus enabling sustainable lifestyle changes.

This is complemented by another phenomenon. Emerging trends such as energy scarcity, disruption of retail, digitalisation, emergence of the sharing economy, alongside many others, will fundamentally alter our urban areas. With the right kind of action, however, these trends can be harnessed to better serve the interests of neighbourhoods, companies and individual inhabitants.

These emerging drivers of change promise to transform our cities in ways that are quite different from the powers that shaped them in the early 20th century:

- Instead of building houses and neighbourhoods from scratch, there will be more renovating and retrofitting of the old.
- Instead of creating new physical and resource-heavy structures there will be more services and products operating within the digital realm.
- Instead of centralized top-down reforms there will be processes operating in a distributed, bottom-up manner.
- Instead of planning and traditional processes there will be engaging visions, experiments and proofs of concepts.

”Emerging trends such as energy scarcity, disruption of retail, digitalisation, emergence of the sharing economy, alongside many others, will fundamentally alter our urban areas.”

THE NEW NORMAL OF URBAN GROWTH

CITIES ARE NOT LIKE they used to be. Cities all over the world are repurposing themselves and building new narratives of their future success. While the rest of society defines progress in increasingly economic terms, cities have started thinking more about their population and their capacity to create a flourishing environment (yes, also in economic terms).

The 20th century city was dominated by big industrial structures and functional planning that separated production, housing and services into distinct zones. An urban region would be defined by one trailblazing company, public function, or field of industry that gave the city a reason to exist and provided employment to its inhabitants, something around which everything else revolved. Earlier, that role typically belonged to large manufacturing companies, later it belonged to universities and high-tech hubs.

The new normal of cities and urban change perceives people, their skills, motivations and capability for collaboration as the only lasting and sustainable resource a city possesses. Factories, offices and companies can decide to re-locate practically overnight. However, if people experience a steady stream of good and inspiring things around them and share confidence in that they can always create or find something new regardless of the existing employment structures, the city will continue to flourish. Different actors can promote a sense of progress and a good atmosphere, but this is always co-created – not planned or served.

At the same time, cities are just like they used to be. Cities are places for human interaction, commerce and enjoyment. In cities we encounter most of the human-made wonders and feel the presence of other people. It is fair to say that this *layer of city 2.0*, cities as arenas for collaboration and spontaneous togetherness of people, has become increasingly important during the young 21st century.

Built structures have a special role in either expanding or restricting this emerging strength of cities. While the symbol of a successful society used to be a factory or a university in the heart of the city,that time is gone. Instead of looking backwards, we should be looking towards building and planning the physical and

"The new normal of cities is about perceiving people, their skills, motivations and capability for collaboration as the most resilient resource a city has."

governance-level prerequisites for the flourishing society of the future. We can change buildings, streets and urban spaces to meet the needs of the future. We can discover new methods to better connect the built environment with new forms and arenas of human collaboration. We can change business models to help capture more value from the already existing building stock. We can make our cities better and more future-proof. This report demonstrates how this can be done.

Six meganarratives that define the new normal of cities

1 Walkability

WALKABILITY MEANS people friendly. 20th century planning aimed to make cities liveable, but in practice gave priority to industrial structures, cars and functional flows of masses. In the 21st century, cities are once again designed for people and made to human scale ("people friendly"). Aesthetic qualities have re-emerged as priorities – walkability and human friendly spatial proportions are now leading design principles.

2 Urban cores as an asset

THE PAST TWO DECADES have seen a renaissance of city centres in Western societies. Cities have increased walkability, built flats and revitalised local services. City centres are not important only as commercial hubs, but as venues for urban life and for enjoying the company of other people. The city centre, not campuses, malls or residential areas, is the key to making a city attractive.

3 Changing work and production

SOCIETY IS MOVING from full-time employment and industrial structures of production towards society where people divide their time between several jobs or pursue careers as entrepreneurs. In the future, factories, public institutions and retail will employ many fewer people than they did in the past. Mixed-use environments will become common, as homes, cafés and co-working spaces replace offices, even factories.

4 Digital consumption and sharing

DIGITAL COMMUNICATION is radically changing the ways we use cities. It gives rise to new services, events and other forms of collaboration in the urban space: e-commerce, sharing economy services like Airbnb, pop-up events like Restaurant Day, and new forms of peer-to-peer communication. E-commerce and the sharing economy may eventually push many established forms of retail and services out of business.

5 Circular economy

CITIES ARE RESPONSIBLE for 70% of human-induced greenhouse gases and consume the majority of energy and natural resources. To minimize this impact, new technologies and business models are used to make better use of existing buildings, spaces, vehicles and renewable sources of energy. The emergence of a circular economy, collaborative consumption and distributed energy production will radically change urban space.

6 People-Public-Private

LOCAL COUNCILS retain control over zoning and planning, but have lost much of their capacity to develop urban space on their own terms, due to the open global economy. Cities' success depends on investments by private companies, and on people's motivation to reclaim, inhabit and spend time in the urban space. City officials are desperate to find ways to engage other stakeholders and to form a shared future vision.

FORERUNNERS HAVE GOALS

MANY NORDIC CITIES have taken upon themselves the task of becoming forerunners in sustainability, in particular in reducing their climate impact. From curbing overall emissions to targeting sectors such as transport, district heating and energy production, these cities have taken determined steps in order to be prepared for the inevitable change in climate and energy markets. In the Nordics, this development is not limited to capitals, as even smaller cities are vying for a place amongst the ranks of the leaders in showing how cities can play an integral part in tackling climate change. Whereas nation-states are constricted by the election period time-frame, cities are setting targets to 2050 and beyond.

"Whereas nation-states are constricted by the election period time-frame, cities are setting targets to 2050 and beyond."

Table 1.1 Targets of some nordic cities

HELSINKI	Carbon neutrality by 2050
OSLO	Carbon neutrality by 2050
STOCKHOLM	Fossil fuel free by 2050
COPENHAGEN	Carbon neutrality by 2025
VÄXJÖ	70% reduction in GHG emissions per capita by 2025
MALMÖ	At least 40% reduction in GHG emissions by 2020
LAHTI	50% reduction in GHG emissions by 2025

In order to achieve these self-imposed targets, the cities have outlined needed measures in different sectors. Stockholm and Oslo, for example, are aiming for a long term transition into fossil fuel free public transportation, and almost all of those hoping to claim the title of forerunner are making strides towards overall energy efficiency. For cities such as Lahti, where heating is the number one cause of emissions (at 40%), aiming for extensive use of green energy and increasing efficiency is a priority. This is also true in Copenhagen, where the CHP Climate Plan 2025 draws special attention to reducing building emissions, that are responsible for 75% of the city's CO_2 emissions.

Why cities have targets

ALTHOUGH THE TARGETS and measures of cities are local, they are a catalyst for a transformation that is global. Currently, over half of the world's population lives in urban areas and by 2050 that number is expected to increase to encompass two thirds of the people living on earth. Simultaneously, cities now contribute 70% of the world's CO_2 emissions. From Oslo to Växjö, Lahti to Copenhagen, cities have realised that where states have failed on an international level, they can succeed in locally. Cities have shown the will to act as an example and seem to have realised something vital along the way: cities are where emissions occur and cities are where they can be curbed.

At the same time, environmental considerations need not be motivated by only benevolence. Becoming a forerunner in environmental matters has and will continue to garner social and economic benefits. Växjö's shift to biomass, for instance, has enabled the city to become less vulnerable and less dependent on energy from outside the district. Further, it has created local jobs and stabilised energy prices, all while being a more environmentally friendly alternative. Malmö, on the other hand, has placed its bet on the correlation between creating a liveable city and attracting new citizens and business. The city's strategy envisions Malmö as "the sustainable city:" a clean, energy efficient urban

area that harbors a cutting-edge environmental sciences research community, drawing in people and businesses alike.

Copenhagen concedes that its ambitious climate plan requires investments, but emphasises that they are precisely that: investments. In the future, they will bring not only environmental benefits, but also well-being for citizens and a boost to the economy. More bicycles mean more exercise, a cheaper utilities bill means more savings and new solutions have a unique export potential. All the while, several of the investments form the backbone for new jobs. With such promises, who would not want to join the ranks of urban forerunners?

Lighthouses show the way forward

THE INITIATIVE AND AMBITIONS of the forerunners are highlighted in certain lighthouse projects within the urban areas. These projects have been planned not only to show a sustainable way forward, but to remind that change is possible here and now. They are urban areas that draw in people and business alike, excited by the liveliness, liveability and flow of people.

LENNART JOHANSSON / CITY OF STOCKHOLM

FRANCOIS POLITO (CC BY 3.0)

Stockholm: Stockholm Royal Seaport

The aim of the transformation of the Stockholm Royal Seaport, Sweden, is to turn the former industrial zone into a thriving residential area with zero fossil fuel emissions by 2030. It will be the first city district in the world to feature full-scale smart grids, reducing both the price and the quantity of energy consumption of its residents.

LPR ARKKITEHDIT OY

Malmö: Bo01

In Sweden, Malmö's Western Harbor's transformation from an old industrial zone to a new sustainable urban area began with Bo01, the European Homes Fair in 2001. A unique combination of urban and natural environments, the area is only a short distance from the city centre.

Turku: Skanssi

The aim for the development of Skanssi in Turku, Finland is to create a socially and environmentally sustainable area. Technology, smart solutions and citizen participation are highlighted in the plan for the urban environment including homes, services and jobs.

REDEMPTION OF NORDIC URBANISM

IN THE NORDIC COUNTRIES, migration into cities accelerated in the early 20th century, and the 1930s saw the beginning of a drive to reshape the built environment. By 1970 the majority of the population lived in cities. This shift took place comparatively late in Western European terms, enabling the relevant agencies to take a systematic approach to urban planning. City planning and architectural solutions became instruments of social reform.

The creation of the modern living environment was closely linked to the development of the welfare state. New functionalist architecture reflected Nordic ideals of universality, equality and classlessness.Traditionally, the inhabitant's social class determined the floor plan of the dwelling: whereas working class families lived in a single room, upper class homes served as status symbols and social spaces. In the course of the 20th century, dwellings came to follow a standardised floor plan, derived from the basic physical needs of the modern individual, family, and society; it varied only in the number of bedrooms aligned around the kitchen and the living room. At the same time these spatial solutions would make the apartment smaller, and thus available to those with lower incomes.

The conception of the basic needs of the individual was value-laden in itself. Policymakers, planning agencies and opinion leaders of the time had a multidimensional view of what the modern citizen required, based on both present circumstances and expected needs of the future. The modern citizen was to be healthy both mentally and physically, and hygiene and cleanliness became the primary concern of densely populated cities, where the risk of epidemics was high. Aesthetic ideals came to emphasise white surfaces where dirt was plainly visible, and in suburban plans plenty of space was left between buildings to allow for allegedly curative fresh air and sunlight. Housing located close to nature was considered a good and healthy environment for all citizens; this was in part due to the fact that large-scale urban living was a recent phenomenon, whereas ties to the countryside and nature spanned an indefinite amount of generations.

On the other hand, the urban habitat was planned to shape the lifestyle of citizens to correspond to the ideal of modern society. For instance city plans were to structure the work and leisure time of citizens: suburbs contained the facilities for active and healthy leisure time, such as sports fields and libraries, in order to minimise loitering on street corners. With schools, kindergartens, shops and services, these neighbourhoods were functional units in themselves, providing all the essentials of and a social backdrop for everyday life.

Bagarmossen, Sweden 1955

BENGT MICHANEK / STOCKHOLMS STADSMUSEUM (BY-NC-SA)

"City planning became an instrument of social reform. Architecture reflected Nordic ideals of universality, equality and classlessness."

Lahti, Finland 1971

KUVAKILA / LAHDEN KAUPUNGINMUSEON KUVA-ARKISTO

RETROFITTING SMART CITY

KIRMO KIVELÄ (CC BY-NC-SA 2.0)

NORDIC CITIES have almost all the ingredients needed to become global models of 21st century human-scale urban environment:

- In the Nordics, cities are well designed. The Nordic tradition of planning and building cities emphasises diverse needs of human scale.
- Infrastructure in Nordic cities is reliable, skillfully designed and well maintained.
- Nordic countries and cities have adopted high standards and ambitious goals in climate neutrality and resource efficiency, with a focus on cleantech and forerunner technologies.
- The emphasis on information and communications technology (ICT) solutions and a rich business ecosystem of mobile and internet startups provide a good starting point for smart city development.
- There is a high level of engagement by citizens, along with active social movements and a high level of education.

The way Nordic cities are developed is quite different from the development of cities in most other regions of the world. Because of their already high standards, they are not likely to be rebuilt on a large scale. The vast majority of the existing building stock and infrastructure will be there for the rest of the current century: the renewal rate is low and is unlikely to rise.

"Nordic cities aim at an ambitious transition: carbon neutrality, a high quality of life, and globally competitive businesses."

Therefore the Nordic version of Smart City will turn the old built environment into 'Smart Retro', building on and around structures dating back to the 19th and 20th centuries. The focus is on urban infill, retrofitting and placemaking (or repurposing) of buildings and urban space that have lost their former use.

Yet these ways of activating urban spaces won't be enough to turn old neighbourhoods into attractive areas of a human scale. They also need services that make everyday life smoother and enhance social interaction between inhabitants. From what we know about the direction of change today, it is evident that most of these services will be mainly digital. Smart city and digital tools will be embedded in old, or 'retro' structures.

This approach provides a good basis for development: the efficient infrastructure, highly educated populations and widespread use of new technologies in the existing neighbourhoods of Nordic cities make them receptive to new

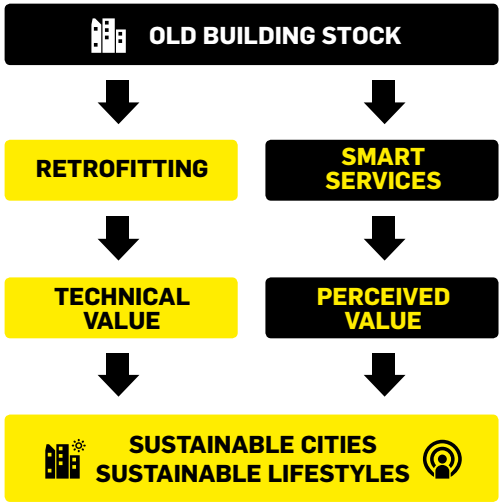

Figure 1.1 Retrofitting adds technical value to the old building stock. While this type of upgrading is necessary, it is not usually enough to raise the perceived value of a neighborhood. What is required in addition are services and functions that enhance smoothness of everyday life and bring about a sense of progress. Both retrofitting and smart services are needed in the development of sustainable cities that enable sustainable lifestyles.

concepts. These areas already possess a potential customer base for new services, and their inhabitants are used to utilising the urban space in service consumption.

Nordic cities aim at an ambitious transition: to become carbon neutral whilst maintaining a high quality of life for all citizens, as well as flourishing, globally relevant and competitive businesses. The sustainability goals of Nordic cities are the basis for their 'design principles' for investment and planning of new areas. But investments in the existing built environment are required: housing and mobility need to be technically updated to a more energy and resource efficient level, at which they encourage people to adopt sustainable patterns of behaviour.

The greatest untapped potential lies in digital services. These are needed to convert these technical changes into better quality of life in cities. The new services should enable life in cities to be smoother and quicker, and allow for more time for things that people truly value: family, motivating tasks, and enjoyable leisure. They help people save time in daily activities like commuting and shopping, or reduce the costs of housing, mobility or home appliances and other material goods.

"Digital services are to show people that life in cities can be smoother and quicker."

Startups that produce these services are called smartups. They provide scalable smart services that produce a better urban living experience, engage consumer users and at the same time significantly decrease the level of energy and resource consumption.

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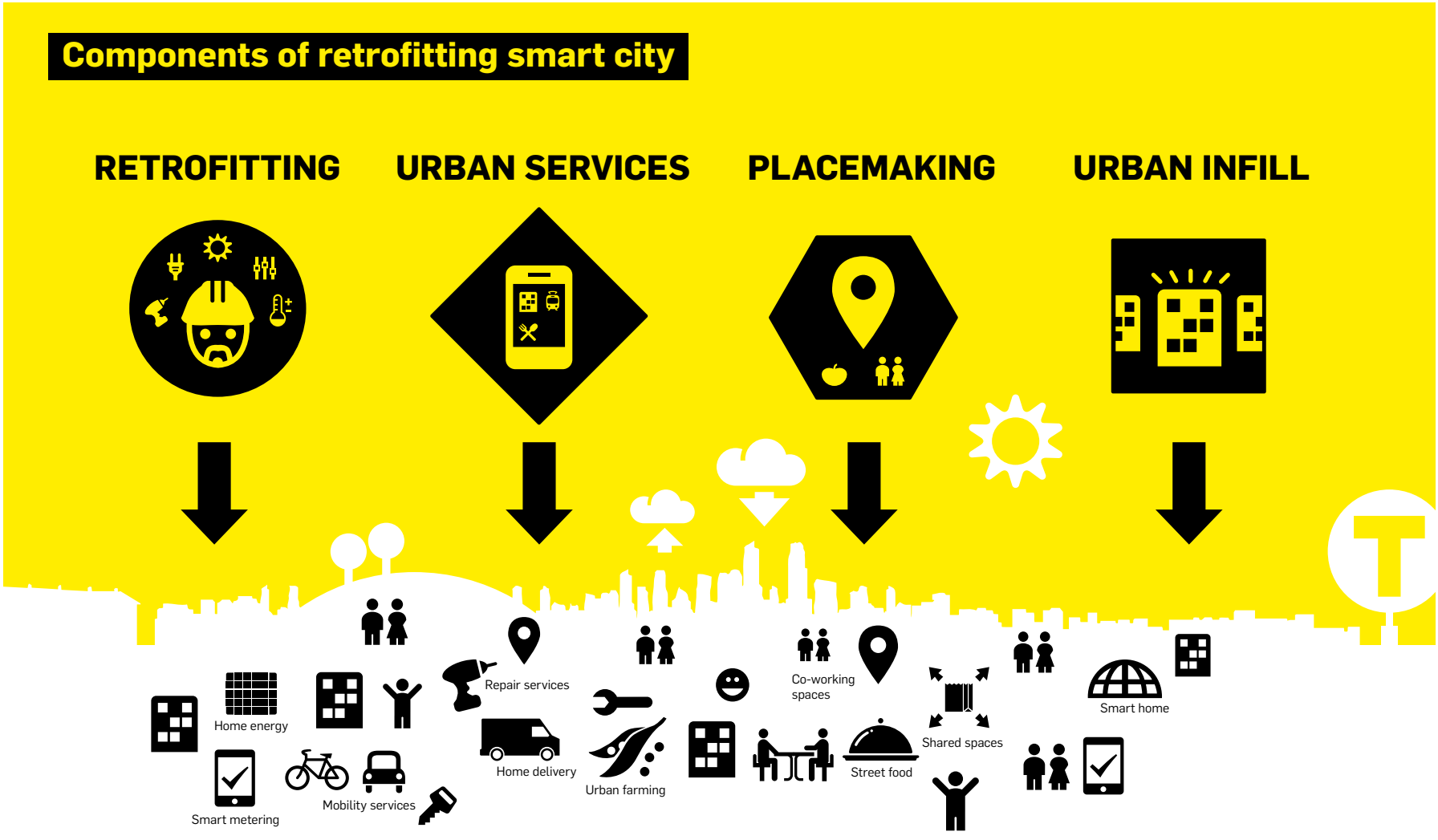


Figure 1.2 Turning old neighbourhoods into smart cities requires four types of renewal activities: retrofitting to upgrade old buildings, startups that provide smart services to satisfy the everyday needs of inhabitants, placemaking initiatives that invigorate public spaces and bring people together, and urban infill to increase user volume and urbanity of a district.

THREE LEVELS OF CHANGE

LARGE TECHNICAL SYSTEMS and infrastructure are facing unprecedented changes. In the coming decades, cities will need to adapt by lowering emissions, increasing energy efficiency and figuring out new ways to manage energy intensive sectors such as transport and energy production. Opportunities like digitalisation and tools provided by new technologies will no doubt play a pivotal role in tackling these issues. Nevertheless, it is not merely technology that is needed to make the shift, but the whole of society.

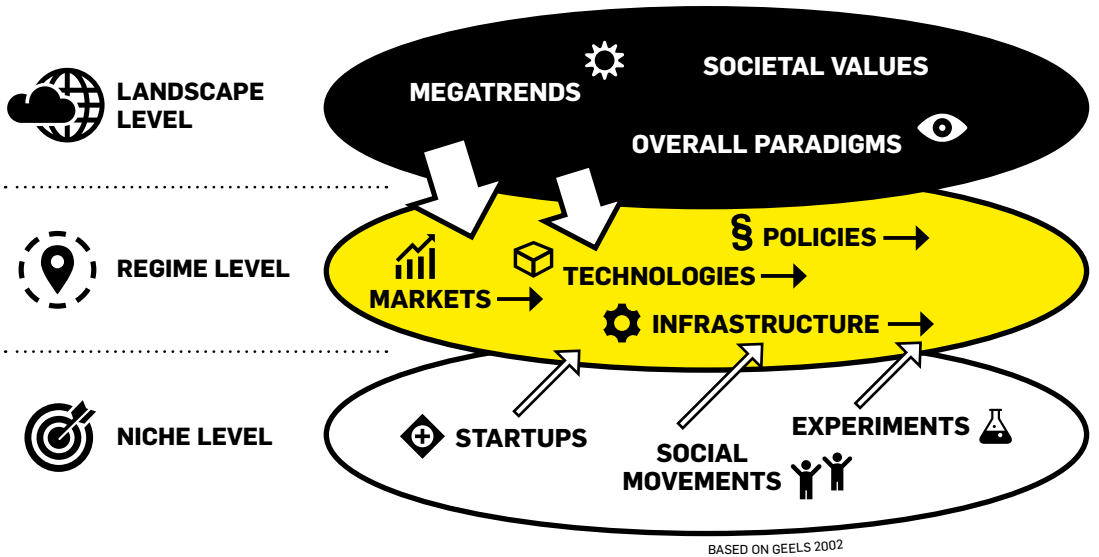
Such large-scale transitions spanning over decades need to be broken down in order to be understood. To help perceive the different phases within the transition, this report uses a multi-level perspective (MLP) on urban change. The MLP takes a systemic sociotechnical approach, encompassing a macro, meso and a micro level. It stresses the interplay between the three levels and the actors within them, helping to define the possible roles for cities and other actors in aiding transitions. By looking at the big picture, far-reaching shifts and their drivers are more easily discernible and manageable.

Multilevel perspective

LANDSCAPE

THE THREE LEVELS all play a distinct part in the MLP, and it is their interplay that governs sociotechnical transitions. The macro level, called the landscape, is true to its name by being the most stable level. It is an external setting used to describe structural trends concerning, for example, macroeconomics, land use, political cultures and long-term demographic shifts. The megatrends on the landscape level exert pressure on the current sociotechnical regimes.

Figure 1.3 The multi-level perspective on socio-technical change is a tool for managing urban transformations. It focuses on the interplay between experimental niche-level activities, established regime-level practices and the landscape-level slow moving structures of society.



REGIME

THE REGIME LEVEL is best described as a system of rules, institutions, and practices that are carried out by different social groups. It is the level where current configurations of technology, culture, politics, science and user preferences are. These sets of rules provide a sort of dynamic stability: change is possible within the rules of the regime, but developments contradictory to current regimes are excluded.

NICHE

OFTEN MADE UP of small networks of actors, the niche level is composed of ideas that can lead to incremental change in regimes. However, when the efforts of many actors are combined or when there is a window of opportunity for change within the regime, micro level innovations can have a radical effect on the regime, which then reconfigures and reestablishes itself.

"By looking at the big picture, far reaching shifts and their drivers are more easily discernible and manageable."

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The social and the technical

THE MLP has been extensively used in analysing so-called sociotechnical transitions. From the development of renewable energy technology to mobility transitions, most of the case studies and theory has focused on the national level. However, as the eye of the world has turned to cities in matters such as sustainability, so too has the role of cities become accentuated in thinking on transitions.

Our approach has drawn attention to the fact that 1) transitions are not merely the outcome of certain technologies, but a process that includes social aspects as well and 2) cities must realise that the drivers for change are not all located within direct reach of policy. While cities do play an important role in creating and managing niches, established rules on the regime level may either prohibit or enable change. Thus, the holistic view of the MLP can aid in seeing how regulation or relations between actors should be changed in order to aid urban transitions.

REMOVING BARRIERS OF URBAN TRANSFORMATIONS

WHY DO OUR CITIES CHANGE SO SLOWLY? There are established policies, practices and market structures that on the one hand make our urban planning machine automatic, but, on the other hand, make it resistant to change, even when change is strongly needed.

1 THE URBAN ENVIRONMENT IS DEVELOPED BY A CLOSED CIRCLE OF ACTORS, AND ITS DEVELOPMENT IS GUIDED BY CERTAIN CULTURAL AND LEGAL PREMISES. Examples of these premises include an imperative to fulfill the basic needs of the inhabitants, in particular to build enough housing for people to live in; planning which gives priority to private vehicle traffic; and a preference to build new instead of upgrading the old stock, even when the former does not yield optimal value to our society. When we overlook the diversity of needs by building basic housing that meets the needs of the "average citizen," we unwittingly resort to an old pattern of only building buildings instead of creating an urban environment.

2 THE ACTORS INVOLVED IN THE DEVELOPMENT OF THE BUILT ENVIRONMENT ARE SPECIALISED IN DEVELOPING ONLY CERTAIN FEATURES OF CITIES. These features are historically determined by the special functions of the city. The defining function has been production, were it an industrial site with its logistic requirements, or a business ecosystem around a university, polytechnic or high technology centre. Society as a whole is also hardwired to consider living, production facilities, and commercial spaces as entirely separate entities. This inhibits us from transitioning into a mixed-use society that builds, modifies and uses its spaces wisely and efficiently.

3 OUR CURRENT SYSTEM DOES NOT ALLOW FOR OPTIMISING THE USE OF SPACE. Markets don't actively look for new models of rental contracts. This is most visible in the case of commercial spaces: many property owners opt to keep shop spaces vacant while searching for a long-term tenant instead of bringing in tenants from pop-ups and other temporary uses. Inflexible standards for renting still often block pop-up businesses and services alongside other modes of temporary and innovative use of space.

4 LASTLY, THERE IS A STRONG DIVISION BETWEEN PUBLIC AND PRIVATE ORGANISATIONS AND THEIR OPERATIONS. The job of the civil servant is to follow and enforce the rules and regulations created by the public sector. Some of these rules and regulations are either clearly outdated or don't allow for optimal solutions, and this lack of agility makes it difficult to develop working practices with non-public organisations, preventing the creation of many new types of services. The creation of new inspiring ways to develop the urban environment therefore requires rethinking and reforming the existing rules and regulations.

These characteristics of our cities and of the current environment business ecosystem, slow down the transformation of our cities towards a more human-scaled and sustainable direction. Because of this rigidity, the urban space is not making full use of opportunities that arise from the fast evolution of digital technologies, business models and user communities. Bits and atoms are being kept apart, despite all the talk of the internet of things. Buildings and cities are still being built for traditional business models: as offices, parking lots, shops and other single purpose services. Yet we are witnessing the emergence of a layer of urban services, from vehicle to ride sharing, from consumer-to-consumer property rental to co-working spaces, from smart home solutions to new home deliv-

ery systems of e-commerce. These all use the existing building stock and urban infrastructure as a platform and enhance its livability and perceived value.

Traditional actors of the built environment ecosystem fail to recognise the potential of this new layer of services, and lack the means to embed them in in their business models. The old methods of repairing and refurbishing do not enhance the experienced value of the built environment. In other words, the value chain of the built environment is broken, or at least outdated.

WHAT HAPPENS TO OUR BUILT ENVIRONMENT and how it can respond to the needs of today are some of the most important questions of our society. The new winning recipe for developing cities is to bring together emerging innovations by startups and urban activists, and the traditional built environment actors. (see, figure1.3 (multi-level perspective). As they become effective and operational, these new collaboration models accelerate the city's favourable development.

In the next section, we introduce case examples of new collaborations between traditional actors of the built environment and new urban service providers, as well as a model for creating a new value chains of urban development in the 21st century.

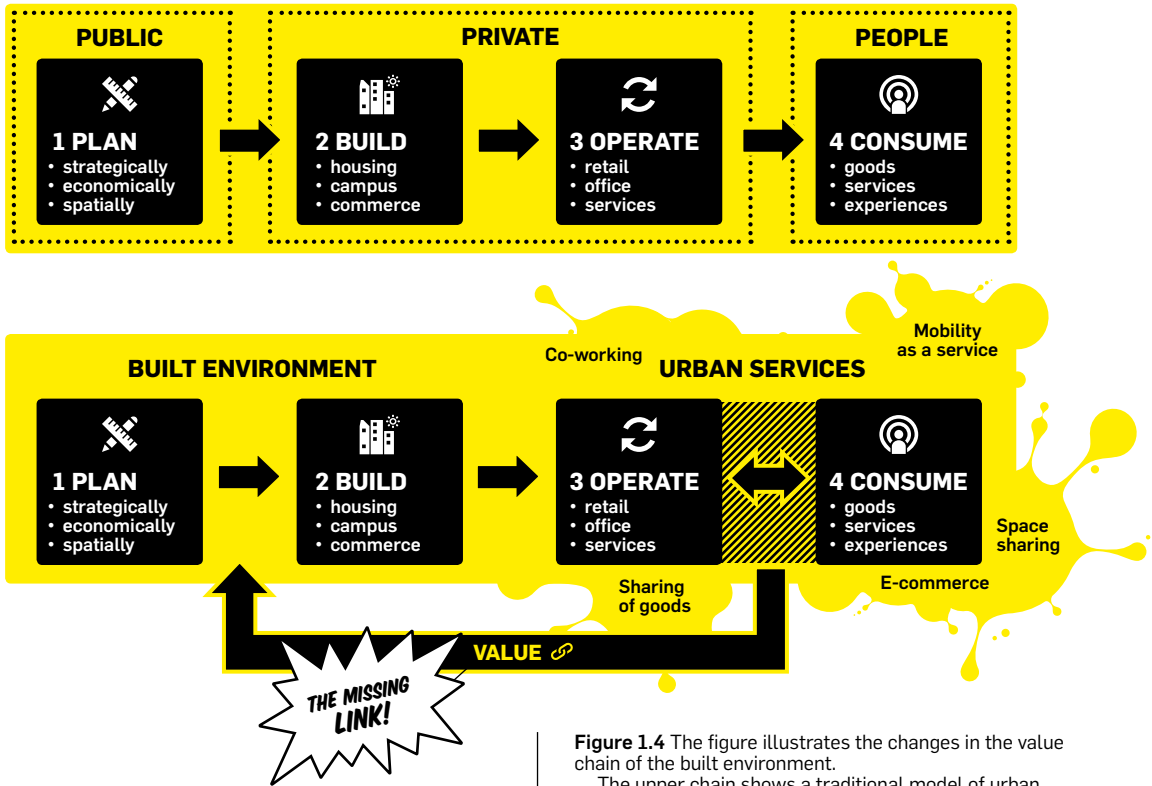


Figure 1.4 The figure illustrates the changes in the value chain of the built environment.

The upper chain shows a traditional model of urban development, where sharply separate activities are performed by different sectors. In this old approach, cities have separate strategies for their different functions, that don't necessarily form a coherent program on the level of implementation.

The lower chain depicts a new model of urban development. A new wave of urban services have appeared, that fade the line between the consumer and the producer of the built environment. The potential of these services to bring added value to the built environment is realised when a missing link is identified. The missing link connects the traditional and the new actors embedding the new services into city planning and traditional business models.

"A missing link connects the traditional and the new actors, embedding the new services into city planning and traditional business models."

SECTION 2:
THREE SCENARIOS FOR THE FUTURE OF SMART CITIES

THIS SECTION SHEDS LIGHT ON THE UNCERTAINTIES OF THE FUTURE. THE THREE ALTERNATIVE SCENARIOS CONSTRUCTED HELP GRASP HOW THE WORLD MIGHT CHANGE OVER THE COURSE OF THE NEXT 25 YEARS, AND WHY NORDIC SMART CITIES CAN ACHIEVE SUCCESS AMIDST BIG POLITICAL, SOCIAL OR TECHNOLOGICAL CHANGES.

FROM FORECASTING TO BACKCASTING

2 types of scenarios

IN THIS REPORT we approach the future of cities and urban life with the help of scenarios. Scenarios can be used as a tool for exploring future uncertainties that we constantly encounter in our economy and society. Scenarios help in building capabilities for strategic steps, in identifying actors that should be prepared for and drive change, and in finding the right timing for action. They describe alternative futures of society and pathways through which those futures can be attained.

There are two main types of scenarios: Forecasting scenarios are constructed from the present day towards the distant future. Their purpose is to explore the types of obstacles and opportunities for which we should prepare ourselves. Backcasting scenarios are constructed from the distant future towards the present. Their purpose is to discover alternative pathways through which a desired goal can be met.

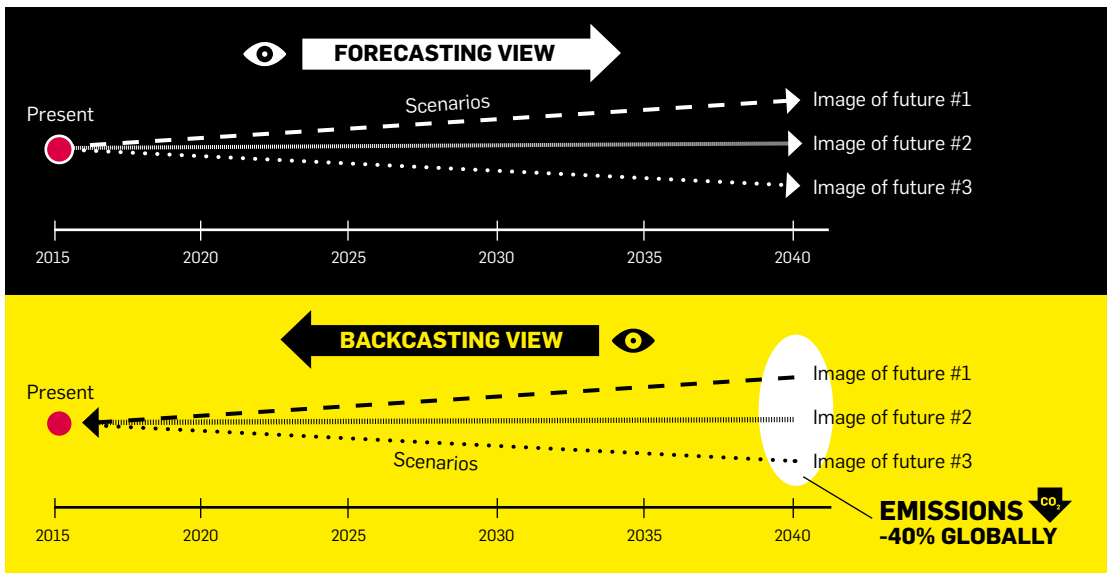
Backcasting is a relevant option when forecasting studies indicate that long-term developments are likely to lead to undesirable outcomes. Backcasting scenarios allow for new options to be considered reasonable, therefore widening the perception of what could be feasible and realistic in the long-term.

In this report, like in many other backcasting studies, the goal is defined through long-term transition to carbon neutral society. An economically viable carbon neutral society is unlikely to be attained through incremental change. Yet avoiding catastrophic climate change is a global priority on which almost all governments, as well as many cities, agree. Backcasting scenarios are needed if we want to turn these priorities into successful and sustaining action.

...scenarios on 2 levels

OUR MAIN FOCUS is on cities, on the transformation of their built environment and on the future of urban services, yet we also portray a much wider horizon on the future of our societies. This is needed because cities don't evolve independently of external factors such as tech-

Figure 2.1 This figure depicts the difference between the forecasting scenario and the backcasting scenario approach.



nology, politics and people's behaviour.

For this reason we depict scenarios on two levels:

1. **GLOBAL SCENARIOS** that provide overall frameworks of how the world is prospected to change by 2040.
2. **CITY DISTRICT LEVEL SCENARIOS** on two Nordic neighbourhoods, Bagarmossen in Stockholm, Sweden and city centre of Lahti, Finland.

The city district level scenarios follow the basic narratives of the global scenarios. However, they provide a much more detailed and contextualised account on how global level changes affect regions with distinct histories. Special attention is given to smartups (see pp. 54), their innovative services and how they enable the transformation to a flourishing carbon neutral society.

...and 3 narratives

OUR FOCUS IS ON CITIES that have chosen to be forerunners in the development of carbon neutral society. We have interviewed a number of experts and asked them why cities choose to do so and how these cities should expect to benefit from early progress. There is no one clear answer. Instead experts provide three different types of narratives:

1. There is an expectation that nations will sooner or later agree on binding greenhouse gas (GHG) emissions reductions and (economic) measures that will place a high price on emissions. Cities should prepare for this new regime.
2. Climate change is the biggest challenge of humankind in our time. We need to find technological solutions that help tackle it. There is practically endless demand for these solutions. The companies that build them and the cities where they are built will enjoy great success once these markets boom.
3. Stocks of oil and many other strategic natural resources are bound to have depleted before we face the climate crisis. When this happens, the global economy will be driven into an unforeseen state of turmoil. Those cities that have increased their energy and resource efficiency, and decreased their dependency on energy and natural resources will be more resilient in the face of this great disruption.

We have constructed three scenarios, each loosely based on one of these narratives. In all three global scenarios, humanity manages to avoid catastrophic climate change. However, the logic of change to carbon neutral society that each scenario follows is different: transition is initiated by a distinct societal driver in each (see figure 2.2). The intention is to demonstrate that there are several leverage points that can potentially trigger the change. In each city district level scenario, regions manage to significantly drop their level of greenhouse gas emissions whilst enabling their inhabitants to experience a higher quality of life than today.

The aim of this scenario exercise is to showcase that an economically viable carbon neutral society can be attained in different ways. Additionally, the scenarios help grasp that the carbon neutrality goal can help cities flourish in several alternative futures.

Figure 2.2 The image shows the logic of change across society in each global scenario.

GOAL-DRIVEN SCENARIOS

BACKCASTING SCENARIOS depart from a goal (such as, for example, emission reduction targets). This goal or criterion determines the set of acceptable future end states of a long-term transition. There may be several acceptable end states, which means that the goal can be attained in different ways.

The goal for these scenarios is: **attractive, open, flourishing and just cities within planetary boundaries.**

'Planetary boundaries' here refers to the carrying capacity of the planet: by our target year cities and their inhabitants need to consume substantially less natural resources and their activities need to emit at least ²/₃ less greenhouse gases than they do now.

This will require zero energy buildings, energy efficient vehicles, electric transport and the use of 100% renewable sources in energy production. Recently these technical solutions have become mainstream and provide a solid platform for the leap towards low-carbon society.

Technical solutions on their own are not enough. If we still commute longer distances, live in bigger flats, buy bigger fridges and wider screens, eat more meat and fly frequently to distant locations, none of the efficiency gains from technology will be enough. We also need behavioural change.

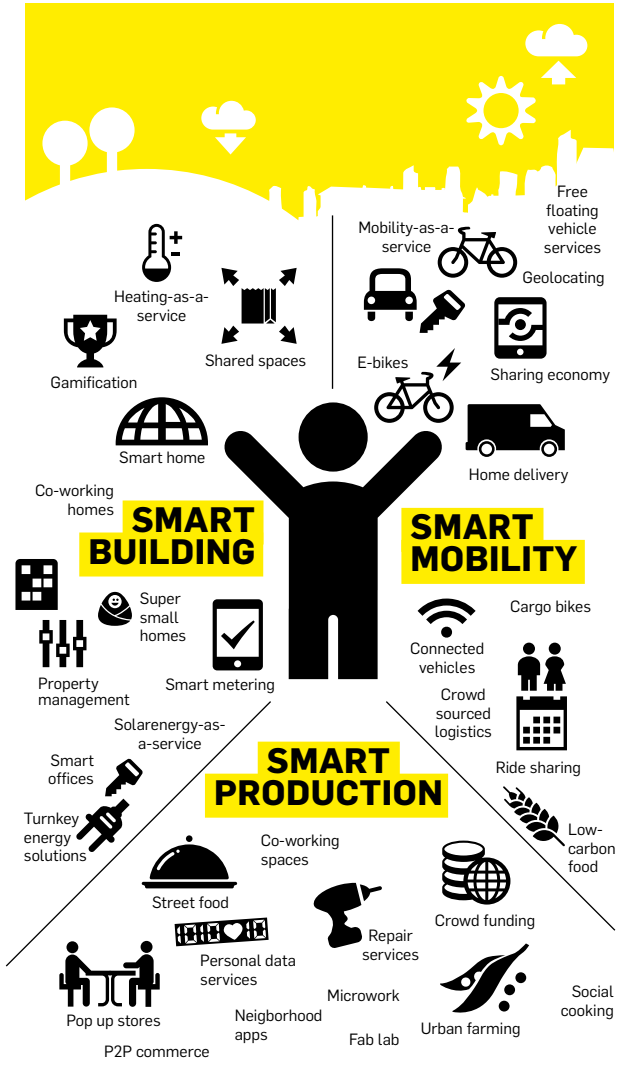
It is apparent that individuals will not make these changes (sacrifices, even) unselfishly, motivated by our need as a society to reduce our resource intensity and GHG emissions. There are different ways to persuade people to change their behaviour. Bans, regulations and price incentives are often considered efficient, but only go so far. In addition to this, there need to be other benefits: a smoothly running everyday life, more exciting experiences, new opportunities for business, or a sense of achieving things together. These are only reached through the clever design of services, environments and objects.

Smart services make urban futures look exciting

THE THREE SCENARIOS describe what ageing Nordic cities may look like in the future. Special attention in these scenarios is given to new types of urban services.

For the past half-century, the central functions of our cities – housing, mobility, work

Figure 2.3 Emergence of smart urban services will change the way we work, move, and live in cities.



and commerce – have remained more or less unchanged. Technical improvements have been incremental, business models have not diversified. Market structures are in many cases still very similar to how they were fifty years ago.

It appears, however, that we are about to witness remarkable changes in the way we live, move, work and shop in cities. Emerging practices will help make better use of existing stocks of goods and spaces in urban environments, as the internet of things will enable as-a-service models. In other words, sensors will soon connect everything that surround us to the internet, so that they can be located, controlled and shared through digital service platforms. In this way, many such things that previously had to be owned or at least rented for substantial periods, can now be traded and used as-a-service.

By 2020 around 50 billion devices will be connected to the Internet. Smartups (see pp. 54) will make use of these digital advances to tap into a pool of resources and to turn them into new types of smart services.

- **BUILDINGS, HOMES, OFFICES** and all their devices will soon be controlled through smart devices. This will help optimise their energy use and enable smart sharing of homes, offices and other types of spaces.
- **MOBILITY OPTIONS** used to be confined to either driving a private car, bike or motorbike, using public transit or walking. The boundaries between them are beginning to blur. Journey planner applications have already made it easier to combine different modalities. Services based on sharing rides, cars, deliveries, bikes, and other vehicles in conjunction with digital service platforms have become the norm in urban environments around the world. Mobility is becoming a service, and not owning a vehicle can offer flexibility not achieved otherwise.
- **SPACES OF PRODUCTION AND WORK** change because our patterns of work are evolving. Many types of tasks can now be distributed to several locations and to several people because of fast digital communication. There is less of a need for people to gather into an office to work together, which opens people to new types of working environments, co-working spaces and shared spaces. In addition, there will be more temporary shops, restaurants and other types of pop-up businesses in shop spaces, offices, containers and tents. Next we are likely to witness new types of manufacturing spaces in the form of fab labs and other makerspaces.
- **BEHAVIOUR** will be shaped by different types of behavioural applications that encourage us to live smarter and healthier. Gamified tools help us attain goals, whether related to work or leisure time, in a playful manner. We can already see a new layer of social behavior and collaboration taking place in urban spaces and neighbourhoods, created by digital social networks initiated by social media tools.

”The goal for these scenarios: Attractive, open, flourishing and just cities within planetary boundaries.”

These solutions will provide new functions and purposes for urban spaces. While buildings, roads, parks and plazas may look the same as they do today, how they are used and perceived will change. What used to be a photo shop will be a temporary test space for new services. What used to be a garage will turn into a repair shop or a fab lab. What used to be plaza or a parking lot will be filled street food stalls. What used to be a private home can be a temporary office for a group of freelancers during daytime. What used to be a private vehicle can be a taxi or a rental car. And the list continues.

All in all, the built structures of our cities in 2040 will appear largely similar to how they look today. However, digital urban services will change the way we perceive, use and shape the urban space around us.

THREE GLOBAL SCENARIOS

The following three global scenarios provide alternative pathways of how the world could change by 2040. These global scenarios form a backdrop for the corresponding city district level scenarios for two Nordic neighbourhoods: Bagarmossen in Stockholm, Sweden and the city centre of Lahti, Finland.

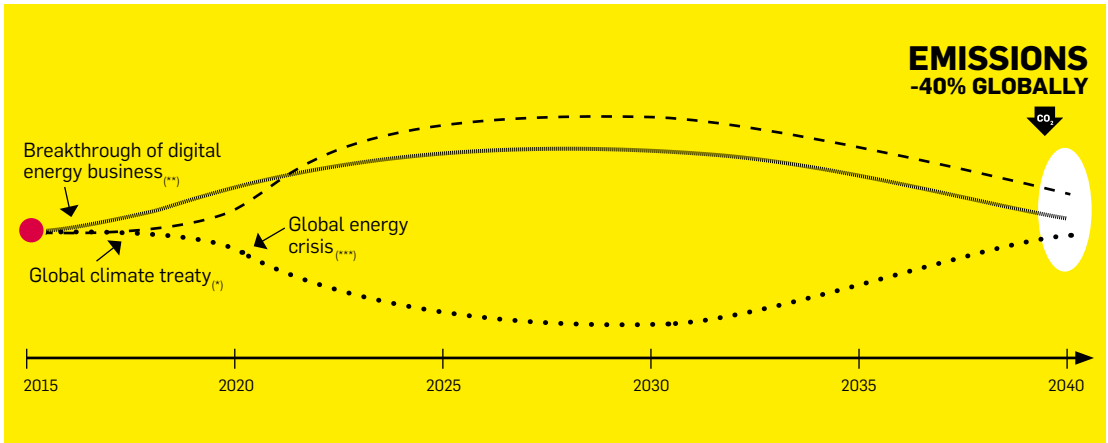


Table 2.1 The table below shows the development of different societal variables in the three scenarios.

SCENARIO	POLITIC	DIGITAL TECHNOLOGY	LEVEL OF MIGRATION	WORK	RESOURCE EFFICIENCY	BUILT ENVIRONMENT	BUSINESS
GLOBAL DEAL	Global/ National + Steering	Advanced	Small growth	High employment	Global recycling systems	New big infra	Big corporations
SMART INNOVATION ECONOMY	City + Responsive	Disruptive	Small growth	Self-employment	Smart substitution + upgrading	Fixing, repurposing, temporary uses	Startups
CRISIS AND RECOVERY ON NEW PATH	District + Partnering	Advanced	Very high	P2p bartering	Sharing, mending, reuse	Infill, fixing	Local, p2p

GLOBAL DEAL (*)

GLOBAL DEAL (GD): A scenario where nations reach a global consensus that fundamentally changes the rules by which the global economy and individual societies function.

SMART INNOVATION ECONOMY (**)

SMART INNOVATION ECONOMY (SI): A scenario where rapid scaling of disruptive technologies dramatically transforms lifestyles, pushing old solutions out of the market.

CRISIS AND RECOVERY ON A NEW PATH (***)

CRISIS AND RECOVERY ON A NEW PATH (CRNP): A scenario where a sudden global energy crisis throws markets into disarray, forcing societies to find alternative ways of meeting the basic needs of their citizens.

SCENARIO 1: GLOBAL DEAL

IN 2019 the EU, China and the US reach a binding agreement on greenhouse gas (GHG) emissions reductions. The deal also includes substantial funding for investments in clean energy markets. This is good news for global cleantech forerunners that gain a significant boost to their competitiveness. Meanwhile, emissions trading markets grow global during the 2020s. Surprisingly many manufacturing and energy companies successfully adjust to the reformed global markets. All this results in a rise in traditional employment in many countries. 'Green growth' and 'green jobs' help nation states and representative systems to regain their credibility in the eyes of their citizens.

Policy ➡ Investments ➡ Technology ➡ Behavior

ENERGY: Large scale centralised biofuel and solar energy production.

MOBILITY: Quick transition to electric vehicles. The global urbanisation trend propels the development of efficient public transit systems.

CONSUMPTION: Due to urbanisation and the surge of energy prices, many people opt for denser housing and reduce their amount of material belongings. Technologically advanced, efficient vehicles and home appliances are popular.

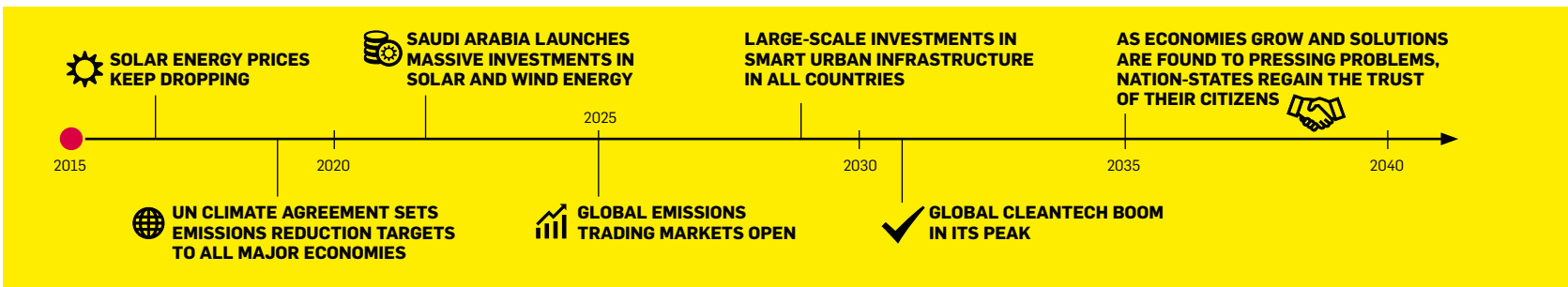
RETAIL: E-commerce soars, traditional retail companies manage to maintain their market share by introducing clever home delivery systems.

BUSINESS: Traditional industrial companies take over the growing cleantech markets. Large corporations, some of them state-owned, remain dominant in global markets.

WORK: New wave of investments prompts the emergence of new jobs globally, in both manufacturing and services.

POLITICS AND PUBLIC INSTITUTIONS: Global governance gains new momentum and new forms after the downturn of early 2000. Nation states take an active role in reforming industrial structures, which helps them to regain credibility in the eyes of their citizens.

NORDIC SOCIETIES: Nordic societies thrive in the big cleantech markets, making it easy for them to maintain their core welfare structures and a just distribution of wealth. People have relatively high trust in institutions and in the future of society.



SCENARIO 2: SMART INNOVATION ECONOMY

INTERNATIONAL climate negotiations come to a standstill. Instead, the global market experiences a series of upheavals: in the wake of the Tesla Power Wall, a series of disruptive innovations that boost energy efficiency and the use of solar power enter the market. These innovations rapidly take over a significant share of the energy and transport markets. At the same time, many of the larger traditional players from retail to construction and expert services fall into decline due to their inability to take a timely leap into new digital solutions. Some cities and regions begin to vigorously push towards the birth of pioneer markets in new solutions. However, a role even larger than that of these public efforts is played by global user communities and a new generation of entrepreneurs. New forms of crowdfunding, collaborative consumption and civic movements shape societies and markets towards sustainable value creation.

Technology ➡ Behavior ➡ Investments ➡ Policy

ENERGY: Local micro production, a central role for solar power, energy harvesting devices.

MOBILITY: A rapid transition to electric vehicles. Sharing rides, vehicles and transport of goods becomes an important part of mobility.

CONSUMPTION: The focus shifts strongly from goods to services and almost anything can be acquired as a service. Local energy systems aimed at consumers enter the market and more money is spent on them than anybody ever dared to imagine.

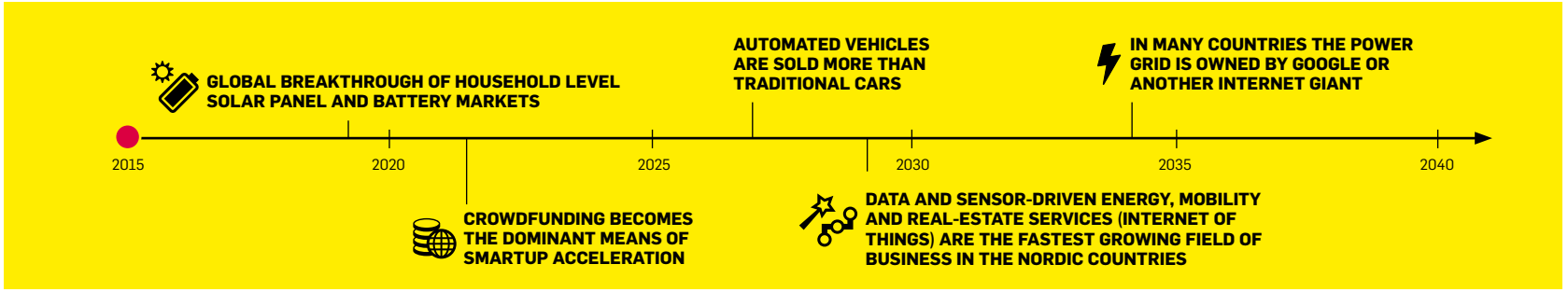
RETAIL: E-commerce and P2P services gradually conquer consumer markets, traditional retail declines.

BUSINESS: The field changes radically as rapidly growing digital companies spread to new sectors and drive incumbents to decline. Simultaneously, new forms of entrepreneurship are born in both manufacturing and services.

WORK: Some traditional jobs vanish and an entrepreneurship-based economy starts to emerge. An increasing number of people receive their income from various simultaneous sources.

POLITICS AND PUBLIC INSTITUTIONS: National and international politics suffer a slump. Interesting things start happening at city and regional levels, as cities begin to take a proactive role as the drivers of the new economy.

NORDIC SOCIETIES: Decline of traditional work and employment structures push Nordic societies to great reform. Social security systems move towards a basic income and some of the public services are replaced by peer-to-peer services. However, the strong ethos of equality endures. New forms of work are successful in providing access to income and meaningful work for many who had previously struggled to find their place in the job market.



SCENARIO 3: CRISIS AND RECOVERY

THE GLOBAL ENERGY CRISIS in the early 2020s pushes most countries into deep recession and provokes unforeseen levels of migration from many vulnerable regions towards wealthier countries. Public expenditures soar momentarily as a vast array of companies go bankrupt and the availability of basic commodities decreases in many countries. The increasing flood of climate refugees puts a serious strain on the economies of European countries, still recovering from the previous slump. Over the course of the following years nations are forced to radically change their governance structures, industrial policies and energy systems. The crisis acts as a catalyst for the breakthrough of many ripened solutions linked to energy efficiency and renewable energy. Pioneer cities and regions manage a faster return to a steady development path thanks to their investments into energy efficiency, renewable energy and sustainable urban structures. Yet recovery also demands a new notion of progress and an economic system that combines money and bartering. Resilient local structures gradually replace many systems that had operated within the context of nation states, extending from many public services to energy and trade.

Crisis ➡ Behavior ➡ Technology ➡ Investments

ENERGY: Decentralised local production of renewables, with solar power and bioenergy at the core.

MOBILITY: Sharing rides, vehicles and transport of goods becomes an important part of mobility. The total amount of kilometers driven decreases significantly.

CONSUMPTION: A momentary but radical decrease in purchasing power changes consumer behavior. A part of the population shifts to a barter economy in basic goods, but slowly returns to a money-based economy.

RETAIL: Different forms of P2P commerce; big retail companies reform their logistic systems and focus on smaller neighborhood stores.

BUSINESS: The crisis forces a large number of companies to go bankrupt and the markets are partly consolidated into the hands of a few of the strongest actors. New regional actors emerge to maintain energy and transport systems.

WORK: An increasing number of people receive their income from various simultaneous sources and make up for missing revenues by bartering.

POLICY AND PUBLIC INSTITUTIONS: Vast differences between regions and nations. In well-prepared regions, the role of local politics grows and citizens place higher trust in local than in national politics.

NORDIC SOCIETIES: The energy crisis forces countries to use public funds to subsidise critical functions such as energy production and logistics, which means that welfare structures are slashed. Some of the services are maintained by the voluntary sector. At the time of recovery (2030) basic income is introduced in order to secure workforce for the maintenance of locally produced public goods.

THESE SCENARIOS TAKE PLACE IN BAGARMOSSEN AND LAHTI CENTRE

BAGARMOSSEN

BAGARMOSSEN IS A NEIGHBOURHOOD in the Stockholm municipality, located around 6 km south of the Stockholm city centre. While it takes only 20 minutes to reach centre by subway, the natural reserve Nackareservatet, with hiking trails and lakes, is just around the corner. With 11 000 inhabitants, the area has a small centre with grocery stores, a pharmacy, a library, a church, hairdressers, pubs, cafés and restaurants. There is a total of 5 600 dwellings, 90% of which are apartments in multi-family buildings. The public housing companies Stockholmshem and Svenska Bostäder are the biggest property owners in Bagarmossen

The building stock from the 1950s consists of low-rise multi-family buildings and smaller single-family homes. High-rise buildings were constructed in the 1960s and 1970s during the Million Homes Program.

Bagarmossen is often described as a neighbourhood with engaged and committed inhabitants. There is, for instance, a blog called Bagisbloggen, where you can get updates on all things happening in the area, as well as neighbourhood Facebook groups such as Bagisbloggen, Bagis!, Bagarmossen Second Hand and Bagisodlarna.

Most of the buildings in Bagarmossen are soon to be renovated, the buildings are of high quality, and well worth refurbishing. In addition, new areas will be built with about 2 500 apartments. Bagarmossen is a mixed area both in terms of the types of buildings and in terms of inhabitants. It has many car-free zones where children can move safely by foot or by bike. In summary, Bagarmossen has the perfect mix of city and nature, and highly engaged inhabitants.

Table 2.2 Basic information on Bagarmossen

	BAGARMOSSEN	CITY OF STOCKHOLM
POPULATION (number of inhabitants 2014)	11 417	911 989
INCOME LEVEL (Average income in 2012 for people 16 years and older)	25 900€ (241 000 SEK)	34 800€ (323 500 SEK)
EDUCATION LEVEL (share of inhabitants 24–74 years old who had a college education in 2014, %)	45,7	51,0
UNEMPLOYMENT RATE (share of inhabitants 18-64 years old who were unemployed in 2014, %)	3,0	3,1
PREDICTED POPULATION GROWTH 2015–2024 (%)	19,9	16,4
CHALLENGES	• Refurbishment needed • Potential opposition of inhabitants towards urban infill projects	
STRENGTHS	• Vital local community • Located with easy subway access and bordering to a big nature reserve	

LAHTI CENTRE

LAHTI WAS FINLAND'S FASTEST GROWING CITY after the Second World War. In 1940–1975, the population of the region doubled and the population of the city tripled. Growth since has been meagre, making Lahti the ninth biggest city in Finland with a population of 103 400. The city's age structure, economic life and building stock are still largely affected by the so-called boom years and the downscaling of heavy industry after the period of high growth.

The Lahti centre is an area of five square kilometres with almost 21 000 inhabitants, located between the lake Vesijärvi and lake Joutjärvi. With almost a third of the inhabitants over 65 years old, the city centre's population is expected to continue ageing towards 2025. To counter the effects of the ageing population, Lahti needs a constant flow of new people.

The city centre has many kinds of services, and successful urban initiatives such as Putiikkipäivä (Boutique Day) have sparked new activities. At the same time, the whole city centre and its companies compete fiercely with large supermarkets located at the outskirts of the city. Decline in the city's economy combined with large scale renovation in the centre have created difficulties for businesses. This has resulted in a vicious circle: the centre became known as a "boring place" not worth visiting, which in turn made starting a new business difficult.

Growth needs its engines: new projects, new investments and new narratives. In 2010, the city of Lahti made the decision to begin transforming the city centre into a more pedestrian friendly area. The plan has a 10-year time frame, and includes building a travel centre to help intermodal passengers to transfer smoothly between trains and buses. In addition, the areas of Radanvarsi and Rantakartano will be functionally integrated to the centre. A new underground parking lot was opened for use in 2015.

According to locals, Lahti and its centre have many active inhabitants with a strong drive to develop their city. In the Facebook group Lahti, citizens share pictures of the city and thoughts about current issues. The group Mastoministeriö is a conversation forum for political topics, with an aim to bring local politics into every citizen's life, and Lahti GreenCity is a politically and ideologically independent forum for those interested in co-designing Lahti into an environmental city.

Despite some problems, the centre is mainly seen in a positive light: for some, it is one of the key reasons to move to or to stay in Lahti. The centre's popularity is growing among families with children. A similar development is taking place in other Finnish cities as well: more and more often families with children want to settle close to quality services and use public transportation, walk and cycle. The centre is known as a compact area, where all the necessities are within easy reach.

Table 2.3 Basic information on Lahti

	LAHTI CENTRE	LAHTI
POPULATION (number of inhabitants 2014)	20 900	103 400
INCOME LEVEL (Average income in 2011 for people 15 years and older)	23 500€	24 400€ (323 500 SEK)
EDUCATION LEVEL (share of inhabitants over 15 years old who had a college or polytechnic level education, %)	28	27
UNEMPLOYMENT RATE (2012, % of the labour force)	14,8	14,8
PREDICTED POPULATION GROWTH 2015–2024 (%)	14,8	9,7
CHALLENGES	• High unemployment rates • Bad reputation • Centre is thought as boring	
STRENGTHS	• Excellent railway and highway connections • Located at the outskirts of the growing capital region • Affordable rents and houses • Large infrastructure projects are done or in progress • Centre's new activities have started to attract people	

BAGARMOSSEN 2015–2040

BAGARMOSSEN 2015

1. The main square by the subway station, including a playground and residential buildings with shops and restaurants on street level.
2. The main square with shops and market tents. There are many business spaces with big windows and doors facing the square, making it possible to integrate them in the public space.
3. A grocery store and locals by the main square. There is a range of shops for everyday needs in the centre.
4. Garages and parking spaces of a residential building on Emågatan Today. The scene gives a closed impression, but has the potential of being the venue for different activities, such as a bike kitchen and other workshop rooms, small stores, pop-up events and workspaces.
5. Residential buildings and parking lots seen from the walkway on Byälvsvägen. The space between the buildings and the street is a potential place for urban infill, with open space for workshops, stores, workspaces, cafés and greenhouses.
6. A peek through a portal into one of the courtyards by Rusthållarvägen. In addition to hosting playgrounds and acting as meeting points for the inhabitants, these courtyards have the potential to become sites for small-scale agriculture.
7. Street and parking spaces in front of buildings on Rusthållarvägen. The suburb is designed to be easily accessible by car, and substantial space is dedicated to parking. Perhaps in the future it will be a site for urban gardening.
8. A small garden for edible plants, cared for by Bagisodlarna, next to the subway station. It is a locally initiated project that started with the participatory process Boendedialogen in 2012 as a way to revitalise the area.
9. A pop-up bike repair shop in a freight container by the main square in Spring 2015. It proved a success, and after the summer it moved into an old garage.

GLOBAL DEAL IN BAGARMOSSEN

THE HIGH GLOBAL PRICE on carbon gave Stockholm-based companies a chance to thrive in the growing global market for resource-efficient solutions. Already in 2016, the city of Stockholm planned to make Bagarmossen and its surrounding area a testbed, building on the neighbourhood's innovative potential arising from its engaged, diverse and innovative inhabitants. Bagarmossen was the perfect place to test ICT solutions for sustainable behaviour in the built environment.

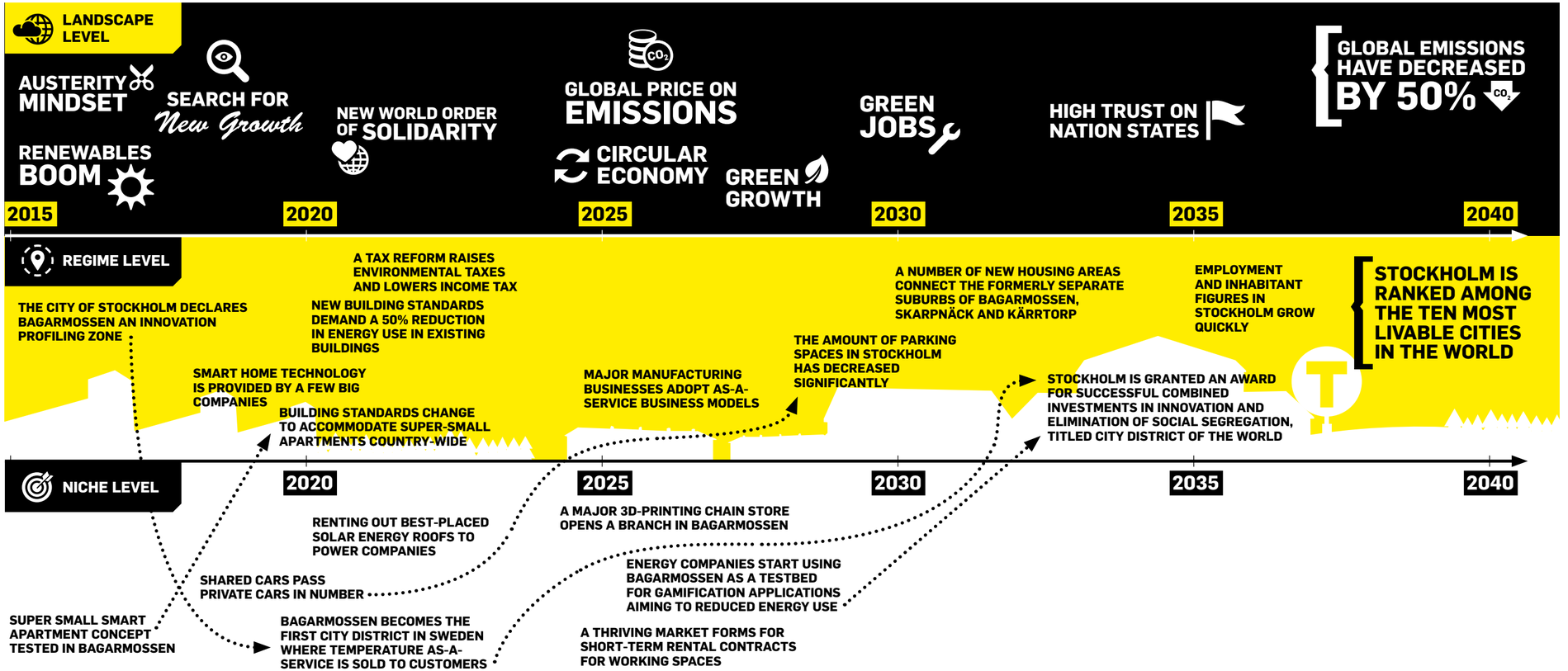
The municipality invested heavily in smartup incubation and set up an organisation to help smartups get started. Being part of their program ensured a stable start with economic help, including work spaces to rent in creative combined workshops, and showrooms in various locations in the city. Bagarmossen itself held about ten different locations ranging from prime shop fronts to garages and basements.

To reach global emissions goals, Stockholm made large investments in its public transit system with the aim of creating a dense and walkable green city. New solutions were found and realised through new financing systems and changes in regulations on the national and organisational level.

A lively job market developed in the region, with a constant need for new people and new skills. Many people work either as employees or as freelancers in the ecosystems of large multinational companies. New professions are evolving and merging with each other. For example, digital health is a field that combines healthcare, life sciences, ICT and gaming. Diverse local services provide work for many, even when some traditional service jobs have disappeared.

The centre of Bagarmossen saw the appearance of commercial spaces used as showrooms for local products and mixed multiuse spaces for working and meeting, relaxing and playing. 3D printing workshops have replaced the old photo, video and mobile stores. As e-commerce soars, traditional retail companies have managed to maintain their market share by introducing home delivery systems combined with higher visibility in pop-up showrooms in ground floor business spaces. Consumption is mainly done in systems of circular economy, such as renting and as-a-service models, delivered either by big multinational corporations or by very local small-scale companies.

The old building stock has been improved through additions of small integrated applications that translate the material world into data and enable the gamification of energy savings and resource efficiency. As an example, smart home applications connect old heating systems to the cloud with a small and easy installable device, making it possible to vary the heating in different rooms and at different times.



SMART INNOVATION ECONOMY IN BAGARMOSSEN

STOCKHOLM IMPLEMENTED a smart city approach in the late 2010s, focusing on combining ICT development with smart solutions to environmental issues. This accelerated a local smart innovation revolution, where many innovations were user-driven, created through social and open collaboration. The services and products developed would change people's behaviour and make sustainable lifestyles more feasible and desirable.

Now, in 2040, Stockholm is ranked among the ten most liveable cities in the world. An important factor of success has been the fruitful grassroots initiatives in cleantech solutions, modifications of social security systems to fit diversified working and income conditions, and new crowdsourced solutions to social needs.

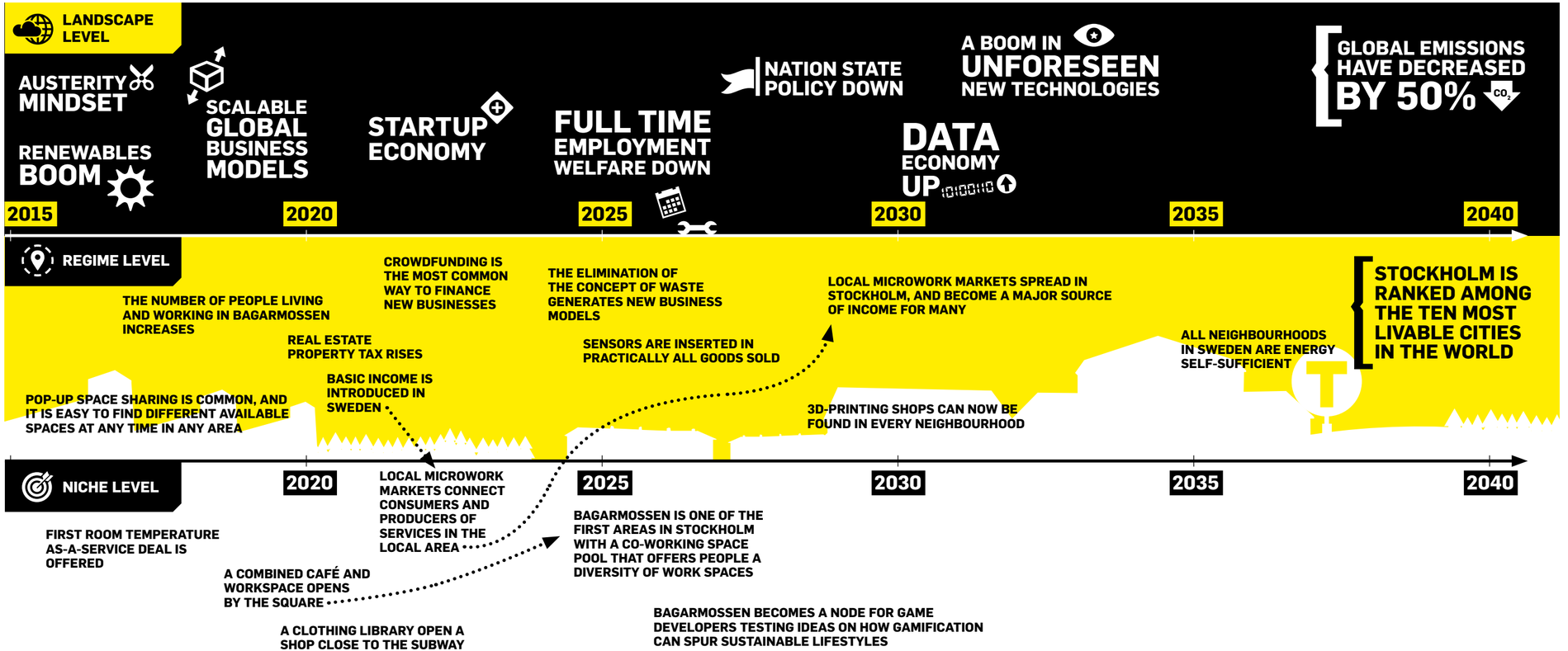
In 2040, most people in Bagarmossen work from home or in the local area. A substantial piece of work is done by freelancers and self-employed entrepreneurs. A platform economy coexists with small entrepreneurs, as work is done both independently and in networks and co-operatives. A number of people specialise in small-scale production, mending and refining products that are sold both on local and global markets. There is a world famous 'Made in Bagis' maker movement, and the neighbourhood is also known for its high quality ecological products from local food co-operatives, sold at the market and in local restaurants.

Many events take place in Bagarmossen and it is a meeting hub for people from all over town. A collaborative project between Stockholmshem, coffee shops and home offices made Bagarmossen the first area in Stockholm with a co-working space pool, offering people a diverse selection of work spaces.

The sharing economy provoked a decrease in ownership, which led to people having fewer goods at home. This, in turn, led to a reduced need for space per capita in homes, facilitating the emergence of a variety of forms of shared living.

From the mid 2020s onwards residents and small-scale businesses mainly use locally produced solar energy. Home-owners and industries sell energy and heating back to the grid, and there is a variety of applications optimising and reducing the energy use of buildings.

Food is grown in a network of small-scale plots in public green areas and in former parking spaces. The green spaces are now valued not only as a place for recreation, but also as a site for production.



CRISIS AND RECOVERY IN BAGARMOSSEN

SWEDEN FARED BETTER than many other countries in the energy crisis of the early 2020s, thanks to earlier investments in a fossil free society. During the crisis the government issued directives, urging people to use local goods and resources. Individuals were creative under the dire circumstances, adopting new and rediscovering old habits and technologies. The crisis profoundly changed people's values and societal priorities, bringing about an awareness of the fact that high quality of life does not equal high material consumption. While the number of climate refugees climbed, these individuals were successfully integrated in the increasingly tight-knit and active local community.

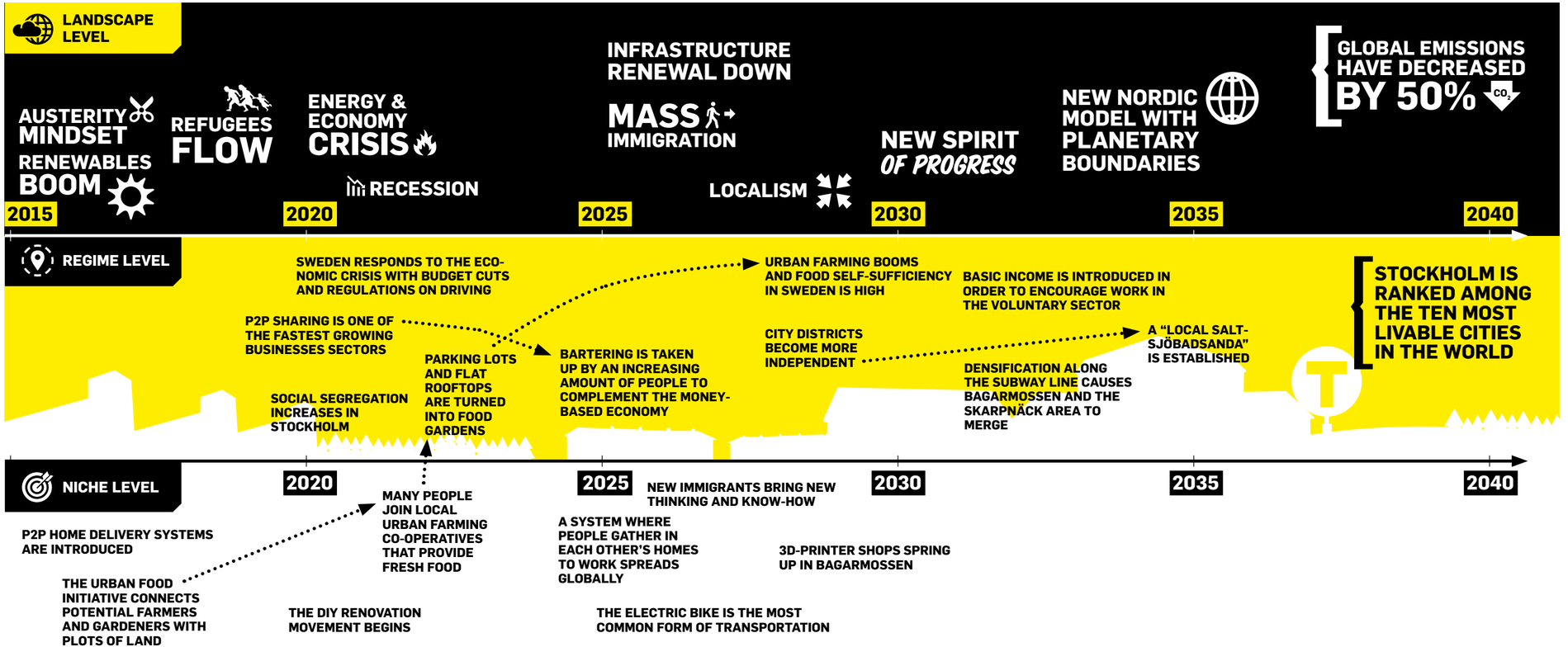
Bagarmossen was relatively well prepared when the crisis hit, as local actors had experience in using new ideas and involving people in their development. In the late 2020s the different parties of the local community agreed on a shared vision and agenda for how to work together towards a better future, thus continuing and developing a tradition of agreement between parties from 1930s Swedish national policy.

Densification around the subway lines made the suburbs along them merge, and Bagarmossen grew together with Skarpnäck and Kärrtorp. The appearance of small energy-efficient apartments designed for neighbourhood cooperation and Bagarmossen's location next to both the subway and Nackareservatet made the area an attractive place to live.

Buildings and the spaces between them came to host small-scale urban co-operative farming. Food co-operatives sprang up during the crisis years in the wake of the collapse of the agricultural system and a hike in food prices. Now, in 2040, they are an integral part of urban life.

In Bagarmossen people cut their use of energy by adapting their behaviour, lowering the indoor temperature and using bikes instead of cars. Sharing rides, vehicles and transport of goods is now an important part of everyday mobility, and an ecosystem of services emerged around these mobility solutions.

Markets developed after the crisis consist of a few very strong actors in combination with many very small and local businesses, surviving on their ability to offer services where knowing the local community is a strong asset.



A DAY IN THE LIFE IN 2040

Eva, 60

GLOBAL DEAL

I WOKE UP at around 7 am in my one-room studio apartment in my co-housing block. There was a beautiful sunrise and birdsong, even though it's mid-winter. It's one of the luxuries of our time: apartments are furnished with sensors that monitor one's sleep, setting off the solar screens at the right time of one's sleep cycle.

I walked to the coworking space, where I work for a multinational healthcare company. I co-founded a startup called Grow Together in the early 2020s, after my recovery from a burnout. My colleague and I combined our skills in game development and healthcare to come up with a system to form groups of people, who do things together to recover from psychological and physical setbacks. Our startup went through the municipal incubation programme and the product was displayed in one of the showrooms in the centre, where it was spotted by the company that currently employs us both.

After work I went to see the doctor about hearing problems. She took the measurements from my ears, and gave me a prescription for a personalised micro hearing aid. I then went to the 3D printing shop to get it printed, and got home at around dinner time.

Obasi, 20

SMART INNOVATION ECONOMY

I STAYED in my friend's flat last night, renting out my room for the night. I am a student at university, so money is a bit tight. The basic income is actually enough to get by on, but I am saving money for a half-year trip to India, so I try to do little jobs most days.

My friend and I went to the world-famous Made in Bagis restaurant by the main square for lunch. The food there is delicious, everything they serve is ecolocal (ecological and locally produced). It is difficult to get a table, but I often do shifts watering and harvesting the kale they grow in boxes on the main square, so I get 50% discount coupons and the head waiter is always able to find me a space.

I met my friend a year ago in a coffee shop office. He is an environmental science student, and we spend a lot of time working on a business plan. We have this idea of growing your own shoes, there is a mushroom that mixes well with hemp, and that can easily be grown in the shape of durable soles for hiking shoes. We'll try our luck on the hikers' crowdfunding platform, hopefully it'll catch on.

In the evening I biked around Bagis doing some deliveries. People usually pay a decent amount for me to bring them their shopping, and it's good exercise as well!

Sada, 40

CRISIS AND RECOVERY ON A NEW PATH

I TOOK the cargo bike to the item library today. I borrowed some winter clothes for the family, a drill and a tool box to set up our new window garden in the living room. I remember when I came to Sweden in the early '20s, the library was a place to borrow information, and people had things all over the place. Now it's quite the opposite: information is everywhere and you borrow things from the library. Things change.

I had my monthly cooking shift for the building tonight. I harvested our communal vegetable plot in the afternoon, so that I could use the vegetables I wanted. There is a plant we used to grow in my country of origin that, surprisingly, grows well in the southern Swedish climate. Experimenting with growing it was originally my idea, but it spread quickly across the region.

After dinner the whole family went to the Folkets hus where we had a live meeting with electronic polling, discussing what new developments we need here in Bagarmossen/Skarpnäck in the coming year. In the evening I did some modelling in preparation for tomorrow's work online with my global engineering team.

LAHTI CENTRE 2015–2040

LAHTI 2015

1. The main highways of Lahti are wide. Many of them are former main roads that are have later been replaced by bypass streets.
2. The construction work of an underground parking system under the main square of Lahti was completed in 2015. The 20 million euro project was hoped to upgrade the attractiveness of the centre. However, the long construction period temporarily hampered businesses of many shop owners.
3. The lower marketplace has recently been turned into a functional park for children and adults. It includes a pergola, exercise machines and trampolines imbedded into the ground.
4. The Trio Shopping Centre is located at the heart of the city and is the biggest shopping attraction in Lahti with over 48 000 m^2 and 6,3 million annual visitors.
5. Most buildings in the city centre were built in the 1950s and 1960s in plain architectural style.
6. The increased supply of cheap big box retail space outside the city centre has emptied several business spaces in the city centre.
7. The new travel centre will be completed by the end of 2015. It is meant to form a user-friendly public transportation hub by connecting bus and railway stations that were previously located apart from each other. The railway around the travel centre will be one of the focus areas of urban renewal over the next 20 years.
8. Several local design-oriented entrepreneurs have their boutiques on the Rautatienkatu pedestrian street.

GLOBAL DEAL IN LAHTI

LAHTI MANAGED to catch the cleantech buzz accelerated by the global climate deal in 2019. In the 2020s Lahti stood out as a success story: a handful of successful cleantech firms established themselves as national forerunners, bringing jobs to the city, and Lahti as a part of the growing Helsinki metropolitan area became an attractive destination for young professionals.

After reaching the previously set 50% reduction target in 2025, Lahti recently achieved full carbon neutrality in 2040, the involvement of large corporations being instrumental in the process. The city's own energy company, Lahti Energy switched to favour renewables, expanding and developing its already existing biofuel industry, and branching out into solar energy. The company now owns a wide network of distributed solar panels located on the rooftops of the city.

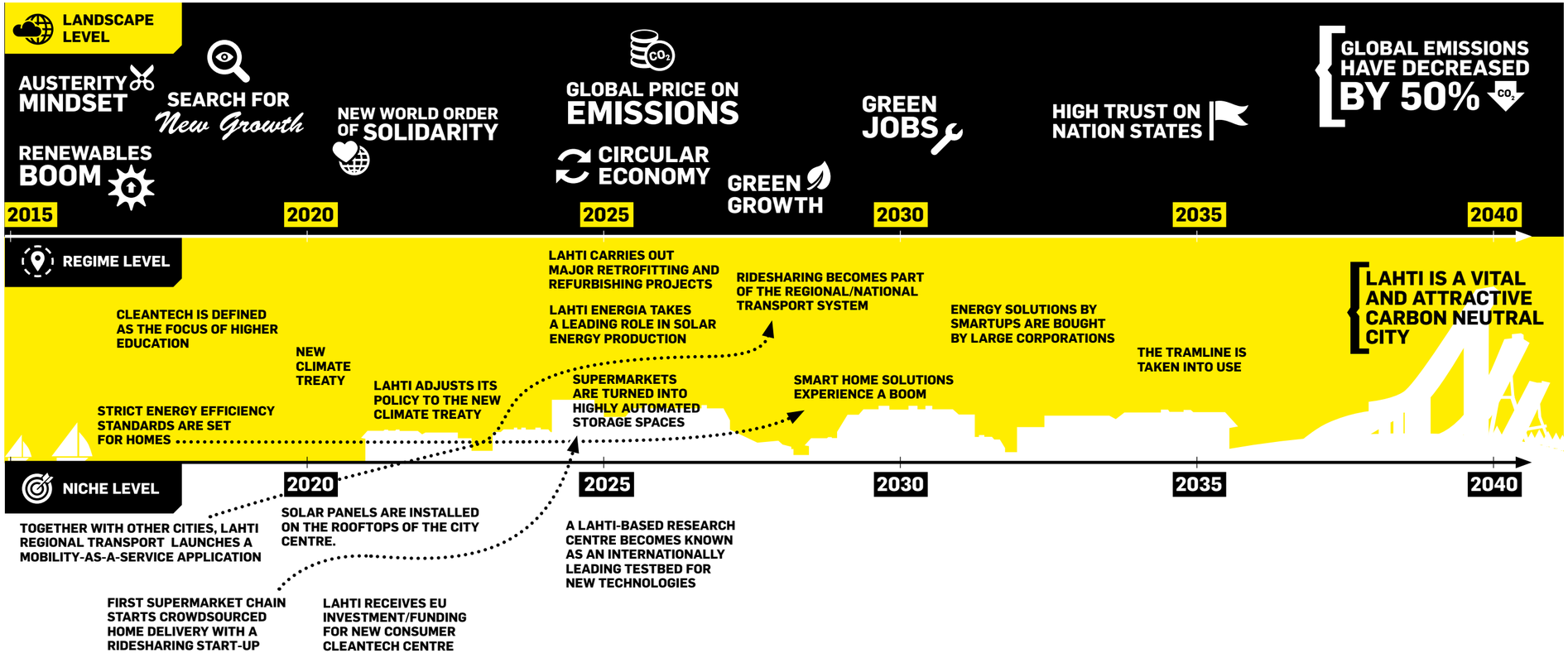
The strategic objective of the city to clear the centre of private vehicles was realised, as high emissions prices combined with a breakthrough in vehicle-sharing services decreased the attractiveness of private motoring. In the 2020s Lahti carried out substantial public transportation projects, the biggest of which was the creation of a light rail system.

E-commerce took over most areas of trade, transforming the townscape. Some of the spaces that previously served as boutiques and small shops in the centre of town now function as showrooms for retail stores. Due to urban densification and high public debt in the past, public services were largely centralised into urban centres. Service units grew in size, and the large public service centres came to offer many services simultaneously.

High employment ensured that these services could be funded. Most people who do not work in cleantech or services work long-distance. Business and industry became concentrated in the hands of big, often multinational corporations that set up co-working spaces in Lahti and other regions.

In spite of the dominance of big businesses, smartups had an important role to play in the cleantech changes. Large corporations were ready to incorporate smaller players and frequently bought solutions developed by startups. Many of these have a presence in Lahti, benefitting from the cleantech know-how in the city.

Among the most important smart solutions were smart home appliances and mobility-as-a-service applications. New energy efficiency standards for homes prompted demand for smart home technology, leading to a boom in smart home solutions. Metal as a Service (MAAS) technology, initially developed as a cooperative effort by smartups, was utilised by the big players in public transport, who introduced a comprehensive MAAS service.



SMART INNOVATION ECONOMY IN LAHTI

THE LATE 2010s turned out to be an era of disruptive change in the Finnish economy, both in figures and in mentality: the old industrial paradigm was gradually replaced by a more agile digital and circular economy. Lahti found itself in the perfect place to benefit from these developments.

The city worked together with small-scale entrepreneurs, turning Lahti into an environment conducive to innovation. While business angels were important, the share of crowdfunded innovations climbed in the late 20s. Entrepreneurs successfully harnessed technology for local renewable energy production, found generalisable technologies for efficient energy use, and developed other forms of smartup business to be exported as well as used locally.

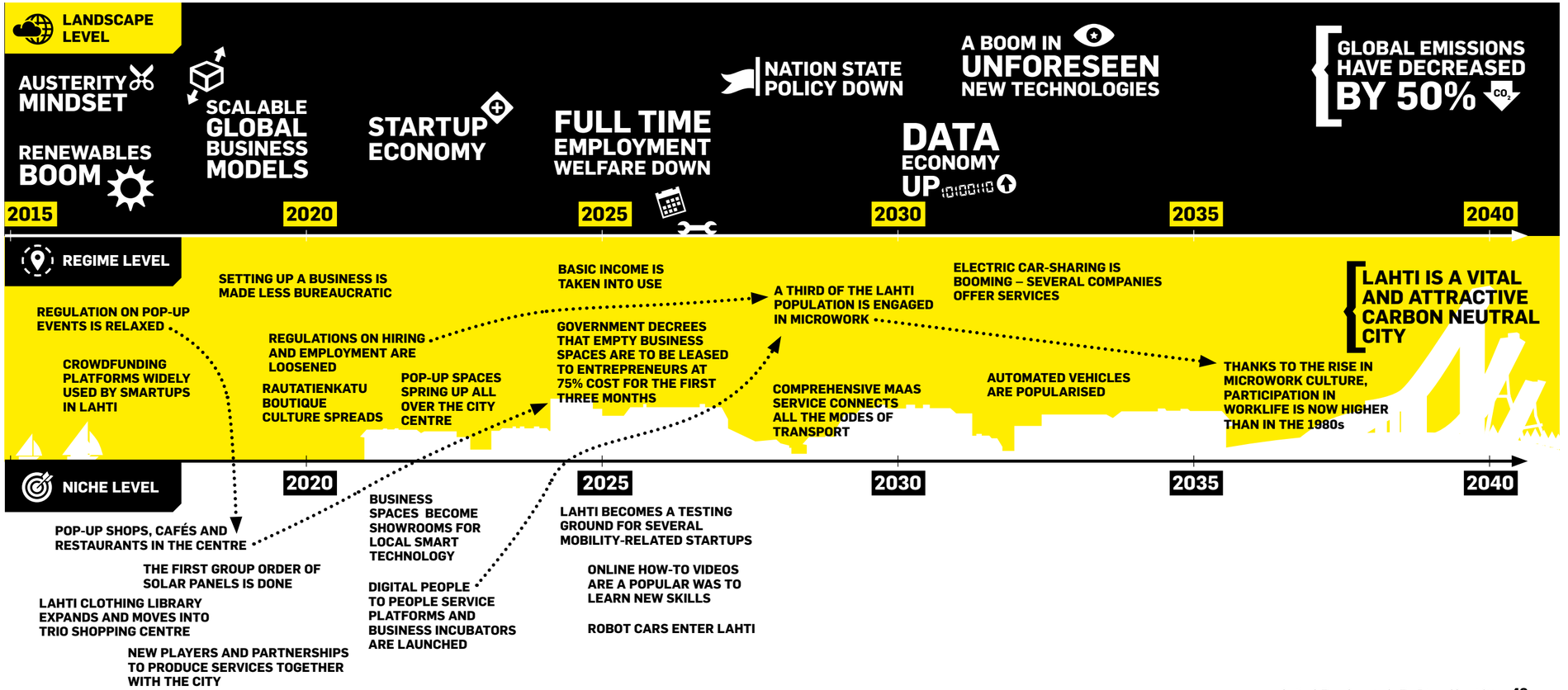
New innovation left its mark on the cityscape. In the 2020s development of mobility-as-a-service applications by local smartups made carsharing and ridesharing easier and more appealing for consumers. The spread of shared automated cars in late 2020s caused the total number of vehicles to fall drastically, freeing up landscape for other activities.

In the late 2010s the Rautatienkatu boutique culture spread towards Aleksanterinkatu. The appearance of pop-up shops and cafés was the first phenomenon to enliven the city centre and draw in people flows. As a result of considerable, even radical deregulation, the atmosphere of innovation became visible in the city centre, which came to act as a testing ground for new ideas.

Relaxation of regulation also transformed the concept of work. A reform in employment and entrepreneurship regulation coupled with the basic income led to the rise of micro-work culture and increasing flexibility in work. The under- and unemployed found new ways of making money and proving themselves capable and useful members of society. This improved equality and cohesion in Lahti and levelled regional differences.

Successful rebranding attracted even more cleantech know-how and startups to Lahti, a favorable turn for demographics. The people who move to Lahti tend to be in their twenties and thirties, educated people without an established career, in tune with the experimentation culture. Integration into the Helsinki metropolitan area has continued, and an increasing number of young families move to the attractive city center, often taking part in the organisation of events and experiments.

The most notable smart solutions of the era are energy storage devices, such as the Tesla Powerwall, and decentralised solar energy production, which brought heating and electricity costs down. At the same time, smart mobility applications, especially mobility-as-a service solutions, contributed to the smooth running of transportation.



CRISIS AND RECOVERY IN LAHTI

THE END OF THE 2010s saw no radical changes to the development paths present in 2015. The Finnish economy plodded along, not quite finding the spark for accelerated growth. Finland was not spared from the energy crisis that hit the global economy hard in 2020, bringing with it a sudden influx of energy crisis refugees. Oil prices soared, food prices skyrocketed and production in many traditional sectors either ground to a halt or went through a radical transformation, resulting in high unemployment.

Recovery was based on the emergence of a culture of mutual aid and a sharing economy. Rather than being measurable with traditional indicators, it entailed entering a new path towards a scenario where people had work, welfare, and meaningful activities.

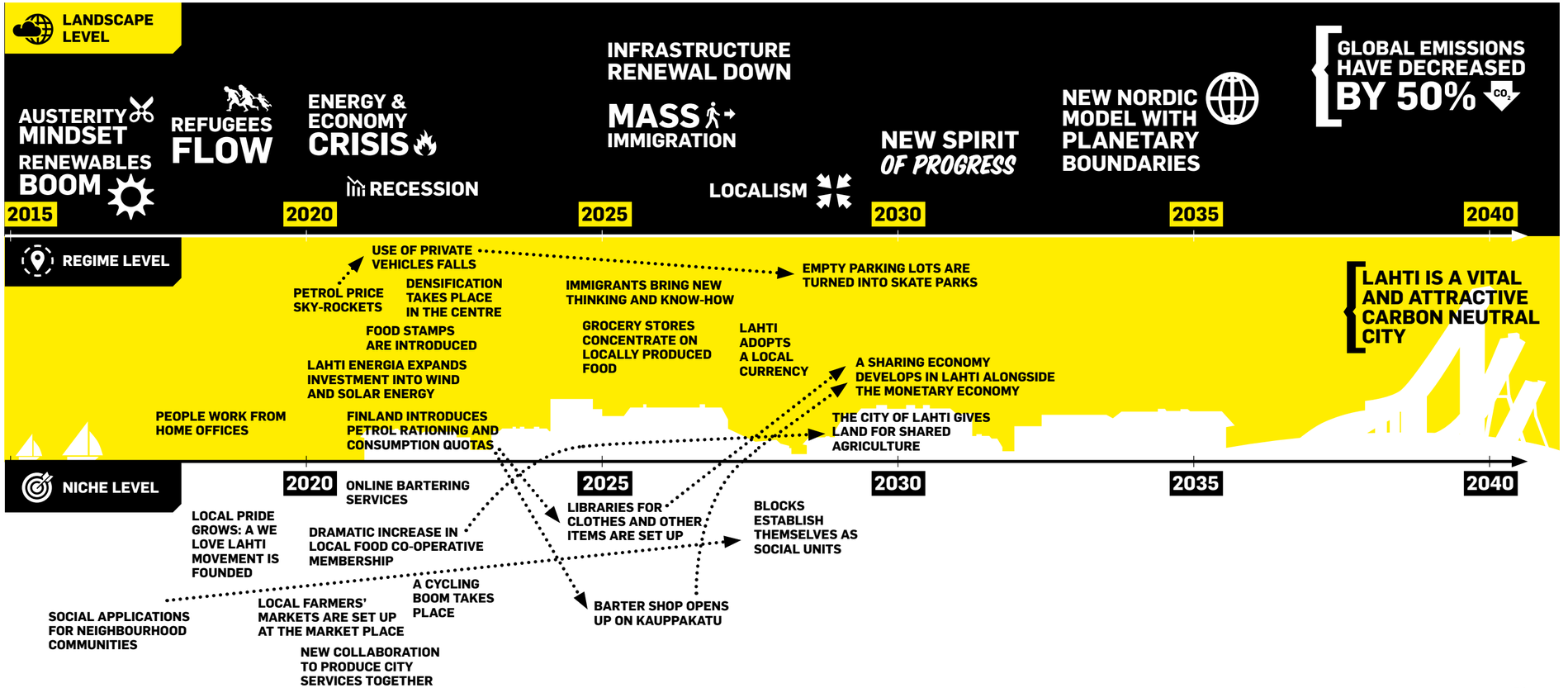
Lahti fared better than many other regions due to a handful of key decisions of the late 2010s. Lahti Energia had begun expanding its bioenergy production and made investments into solar energy already in 2017. Initiatives such as a community exchange system and a food co-operative with a large membership were already present in Lahti. The existence of a P2P ridesharing system meant that Lahti was more prepared than others to face the logistics crisis.

Changes in the Lahti centre reflected developments in the economy. 2020s saw an increase in the number of empty business spaces, as consumption shriveled. Cars were first replaced by cargo bikes and later the electric bike was popularised. The high costs of mobility drove people to live closer to the centre, which became more densely populated.

Little by little the centre started to liven up. A local farmers market was set up on the marketplace, and repair workshops appeared in the Trio Shopping Centre. A newfound community spirit inspired organisation of free concerts and outdoor dinners, many of which assumed influences from other cultures as immigrants became active members of society.

One of the most transformed industries was agriculture, food production became almost entirely local. By 2024 almost everyone in Lahti was a member of a food co-operative with plots of land on the edges of the centre. For other products, a structured system of sharing, bartering and lending, developed; this was eventually complemented by a local currency. These trends came together to produce a spirit of localism, where blocks and neighbourhoods formed one's social sphere.

Neighbourhood applications emerged as important tools for co-operation and co-creation within communities that come up with do-it-yourself solutions to problems. An important enabler of local food production was the use of bioenergy in greenhouses. Additionally, electric bikes became chargeable with solar energy, greatly enhancing mobility.



A DAY IN THE LIFE IN 2040

Janne, 45

GLOBAL DEAL

MY DAYS FOLLOW a similar pattern. In the morning I ride the tram to the offices of a multinational cleantech company, where I work as a strategy specialist. I started my career in an insurance company, but since mechanisation disrupted my field of work, I was re-educated in the Cleantech Professional Re-education Centre in Lahti in mid 2020s.

I usually come back home at around 18:00. The smart heating system in my home knows this, and only starts heating the living room as I leave work. I live in a 1960s apartment block on Vesijärvenkatu, retrofitted fifteen years ago to meet the energy efficiency standards. The construction work was carried out with the help of affordable loans and design specialists arranged by the city.

In the evening my wife and I order food for the next day from the supermarket. The products are delivered by a bike courier a couple of hours later. My wife is employed by a Helsinki-based company, and normally cycles to a co-working space every morning. Some days, like today, she takes the high-speed train to Helsinki for a meeting.

Elina, 70

SMART INNOVATION ECONOMY

WHAT A BUSY DAY! In the morning I took a stroll in the city centre, and had breakfast in the temporary insect food kiosk that my neighbour set up a few days ago on the market square. The centre is so nice to walk in now that there are only a few cars, and even the ones that drive around are electric ones that emit a quiet hum.

In the early afternoon I had a peer group senior exercise class in the Kirkkopuisto park, since the weather was nice. Afterwards we stayed and chatted about a new healthcare application that monitors one's mood and stress level during the day. The application was crowdfunded by our group: the development process started a year ago when we noticed that most of us needed a reminder to slow down and relax as our days are so active. I give classes to different groups on how to make use of the application in one's everyday life, utilising my training as a psychologist.

When I came home, I noticed that the solar panels on the roof of our housing cooperative were in need of repair. Installed in 2020, they are already quite old, but they have enabled us to produce most of the energy we use, saving us quite a sum of money over the years.

Afsana, 15

CRISIS AND RECOVERY

I CYCLED TO LAUNE for school at 9 am. My friends and I spent the first two hours weeding the broad bean field, while another group was watering the plants in the greenhouse. Weeding is my least favourite task, but our teachers say that it's important to learn by doing, and I guess everyone needs to learn how to grow their own food. Then we had a maths lesson and a Finnish lesson. For lunch we had tomato soup made out of the tomatoes we harvested last week.

I got out of school at 2 pm, and my friends and I went to look at clothes in the different clothing libraries in the Trio Shopping Centre. I have a subscription to four, and my parents promised to buy me subscription to a fifth one for my birthday. Mum says people used to own clothes, which sounds weird, and must have taken up a lot of space in the apartment.

I picked up a pair of shoes from Trio for the guy who does the plumbing in our building, and had sent an open request through the delivery app for someone to deliver them to him. On my way home I got a message on the neighbourhood group about tonight's dinner plans. Normally our block has dinner in the social space of our building, but the May heatwave is here, so today we ate outside in the courtyard.

SECTION 3:
TESTBEDS AND BUSINESS MODELS FOR URBAN RENEWAL

THIS SECTION GATHERS LESSONS LEARNED FROM THE SMART RETRO EXPERIMENT OF MATCHING SMARTUPS AND TRADITIONAL ACTORS AND OF ACCELERATING NEW URBAN SERVICES THROUGH THESE COLLABORATIONS. IT INTRODUCES FIVE OF THE TESTBED CASES UNDERTAKEN IN THE SMART RETRO PROJECT. THE CONCLUSIONS FROM THESE EXPERIMENTS ARE PRESENTED IN THE FORM OF BUSINESS MODEL CANVASES FOR DIFFERENT ACTORS IN THE BUILT ENVIRONMENT. THEY HIGHLIGHT THE ACTIVITIES THAT PRODUCE VALUE BOTH TO BUSINESSES AND CONSUMERS.

SMARTUPS MAKE CITIES SMART

NEW INTERESTING URBAN SERVICES are produced by 'smartups.' What is this new breed of startups?

From a business perspective, cities hold within them a great deal of unused or inefficiently used physical resources, such as buildings, infrastructure and vehicles. Smartups are startup companies that make use of digital advances to tap into this pool of resources. The products and services developed by smartups aim to free their users from inefficient use of resources by providing smarter ways of living, moving about, and consuming energy – thus reforming the very core of our everyday life.

The smartup value proposition is to make everyday life more comfortable, cost efficient and interesting. In order to deliver this, they utilise real-time digital communication to optimise the use of physical resources. Bits and atoms meet. In this way smartups facilitate a shift away from resource-heavy consumption patterns and towards a sustainable lifestyle.

"The products and services developed by smartups aim to free their users from inefficient use of resources by providing smarter ways of living, moving about, and consuming energy."

There are four ways in which smartups circumvent natural resource scarcity:

1. Through **sharing**, more value can be created with the same number of resources. Examples: Airbnb and Sharetribe.
2. Applications can be used to **optimise** the use of a resource. Examples: Nest and Fourdeg.
3. **Up-cycling**, or tinkering with existing resources, can make the resources more energy efficient. Example: Pure Waste Textiles
4. Existing products and behaviours can be **substituted** with resource-efficient ones. Example: Solnet Green Energy

Smartups are key in the emergence of experimentation culture. In their search for scalable business models, smartups experiment with product or service concepts, which may or may not break through. Smartups thus form an environment where fledgling technologies are developed and tested out, successful ones taken into wider use, and unsuccessful ones discarded.

The smartups have arrived to the cities changing the use of services, behaviour and consumption patterns. They can either disrupt old services and business models or add to and enhance them if the link is found between actors.

ENERGY	Smart home energy optimisation	Fourdeg Greenely
	Peer-to-peer energy	Open utility
	Solar energy as a service	Solarcity
	Temperature as a service	Optiwatti
MOBILITY	Vehicle sharing	City Car Club Lådcyklar
	Peer-to-peer delivery	Piggybaggy Bringbee
	Ride-sharing	Blablacar
	Vehicle upcycling	Suomen Bioauto
FOOD	Sustainable food	Bitty
	Smart harvesting	Urban Food Initiative Grow the Planet
	Local food	Benjamin's Maatilatori FarmDrop
RETAIL	Smart shopping	SnipSnap
	Peer-to-peer second-hand	Remarket
	Clothing as a service	Nurmi Clothing
	Online marketplace platform	Sharetribe
	Online bartering	Yerdle Swap.com
WORK	Co-working space	Impact Agency
	Local microwork	Generation Ungdom GoWorkABit
	Home office	Hoffice
COMMUNITY	Neighbourhood community application	Represent Meido Yhteismaa
	Community planning	Community PlanIT
	Crowdfunding	WeShareSolar Spacehive

Table 3.1 Examples of smartup business models

SMART RETRO MODEL – BUILDING THE MISSING LINK THROUGH CO-CREATION AND TESTING

TRULY NEW VALUE is born in the field of services connecting the digital and physical world. The value is economic – perceived or experienced: they offer us more comfortable, easier, cheaper and/or interesting urban life. For example, after six months of launching, a startup called Wolt offers home deliveries from 200 existing restaurants in Helsinki, a city until recently with a notoriously poor level of home deliveries other than pizza and kebab. From the point of view of local restaurants, Wolt increases their customer flows. Airbnb has opened access to a far greater variety of interesting holiday accommodation than was previously affordable to most. It also offers the residents an opportunity to monetize their temporarily unused spaces.

Except for the few most famous services, the volume is still modest compared to the big moves and money in the traditional value chain of the built environment, such as the construction business, the real estate development, or utilities. Most of the interesting smartups introduced in the table on the page 57 are still tiny.

However, the rules of value production in the traditional chain are changing. The shopping centres do not automatically fill in with the more classic retail chains. In many, tenants change often and spaces stand empty for longer times. The retrofitting business is growing faster than that of construction but the margins in retrofitting are lower. Additionally, in this traditional value chain, digitalization is in its infancy, almost inexistent. Atoms do not meet bits. The reallocation of assets is needed but it is stiff.

The volume of new services interacting with digital and physical is still modest due to infancy as well as other important players. Most physical services and goods such as housing, transportation and vehicles cannot be replaced by digital substitutes to the degree that communications and entertainment have been. Facebook and other similar services can be said to have replaced postal services and media to a degree, but Airbnb will never replace property

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services and construction. People will always live somewhere and that place needs to have a roof of some sort, and be heated and cooled. People will most likely want to move from A to B and back, and they will eat one form of food or another. All this consumes energy and other natural resources; digital will not replace physical, but these two will join and exchange qualities.

Having the players of the digital and physical world work together and exchanging qualities is not simple. When it comes to collaboration from startup to corporate, or startup to public sector, the size, volume, business logic, and the ways of working are all different.

In Spring 2014, Smart Retro project was initiated by 14 partners from three Nordic cities, Lahti in Finland, Stockholm in Sweden and Oslo in Norway to build the missing link between the big players of built environment and the smartups providing new services, the link between the atoms and the bits, the physical and the digital.

Smart Retro project has been a big experiment of building the connection and initiating co-creation between startups and established public and private organisations. Next we introduce the steps of building the link.

"As a result of Smart Retro collaboration, we ran a test with a startup. Cooperation has been amazingly inspiring and instructive. I have learnt that ideas should be tested quickly."

– **Marko Laaksonen**,
Retailer, K-Citymarket Paavola

	SMART RETRO BIG PARTNERS
CITIES & OTHER PUBLIC BODIES	City of Lahti, the 9th largest city in Finland with 103 000 inhabitants and 5500 employees. www.lahti.fi
	FutureBuilt Oslo, a Norwegian national ten-year programme (2010-2020) with a vision of developing carbon neutral urban areas and high-quality architecture. www.futurebuilt.no
	Stockholm Business Region Development, Stockholm´s marketing and business promotion company in co-operation with 52 municipalities in the Greater Stockholm Region. www.investstockholm.com
	Nordic Innovation Fund funds Nordic projects that boost innovation and competitiveness in the Nordic business sector and lead to commercial and sustainable development. http://www.nordicinnovation.org/nordicbuilt
CONSTRUCTION & REAL ESTATE	Citycon, Citycon is a leading owner, manager and developer of urban grocery-anchored shopping centres in the Nordic and Baltic regions. www.citycon.com
	Granlund, a Finnish design, consultancy and software company with core expertise in energy efficiency. www.granlund.fi
	Infill, company of urban repair and densification building urban housing on small plots of land and transforming existing buildings and city structures. Infill is a part of Aspelin Ramm. infill.no
	YIT Corporation, the largest residential construction company in Finland and the largest foreign one in Russia, aiming at being a leading European developer, builder and service provider. www.yitgroup.com
HOUSING	Stockholmshem, a public housing company since 1937, owned by the city of Stockholm. The second largest housing company in Sweden, with 50 000 tenants. www.stockholmshem.se
RETAIL	K-citymarket Paavola is a department store since 1971 in Lahti City Centre. It t is a member of Kesko and is run by an independent entrepreneur. www.k-citymarket.fi/kaupat/lahti-paavola
	Kesko, one of the biggest trading sector companies in Finland managing retail store chains and producing services for them. Kesko and K-retailers form the K-Group with 45 000 employees. http://www.kesko.fi/en
RESEARCH & EDUCATION	Centre for Sustainable Communications (CESC) of KTH Royal Institute of Technology is an interdisciplinary research environment, conducting innovative research on ICT for sustainability. www.cesc.kth.se
	Demos Helsinki, a Nordic think tank helping organizations, companies and communities to succeed in the future. The leader of Smart Retro programme. www.demoshelsinki.fi
RESEARCH & EDUCATION	KHiO, Oslo National Academy of the Arts, Norway's largest college of higher education in the field of arts and design. www.khio.no

	SMART RETRO SMARTUPS AND ENTREPRENEURS
ENERGY	Fourdeg, optimising and managing heating energy of from a single flat to district heating network www.fourdeg.fi
	Greenely, a mobile app visualising a household's energy consumption using research-based algorithms, greenely.com
MOBILITY & LOGISTICS	CityCarClub, a car-sharing service, citycarclub.fi
	PiggyBaggy, a crowd-sourced delivery service by Coreorient http://hello.piggybaggy.com
FOOD	Urban Fruit Initiative, a hyper-local products made from surplus fruit, fruitinitiative.firebaseapp.com
RETAIL & CLOTHES PRODUCTION	Moral Guard, a personal digital conscience for consumers to help shop according to their values, and a tool for business to know their customers, moralguard.com
	Remarket, a curated online marketplace for second-hand clothing, remarket.fi
	Nurmi Clothing, a design clothing company with highly transparent and sustainable production chain, a www.nurmiclothing.com
WORK	Generation Ungdom, hyperlocal domestic services by unemployed youth, generationungdom.com
	Hoffice, Network of free co-working places in people's homes, hoffice.nu
COMMUNITY	Meido, a digital housing tool and social network for housing companies, meido.fi
	Nappi Naapuri ('Nifty Neighbour'), a map based social media for connecting and helping with the people in the neighbourhood. Developed by Yhteismaa. nappinaapuri.fi
	Represent, an website and app helping people to have their say on things that matter to them locally, regionally, and globally and to connect it to decision-making www.represent.cc

Table 3.2 Smart Retro partners, startups and entrepreneurs

Smart Retro Model

PHOTOS: ALEKSI NEUVONEN (CC BY-NC-SA 2.0)

1 Find the need

WE SEARCHED for the traditional players of the built environment looking for new opportunities to make the cities more sustainable and livable and to generate new business and new value. Impressively, we found fourteen players looking for change: from a public housing company to a think tank, from a business developer to universities, from construction companies to cities, from a retail chain and shopping centre owner and developer to a property and energy consultancy.

2 Find the new innovators

WE OPENED UP a call around the Nordics to find the innovators of new smart urban services and forward looking local entrepreneurs interested in new opportunities to develop and grow their business by collaborating with the more traditional actors and businesses. We got 61 applications from 6 countries. With the Smart Retro's big partners, we chose some 15 interesting ones to join Smart Retro.

3 Match & Co-create

OUR HYPOTHESES were that smartups could benefit from the industry insight, along with the experience and the sizeable channels and reach of end-users, which the established actors have. Similarly, the big players could benefit from smartups' insight into digitalization and sharing economy, their agile ways of working and new business models, as well as from their involvement with early adopter consumers.

After finding the interested established actors, smartups and local entrepreneurs, seventy of them were brought together twice on a two-day innovation camp, one in Lahti and one in Bagarmossen, Stockholm.

The purpose of the camps was to develop the service concepts of smartups further by utilising the various expertises present, and by working together to find mutual interests and matches between cities, big companies, startups and entrepreneurs. They were encouraged to plan for cooperation through real-life tests.

The representatives of big companies and cities were given a role of a mentor to smartups. However, the idea was to also incorporate "reversed mentoring:" the mentors were to learn from the startups. Additional mentors with expertise from marketing to business development were also involved in the innovation camps. Community leaders were brought to the innovation camps and smartups were encouraged to leave the camp space to interview their users and customers in the streets of Lahti and Bagarmossen, as user perspectives was highlighted in Smart Retro.

ALEKSI NEUVONEN (CC BY-NC-SA 2.0)

4 Test in real life, with real people

DURING THE SECOND innovation camp, the participating organisations were pushed to quickly try out collaboration in real life. The purpose of early testing is to find out what works and what does not in the service and how it should be iterated. Early testing also enables the service to gain valuable first users and credibility for a new service. Because Smart Retro is about building new value chains between actors, there was another important aspect to test in Smart Retro: how the businesses of the potential partner organisations fit together and benefit each other and how the business partnership could work,. Thus, in the spring of 2015 after the innovation camps, the Lahti City Centre and Bagarmossen suburb in Stockholm were turned into urban testbeds for new sustainable services. The tests provided for the biggest, sometimes almost painful, leaps in learning. Learning by doing is the hardest, but often the most fruitful way of learning.

As the culture of rapid testing and experimentation is a paradigm and practice on the rise, moving from the startup and IT world to public sector and services, next we tell more in detail what we think is the value of testing. We will also elucidate what the Smart Retro tests were like and what the start-ups, the established actors, and the end-users learned from the Smart Retro tests.

The Smart Retro Tests

- **K-CITYMARKET PAAVOLA, KESKO & PIGGYBAGGY:** Peer-to-peer delivery through PiggyBaggy platform for online grocery orders of K-City-market Paavola in Lahti
- **CITY OF LAHTI, PIGGYBAGGY & LOCAL ENTREPRENEURS:** 24/7 Smart Container pick-up point in Lahti City Centre
- **CITY OF LAHTI & CITYCARCLUB:** A survey on interests and needs of residents for car sharing services
- **CITY OF LAHTI & YHTEISMAA:** Yhteismaa's Nappi Naapuri ('Nifty Neighbour') online platform as a new tool for volunteer neighbourhood contact persons in Lahti
- **NURMI CLOTHING:** Nurmi Clothing Library
- **STOCKHOLMSHEM, BONNE MÉCANIQUE & GAMLA ENSKEDE LÅDCYCKLAR:** Cycling service point in Bagarmossen square
- **STOCKHOLMSHEM & GENERATION UNGDOM:** Offering Generation Ungdom's service of small household help by unemployed youth to Stockholmhem's residents
- **REMARKET:** Recruiting sellers to remarket peer-to-peer 2nd hand clothes retail platform
- **REPRESENT:** First questions, comments & voting round on Represent platform

Why to test?

AT THE SMART RETRO INNOVATION CAMPS, the new product and service concepts of the entrepreneurs and startups were further developed with the partners, community leaders and experts - the camps were about co-creation. Then, in the testbed phase, these concepts were tested with a partner in real environments, with real people. The testbed phase was about experimentation: the startups and entrepreneurs conducted a temporary experiment where they, together with users and partners, tried out their new service or product concept in a real-life environment. The goal was to learn about the concepts together.

Real users tested the concepts in their everyday lives. Depending of the concept, this testing occurred in their homes, on their mobile phones, or it may have been a temporary service point in the urban space or in an existing shop. In Spring 2015 we recruited residents who wanted to be test users and co-developers of new sustainable services: 80 signed up to the test user pool! However, most engaged test users were those who the startups recruited on a case by case basis.

The Smart Retro tests were partly designed on the Smart Retro innovation camp in Bagarmossen, but they got their final form in the following months in the negotiations between partners and startups.

Experiments were meant to gather feedback and knowledge on the concept. For example: How do people use it? When? For what? Will they return to use it? Who uses it? What is the value of it for them? Which features are important for them and which are not? Does it work technically? What does not work? What works? Does the system work? How does the collaboration between the producer and partner work? Are people or partners willing to pay for it? In general, there are many questions, but only certain questions should be chosen to be learned from during one experiment.

Both companies and users learned from the tests. Users learned about new products and services and how they can help them in their everyday lives. This may lead them to become regular users of the services in the future.

The results of the experiment (the feedback and knowledge) are used to evaluate and improve, or radically change, the concept or the business model. In some cases, some improvements and changes, also known as iterations, were done during the experiment (see, for example, the Piggybaggy & K-Citymarket test case).

Feedback and results gained in the experiment can also be used to convince new customers, users, partners or investors to buy the service, to collaborate with the company or invest in it.

Overall, the experiments were valuable in that they helped to imagine together what is possible and what the future of an environment and the life in it could be like. Through inspiration and convincing of possibilities of future life, experiments can help to generate more action.

"The results of the experiment are used to evaluate and improve, or radically change, the concept or the business model."

OUTI KUITTINEN (CC BY-NC-SA 2.0)

Learnings from Smart Retro

"Irritation should not be cleared completely. It means that learning is happening."
– A SMART RETRO PARTNER

	STARTUPS FROM BIG ACTORS	BIG ACTORS FROM STARTUPS
LEARNINGS & GAINS	Mentoring	Fresh, innovative views
	Contacts & visibility	Drive & will
	Experience & process-knowhow	Expertise on a certain subject (e.g. peer-to-peer models, digital platforms, sharing economy)
	Volume	Insight in value-based consumption
	Credibility in finding funding and new customers	
WHAT IS LEFT TO BE LEARNED	Scheduling	Courage to experiment
	Organising	Openness
	Management	Flexibility

Table 3.3 What collaborators got from each other during co-creation & testing

What both the startups and big actors got from Smart Retro

- Contacts & networks
- Visibility
- Fresh views, insight & spirit
- Co-creation as a way of collaboration and development
- New attitude: user-focus, testing ideas rapidly in practice
- New tools: service design methods, testing

What testers still need to learn

- Understanding and writing down the purpose of the test by all the parties
- Setting measurable targets
- More courage to test even when everything is not technically perfect yet
- Learning from user data and analytics collected by websites and social media
- "Rather 6 x 6 days than 6 months," both startups and big actors alike are inclined to think experiments in terms of long pilot projects, the idea of continuous, rapid testing is still to be internalised

What created most friction between test partners

- Understanding that being innovation partners is different than the partnership between contracting parties. However, at some point the paying test partner (most often a big company or a city) and the delivering partner (most of the times a startup) need to assume the roles of contractee and contractor and get things done.
- Funding: Startups do not have resources. On the other hand the bigger partners do not yet have an allocated "test budget" and need to look and apply for resources case by case.
- Different time span: Cities and big companies move at a slower pace and need more time, for example, for decision making than agile startups that can and want to do things more immediately.
- Different scale: the problems and the importance of the innovations are of different scale for cities and big companies than for startups. A short test is microscopic among the questions with which the cities deal in urban development. However, the same test can be a matter of life and death for the survival of the startup.

What a third party facilitating the collaboration should offer

- support in creating shared rules and mutual understanding on collaboration, funding, available resources and responsibilities
- templates for contracts regarding collaboration and intellectual property rights (IPR)
- support in finding funding
- benchmarks and a toolkit for practical planning of tests and for setting measurable goals
- planning of the tests and setting measurable goals

Based on the interviews of the Smart Retro participants.

FIVE TEST CASES

Would you bring home your neighbour's groceries, too? – Online deliveries by PiggyBaggy

TEST PARTNERS: K-Citymarket Paavola, Kesko and Piggybaggy by Coreorient

WHEN CITYMARKET PAAVOLA in the Lahti City Center launched its "Order & Pick-up" service for online orders, it decided to offer a delivery option with PiggyBaggy, a peer-to-peer delivery platform developed by Coreorient. The two companies had first met in Smart Retro Innovation Camp in Lahti.

In a short time, 100 enthusiastic citizens had registered to do the deliveries. During the testing period, the delivery was free for customers and Citymarket payed a 5 € fee for the volunteer drivers. The first delivery was made by a 17-year old scooter driver to a mother of two small children. During the 2-month test, 43% of Citymarket's online orders were brought home by PiggyBaggy. "We now have no doubt at all that the grocery deliveries couldn't be made with PiggyBaggy," says retailer Marko Laaksonen after the test.

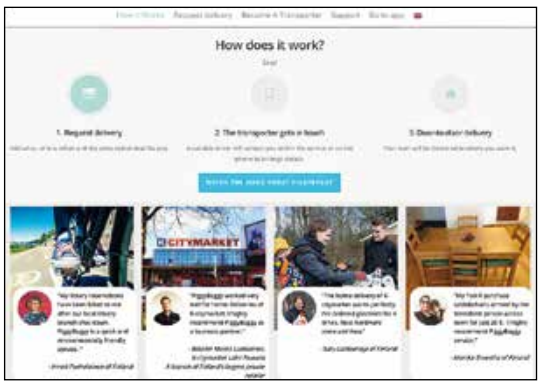
During the test, acquired knowledge was quickly turned into adjustments in the service: first it was required to register as a driver in the shop, later it could be done online to lower the threshold. Also, a new option to make orders by telephone was was introduced to meet the needs of those seniors not familiar with online ordering.

Coreorient highlighted that through the test they learned a great deal regarding marketing, especially on community-based marketing. To spread the news on the new service, Coreorient communicated actively in local Facebook groups and Citymarket offered coffee and cake with info on the service for 500 Citymarket customers. The City of Lahti's SIIRI, advice and service centre for elderly, also informed its customers of the service. "After finishing the delivery pilot, we got several angry phone calls from senior citizens. They were missing the service. Which of course is positive," tells Harri Paloheimo, the CEO of Coreorient, the company behind PiggyBaggy.

PERTTI LOUHELAINEN / ETELÄ-SUOMEN SANOMAT

In addition to important learnings for the development of the service concept, the test has brought another kind of value: a large potential customer from abroad has become interested in PiggyBaggy and the test with Citymarket brings credibility to the negotiations. Also continuing the service in K-Citymarket Paavola is being negotiated.

OUTI KUITTINEN (CC BY-NC-SA 2.0)



USER PERSPECTIVE

Tuulikki, 75, Lahti

TUULIKKI is an active retired math teacher and a craft enthusiast, who lives alone in the Lahti City Centre. K-Citymarket's online orders with Piggybaggy's delivery service came in hand for Tuulikki after a knee surgery. She couldn't carry heavy shopping bags or drive her car to the supermarket.

She found out about the service in the local newspaper article. "This is like made for me I thought!" laughs Tuulikki. Mainly thanks to the home delivery of the groceries she was able to follow her physiotherapist's advice to stay home for the recovery period. "My children, who live elsewhere, were very relieved when they heard I had found this service."

She made the orders online. "I didn't use the phone order option, I think it's easier online where you can see things."

Tuulikki was astonished by how smoothly and accurately the Piggybaggy delivery worked and how genuinely nice and helpful the drivers were: "They didn't seem to have any rush but had time to chat as well. When they saw me at the door with my crutches, they offered to carry the bags inside or even to put the items in place in the kitchen! I guess only social people take this kind of job."

HEIDI VÄLIMÄKI (CC BY-NC-SA 2.0)

From test to time-out – Nurmi Clothing Library

IN THE BEGINNING of the Smart Retro Acceleration Program, Nurmi Clothing was a design clothing company. It specialized in creating clothes and accessories using the Nordic tradition of long-lasting design, while at the same time not compromising on the sustainability and transparency of the production chain. After the testbed phase, however, Anniina Nurmi decided to direct her business towards the unknown.

After the innovation camp, Nurmi had many ideas to test, mainly on marketing. Instead, they then decided to go a clothing library, a service where customers can borrow clothes and pay a fixed monthly fee.

The library test was easy to set up in one afternoon in Nurmi Clothing's studio and store in the Lahti city centre. The deal was 2 items a week for 2 weeks for 30 €/month or 120 €/6 months. Positive feedback was instant although only some twenty people signed up. Later on, Nurmi arranged a survey in the store and online studying consumers' views and wishes on a clothing library; 350 people answered. A clothing library from Amsterdam contacted Nurmi for collaboration.

NURMI

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First Anniina Nurmi thought the clothing library would be a small exciting experiment and serve more of the role of a nice addition to the brand. But then it got her thinking: maybe it should be in the heart of the business. She started to sketch a whole new business model. First a combination of a quality basics collection produced by Nurmi Clothing complemented the clothing library consisting of various labels but run by Nurmi – but the numbers did not work. The second draft was a peer-to-peer online clothes rental service – but the market does not seem ready for it.

The thinking at Nurmi had turned – they took a break from producing clothes collections and used the time to think. "With all the knowledge we've gained during the years, we will now carefully re-think our whole concept. The schedule for launching the new concept is still open. The aim is to think totally outside the box," says Anniina Nurmi. "But one thing is for sure: sustainability and transparency are not something I'm willing to compromise on."

USER PERSPECTIVE

Heini, 28, Lahti

HEINI is a textile and clothing technology student, who lives in Lahti with her boyfriend. She is a visual person with an eye for aesthetics. She enjoys decorating her home, doing yoga and long-boarding. Life in the countryside fascinates her, even though she likes cities as well.

Heini was very happy with the clothing library experiment: "It is an exceptionally good value – think about renting eight Finnish design pieces for the price of a cheap shirt of a chain store! I also liked the fact that one does not have to commit for more than one month at a time."

"The highlight of taking part in the experiment was when I went to a party and could rent this very cool turban and a matching dress without having to buy them for myself. I shared the idea of sustainable consumption already before the test, but it was nice to see that it actually works well. I wish to see more clothing libraries replacing traditional clothing stores everywhere."

HEIDI VÄLIMÄKI (CC BY-NC-SA 2.0)

OUTI KUITTINEN (CC BY-NC-SA 2.0)

The Fruits of Co-creation

ONE OF THE SMART RETRO STARTUPS, Nurmi Clothing turned 5 years during the programme. To serve the birthday party guests something along the Nurmi Clothing's sustainable and circular economy ideology, Anniina Nurmi contacted K-Citymarket Paavola's retailer Marko Laaksonen she had met during Smart Retro Innovation Camps asking if they could use leftover food from Citymarket to cook at the birthday party. The waste-food was turned into veggie burgers. But yet another idea was born: Nurmi was planning a birthday beer with a Finnish artisanal brewery. Could it be spiced up with leftover citrus fruit from Citymarket Paavola? A stylish limited edition 'Nurmi x Hiisi #1' beer with a citrus taste sold exclusively at K-Citymarket Paavola in Lahti was born.

A city learning to be a test platform – 24/7 Smart Container

TEST PARTNERS: Coreorient, EDi-Soft Finland, City of Lahti, local entrepreneurs

HENNI AHVENLAMPI /COREORIENT

EVER STRUGGLED to pick up your shoes from the shoe repair shop before it closes? A self-service 24/7 pick up point in the form of a special smart container was brought to the Lahti city centre to solve this problem. More generally, from the service development perspective, the idea was to test a solution to the logistics problems of local shops making their services available to new customer groups and to enliven the city centre.

From the city's perspective it was somewhat hard to argue why they are part of an experiment aiming in developing the business of local entrepreneurs. However, the focus was found as a part of learning the following: How do cities work as testbeds for new business and service development? How can the city support the local city centre service and retail entrepreneurs; moreover, is it allowed to do it as a public actor? Could new services offer solutions for serving the elderly or activating citizens?

The test was organised by Coreorient, the startup behind PiggyBaggy delivery service and the design of a the smart container, and a logistics company EDI-Soft Finland Oy. It was funded by the City of Lahti and the Finnish Transport Agency. Eight local entrepreneurs from a shoe repair shop to farmer's market and a cosmetics shop & day spa took part in the test offering their customers an option to get the services and products delivered either to the self-service pick-up point in the container or to home by using PiggyBaggy delivery service. In addition, citizens' interests for peer-to-peer rental services was tested: a steam cleaner, a cargo bike and e-kickboards were available in the container to be borrowed for free.

Importantly, this test was an experiment of collaboration between a digital era startup, very local entrepreneurs and the city. What was learned from such collaboration?

"When working with local entrepreneurs you need enough time," note both the startups and the city. "Two months is a very short time to get

HENNI AHVENLAMPI /COREORIENT

both business and citizen users to adopt a new service." Cities would be used to much longer pilots projects, but then again, startups cannot commit for long experiments due to lack of resources.

For a public organisation it is not that easy to assume the new attitude of "failing fast and trying again". To think that if the concept did not attract large number of users during the test, it is not really a failure but a test result telling about demand or other things, is a new viewpoint to digest in the public sector.

"The cities can be challenging partners because they are so big. The city is not one entity – we needed to look for internal partners within the city organisation," notes a city representative. "Our role is to be an enabler, to lower thresholds, to bring credibility in finding funding." "We learned that an innovation partnership is different than a partnership between a contractor and contractee. You are there to test and learn together, but at some point you need to assume the role of the contractee and startup the producer's role to get things done. The roles and responsibilities need to be clearly defined. As long as things are functioning, few other regulations are needed. So it should be something between bureaucracy and iterative development," says a city representative. "All in all, through this, we have gotten positive views for the possibilities of development. And the drive that startups have is contagious!"

USER PERSPECTIVE

Ville, 37, Lahti

VILLE is a master shoemaker, who shares his time between Lahti, where he co-owns a shoe repair shop, and Helsinki, where his girlfriend lives. Ville is into reading books about cosmology and likes to relax by playing computer games. In life he values integrity and tolerance towards other people.

Meeting Harri Paloheimo from Coreorient in an innovation event made Ville interested in trying out 24/7 Smart Container for his business: "I knew taking part of this test could bring us more visibility and marketing value, but most of all it was fun and fresh to try something out of the ordinary within your work. After the experiment, I've been thinking if we should start a tool rental service in our own shoe repair shop. Even within the most traditional businesses, such as shoe repair industry, there is a need to continuously develop and try out new ideas in order to keep up with the competition."

HEIDI VÄLIMÄKI (CC BY-NC-SA 2.0)

Just give it a try – Cykel Container

TEST PARTNERS: Stockholmshem and Bonne Mécanique

ALEKSI NEUVONEN (CC BY-NC-SA 2.0)

THERE IS SOMETHING about Bagarmossen and cycling. "There are so many bikes, and very engaged cycling enthusiasts. But there was no bike repair shop, and we realised that there was a need for one, that many wished one existed," says Tobias Lind, a project leader from Stockholmshem. The solution was a big blue container in a quiet corner of a plaza.

The container was turned into a bike repair shop by Bonne Mécanique, which has a shop in Södermalm, Stockholm. Stockholmshem assumed the initial cost of the container, then rented it out to Bonne Méchanique. Joel Jansson, a bike mechanic living in Bagarmossen was found to run the Bagarmossen container shop. He offered repair service, tools, and help in repairing the bike by oneself, as well as courses for learning how to repair a bike.

The test period ran from April to June, the busiest period for bike repair. The container raised great interest in local media and social media. Soon after opening, Joel had more bikes he could handle. A local bike messenger, Simon Bohjort, started to hang out at the container and offered to help. The two started working together.

"With this temporary experiment we were asking: 'Bagisbor,' (the residents of Bagarmossen) do you want a permanent bike repair shop?" says Tobias. Judging by the flow of customers, approximately 10 per day, the answer seemed to be yes. However, the permission for having the container on the square expired and it had to close down.

But a new idea came from another local bike enthusiast, Måns Andersson, the owner of Gamla Enskede Lådcycklar cargo bike shop: there was spare space by his workshop. After the

BAGISBLOGGEN

summer Jansson and Bohjort became new local entrepreneurs opening up a permanent bike repair ”Söderorts cykelexpertis”.

Tobias Lind from Stockholmshem says: ”From this experiment we have really learnt that if you want to succeed, you need to involve people who have genuine interest. The established actors' role can be to put in some money and structure but the key to make it work is local interest and engagement. We found that in Joel.”

For Stockholmshem it was not only about bikes. It was also an experiment to liven up a relatively unused corner of a square. ”It really became a new social meeting spot, with people sitting on the benches watching things going on at the container and having coffee offered by the shop”, says Tobias. Thirdly, it was an experiment of an experiment: “This was our first experiment. We want encourage and help more small and new entrepreneurs to try out and proof their business ideas with a temporary test.”

”For developing more flexible and interesting urban areas, having experiments and temporary uses is definitely a tool. But to scale this urban testbed thinking up, we need to work with bureaucracy and regulations to remove obstacles for it.”

Growing business from door to door – Generation Ungdom

KNOWING YOUR CUSTOMERS is the alpha and omega of a successful business. However, businesses rarely show much commitment to knowing and serving their customers. Joakim Lövgren, the founder of Generation Ungdom, stands apart as an example of what it means to know customers well.

Generation Ungdom's goal was to provide people with domestic help – for example to address small computer problems or to move a sofa – and employ unemployed youth in doing it. Lövgren, 20, himself had experienced the difficulties in securing employment and decided to build a solution, which would also help others. To test if the idea would work and to find out the customers' needs, Joakim moved from Göteborg to Bagarmossen, Stockholm for two months and rang the door bells of Stockholmshem's residents offering the service himself.

But how did Joakim end up from Göteborg to Bagarmossen? Generation Ungdom's business idea was chosen to take part in Smart Retro and was awarded for the best pitch at the innovation camp in Stockholm. Stockholmshem was impressed of Joakim's determination and helped Generation Ungdom in finding a suitable area within Bagarmossen and an apartment. They also gave feedback on the test plan and the pricelist and communicated it to its tenants. However, the hard work of offering the service and getting first customers was all up to the entrepreneur himself.

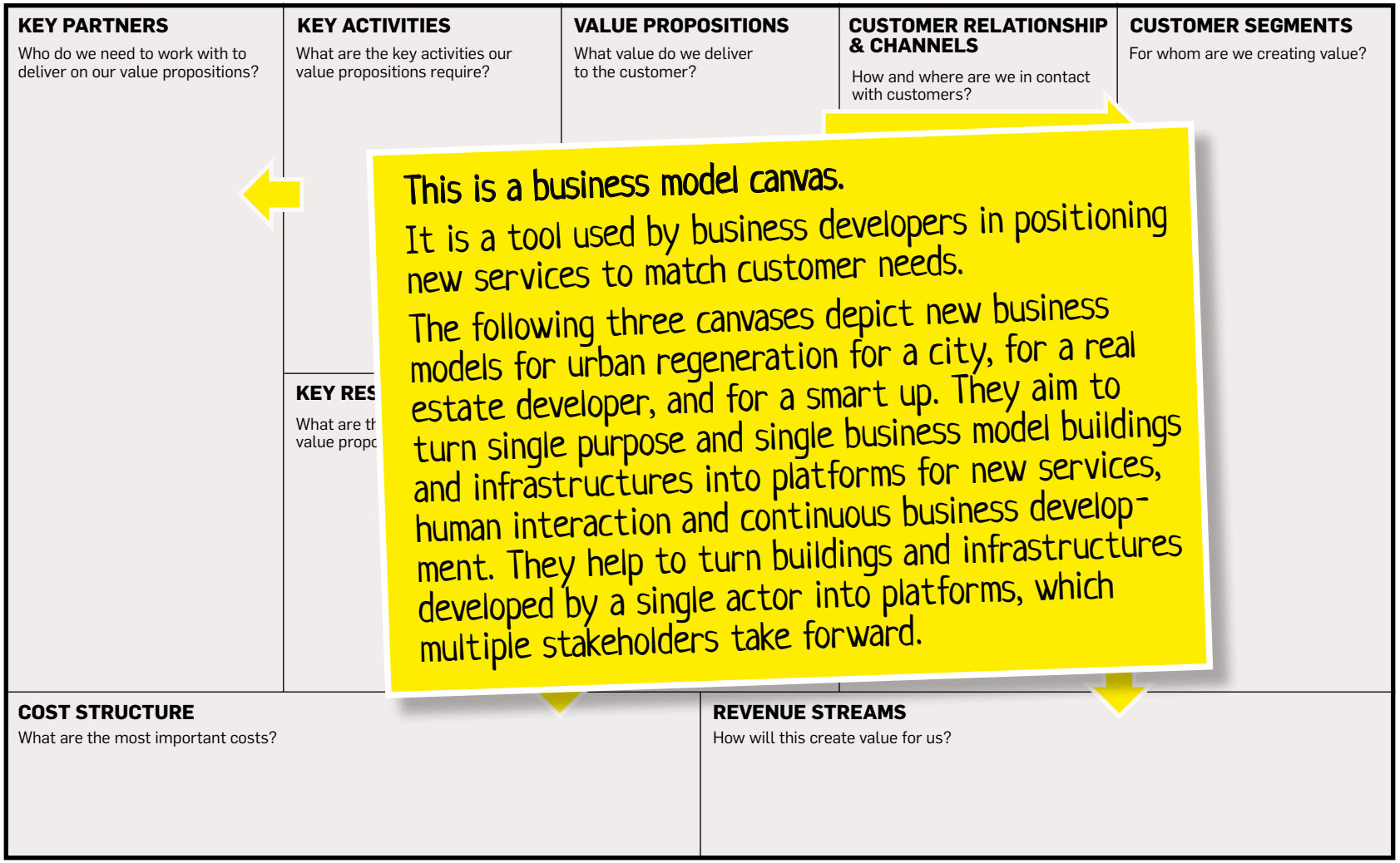
For weeks, the business was slow. Finally the first customer signed up for Generation Ungdom to clean her apartment twice a week. Then, a row of orders came in encouraging to keep going. “The biggest customer was a man who wanted to get rid of algae in his house. After I had removed the algae, he wanted me to paint his whole house,” tells Joakim. All in all there were some ten test customers.

“The test made me realise that I had to change my concept a bit, in areas like pricing, and travel time. I think practical testing is the best way to find out if your idea is good or not!”

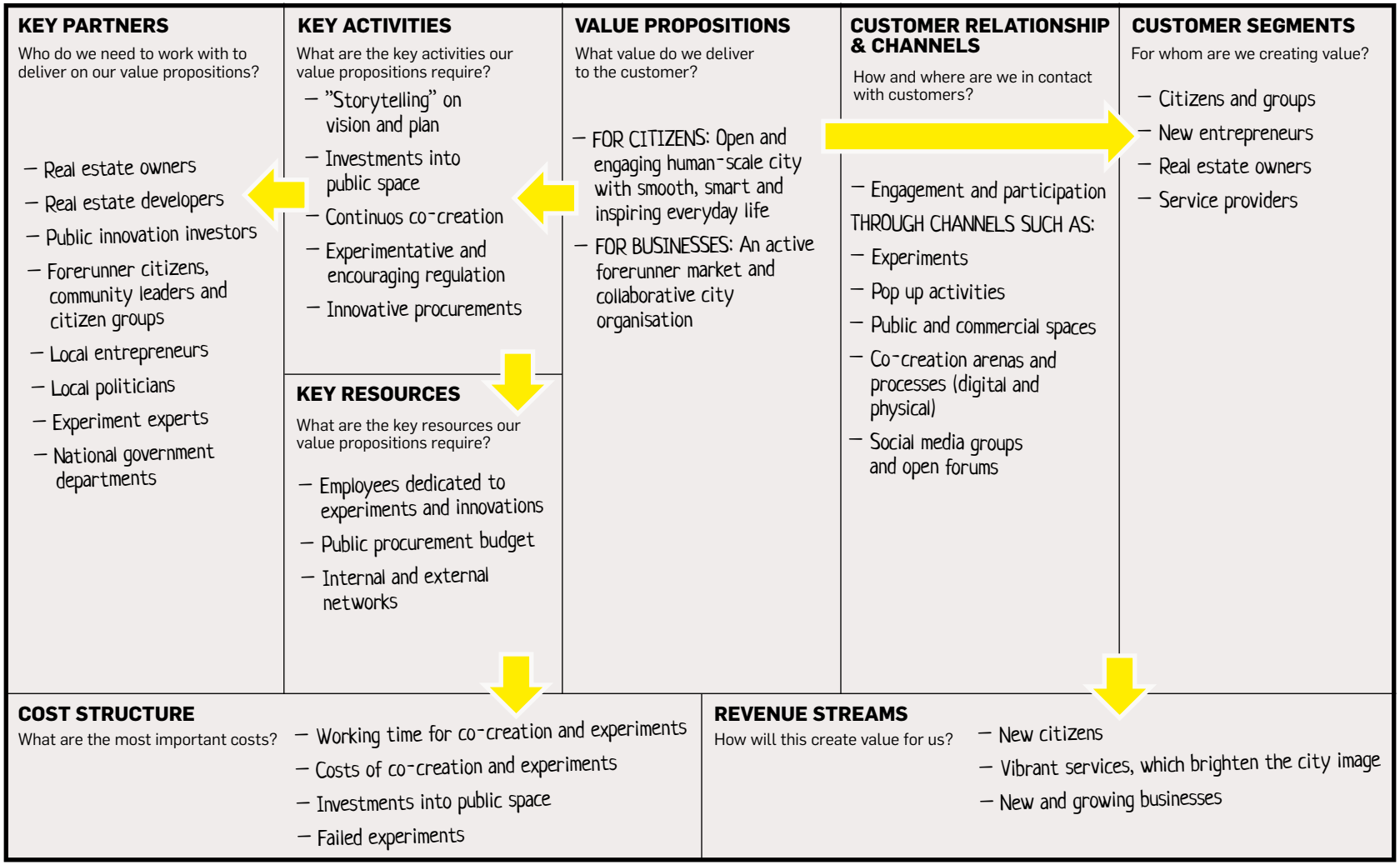
The future of this hyperlocal microwork concept looks promising: “A real-estate company has shown interest in the concept and would like me to implement it in the areas where they have many tenants.”

“I hope to create at least a thousand new jobs in the future, and to have Generation Ungdom always have a positive vibe and become a brand known by a vast majority,” envisions Joakim Lövgren.

BUSINESS MODEL



BUSINESS MODEL for a human-scale SMART CITY



BUSINESS MODEL for a REAL ESTATE DEVELOPER wishing to tap into the value created by smart services

KEY PARTNERS

Who do we need to work with to deliver on our value propositions?

- CITIES: Economic development division, urban planners, technical, environment and public works divisions
- SMARTUPS as suppliers
- Active CITIZEN GROUPS

KEY ACTIVITIES

What are the key activities our value propositions require?

- Searching new providers of smart solutions for needs of customers
- Searching active citizen groups and local entrepreneurs wishing to use spaces for events or pop ups
- Matching emerging services with existing businesses and available spaces to create a good mix of service businesses, additional revenue streams and enhanced user experience
- Business to business mentoring to ensure viable providers and tenants
- Experiment with pop-ups and temporary uses to create a continuously evolving mix of services and urban environment

KEY RESOURCES

What are the key resources our value propositions require?

- Leased spaces
- A CURATOR matching emerging services with existing businesses and available spaces
- Public spaces: streets, plazas, parks
- Other spaces: rooftops, garages, passages

VALUE PROPOSITIONS

What value do we deliver to the customer?

- FOR CONSUMERS: Smooth & smart everyday life enriched with experiences provided by good mix of digital and location based services and pop-ups
- FOR TENANT BUSINESSES: A flexible and accessible business environment, which provides continuous flows of people and support for business development

CUSTOMER RELATIONSHIP & CHANNELS

How and where are we in contact with customers?

- Continuous flow of information on customer needs, wishes and ideas and continuously evolving environments

THROUGH CHANNELS SUCH AS:

- Co-creation with consumers, startups, tenants and other stakeholders
- Pop ups, temporary uses and events
- Short-term lets
- A curator matching emerging services with existing businesses and available spaces
- Branding: Creating and communicating a progressive story

CUSTOMER SEGMENTS

For whom are we creating value?

- CONSUMERS
- TENANT BUSINESSES such as retail, traditional and smart service providers

COST STRUCTURE

What are the most important costs?

- Increased networking costs
- Development costs
- Marketing and communications
- Working time for a curator

REVENUE STREAMS

How will this create value for us?

- New models for short-term lets
- Higher vacancy rate of spaces
- Subscription of or transactions on digital service platforms
- Faster planning and execution processes of development projects

BUSINESS MODEL for a SMARTUP operating in a forerunner smart city

KEY PARTNERS

Who do we need to work with to deliver on our value propositions?

- Groups of LEAD USER CONSUMERS
- CITIES: Economic development, technical, environment and public works divisions

INCUBATOR AND ACCELERATOR PROGRAMS: seed funding, test platforms, proof of concept opportunities

KEY ACTIVITIES

What are the key activities our value propositions require?

- Experimenting with real users, understanding behavioral patterns and obstacles for adoption of new solutions
- Embedding services into the existing environment and services

KEY RESOURCES

What are the key resources our value propositions require?

- Partnering with built environment gatekeepers
- Rapidly implementing new solutions into the old environment and services
- Goodwill and enthusiasm of lead user consumers

VALUE PROPOSITIONS

What value do we deliver to the customer?

- For CONSUMERS
  New services, which ensure smooth & smart everyday saving time and money, as well as enrich experiences
- For REAL ESTATE OWNERS and DEVELOPERS, RETAIL and ENTREPRENEURS

  Digital services, which increase flows of people, bring additional touch points to existing services and improve user experience

CUSTOMER RELATIONSHIP & CHANNELS

How and where are we in contact with customers?

- Continuous flow of information on customer needs, wishes and ideas

THROUGH CHANNELS SUCH AS:

- User networks and communities and their communication channels
- Property owners as channels to user acquisition
- Popups and other forms of presence in urban space
- Curators that help in incubating and matching emerging services with available spaces of property owners

CUSTOMER SEGMENTS

For whom are we creating value?

- CONSUMERS
- REAL ESTATE OWNERS and DEVELOPERS
- RETAIL
- LOCAL ENTREPRENEURS

COST STRUCTURE

What are the most important costs?

- Negotiations and partnerships with slow-moving big organisations (cities, real estate)
- Working time for experimentations and recruiting lead user consumers

REVENUE STREAMS

How will this create value for us?

- Direct revenue from CONSUMER USERS
- Contract with a REAL ESTATE COMPANY or CITY

A MODEL FOR URBAN RENEWAL IN THE DIGITAL ERA

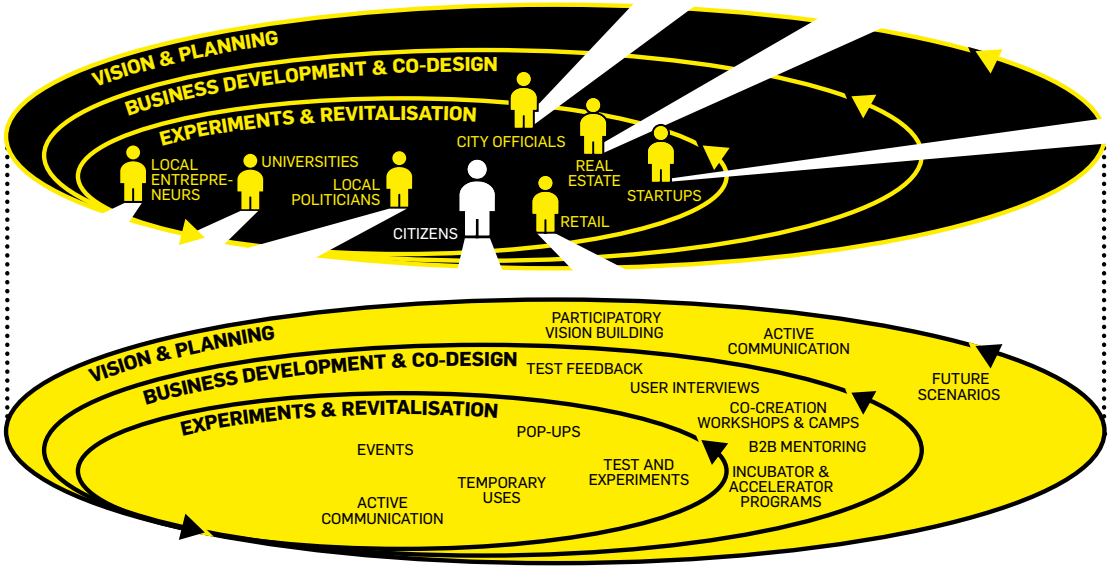


Figure 3.1 The model and activities for smart urban renewal in the digital era. On the city level, it is a new way to develop cities and regenerate neighbourhoods. From the point of view of business, it means a way to develop better business environments and introduces tools for creating viable smart services. For the citizens, it includes them and their groups as an inseparable part of the process – both as partners and as independent actors.

THE PREVIOUS PAGES have described new and partially experimental ways in which cities, different types of real estate developers and owners, as well as startups developing new smart services ('smartups') can contribute to and succeed in the renewal of cities.

The prerequisites for all this include deeper partnerships between different stakeholders and tools for co-creation to structure these partnerships. The new model for urban renewal (see figure 3.1) pulls together different planning and economic development authorities of the cities, construction and real-estate industries, different types of retail and service businesses and citizens through co-creative activities. These activities cut across the traditional division of labour between different sectors. They transform the standard model of mere public-private-people partnerships into co-creation between the public, the private and the people on regenerating attractive neighbourhoods and creating more value out of the existing built environment.

Co-creative activities needed:

- A city needs a narrative in the form of a shared vision and planning. **Vision and planning** should be made not by city officials and politicians only, as it currently often is, but as an iterative process engaging citizens and businesses, as well as local universities. This is the prerequisite for creating a sustainable and accepted vision and turning it into actions in different sectors. Participatory vision building and planning also sets ground for collaborations.
- Growing a healthy and vibrant local economy requires constant **business development with strong emphasis on co-design**: very few businesses can grow or even maintain their position in the market without actively engaging their (current and potential) customers and establishing long-term collaborations with other companies, thus creating value for both parties.
- There are no flourishing cities without vital and attractive public spaces outside the commercial realm. It is not possible for cities to maintain

their charm without **constant experimentation by different, often new and surprising actors**: urban activists, entrepreneurs, artists and organisers of events of differents scales. Experiments, events and pop ups increase flows of people in the city. In addition to revitalising public space, flows of people help businesses and services flourish. The experimentation, or testing, is also a tool for public service and business development. The members of the community (both public officials and others) need to tolerate experiments even when they occasionally fail. Active communication of the experiments and other temporary changes is the key for creating understanding and engagement.

Some tools for co-creation:

- **SCENARIOS** can be used for exploring future uncertainties that we constantly encounter in our economy and society. Scenarios help in building capabilities for strategic steps, in identifying actors that should be prepared for and drive change, and in finding the right timing for action. They describe alternative futures of society and pathways through which those futures can be attained. They give an important narrative and sense for initiating different actions the present and link individual efforts to a bigger picture showing their importance.
- **CO-CREATION WORKSHOPS & INNOVATION CAMPS:** The purpose of co-creation platforms, such as workshops and innovation camps, is to facilitate the creation of new value networks and partnerships. In the platforms new smart service concepts and their business models are co-designed further by the partners and citizens to better answer the needs of users, while also being valuable and viable from the business perspective. The platforms can be run by companies or economic development division of the city on a regular or needs basis. They require facilitators, who lead the process and facilitate matchmaking of potential partners and involve end-users.
- **BUSINESS TO BUSINESS (B2B) MENTORING:** Established businesses have valuable insight to help develop a new company and ensure its services are viable. The motivation is not only to help but to develop a potential supplier for oneself or a more reliable tenant for a property. At the same time, mentoring rising companies keeps established companies on the pulse on what is happening. Mentoring can happen through co-creation platforms, accelerators and incubators, or corporate venture programs. Real estate developers should consider having curators for finding and incubating emerging service providers to complement their own business or to match them with available spaces.
- **TESTS AND EXPERIMENTS** turn cities into platforms for accessing the market. They make new partnerships true in action. They provide valuable insight and proof of concept both on the public or business service concept and for the new partnership. The feedback from tests is used for further developing the service concepts and to estimate their viability in the city. Tests and experiments also create a sense of progress in the city. The economic development units of the city and the incubator programmes related to it should be the forerunners in enabling the use of a city as a platform for developing new services and business. Cities should consider having a facilitator for experiments to open doors, remove obstacles and help in finding funding and built partnerships with the different units of the city.
- **POP-UPS, EVENTS AND TEMPORARY USES** enliven the public space, bring people together and offer people a chance to "live their city." They increase flows of people, which are perhaps the most important characteristics of truly urban areas. For real estate developers, they are a tool to partner with citizen groups and to offer new experiences and attraction, as well as to allow new and small businesses to access the environment, to fill in newly developed old spaces, or vacant spaces during quiet business periods, thus creating a feel of a thriving property.

The goal of the model is an attractive and open city with an active urban sphere, increased flows of people and encounters both on- and offline, as well as a dynamic economy with more local loops. A city with both smart infrastructure and sustainable lifestyles.

SUMMARY

THE AIM OF THIS REPORT has been to introduce a new approach to the future of cities and urbanism. This approach combines the ambitions of turning cities smart and climate neutral, within the constraints of the prevalence of old building stock in the developed countries.

Many cities have already adopted these goals, and acknowledge a need for investments in transforming their built environment. Yet the mere imposition of targets is not enough, neither in terms of accelerating emissions reductions, nor in terms of generating economic growth or convincing people that their living environment and everyday life will improve. Without these promises it is difficult to create political and economic momentum to back the substantial investments needed to transform the built environment of cities into smart and carbon neutral.

It is therefore evident that there is a lack of actors that could bring about the envisioned change, leaving an implementation gap. This report introduces smart urban services and smartups as their primary providers as that missing link. Emerging urban services can help make people's lives smoother whilst adjusting their lifestyles to better meet the requirements of future cities: for instance reducing the amount of owned goods so that people fit in affordable-sized flats, or enabling mobility choices that don't require one to own a car in already congested cities.

It will, however, be difficult to bring these services to mainstream use without better collaboration between the incumbent actors of cities: public regulators, real estate owners, urban planners and retail businesses. The built environment is a platform on which smart urban services can grow, making it more lively. With the right kind of vision, with innovative urban planning, with progressive business models and permissive regulation smartups can boost the transformation of the urban building stock.

New partnerships between innovative startups, cities and more established companies won't happen without new working methods. For instance, startups operate in an extremely agile manner and at a fast pace compared to public organisations and many bigger companies. They are occasionally eager to get things running whereas more established organisations take their time to plan things more carefully and are more risk averse. Startups can put all their resources on the line for one experiment, whereas it is difficult for bigger organisations to allocate their resources on a substantial scale.

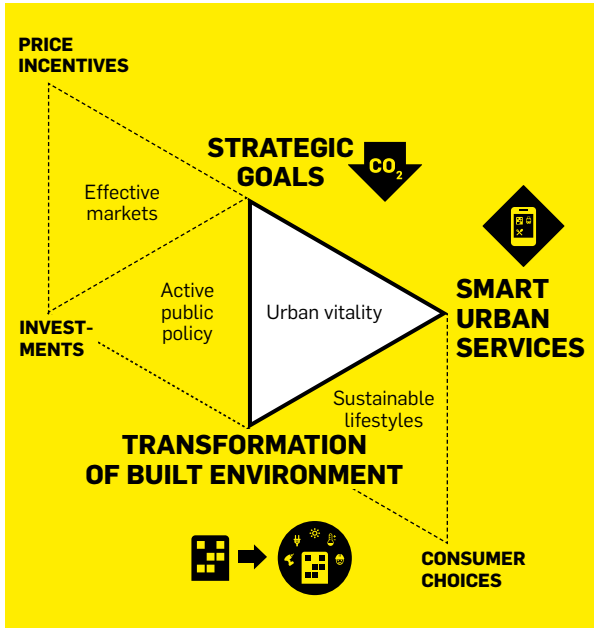


Figure 4.1 The figure lists possible avenues of urban transformation into smart and climate neutral cities. This report has focused on the interplay between three of these avenues: strategic goals of cities, transformation of the built environment, and smart urban services. We perceive combination of these three as the main source of urban vitality.

Because of these differences, we designed and implemented a testbed programme as a platform for collaboration. A programme scheduled to last for a limited period of time with clear rules is an easy way to initiate collaboration. Other advantageous features include an external facilitator and a neutral platform. Experimentation

is open-ended: it can be the beginning of more substantial collaboration, it can be a tool for learning about new topics, it can serve as an external R&D function.

The focus of our study and experimentation have been two Nordic neighborhoods that share similarities as well as differences. Both Lahti centre and Bagarmossen are located in wealthy Nordic societies with relatively well-educated citizens and an extremely reliable urban infrastructure. Both areas are within easy reach of the railway, with housing that consists mainly of modest-sized flats, and an engaged and active body of inhabitants. Both have been built mainly between the 1950s and the 1970s. But whereas Lahti is a former industrial town gradually positioning itself as part of the Helsinki metropolitan region, Bagarmossen is a residential area of Stockholm, a highly international city with good prospects for future growth.

In addition to hands-on experimentation, this report presents a scenario exercise on the future of the two cities. The three scenarios sketched out complement experimentation: they provide alternative narratives on how the two test areas could develop over the next 25 years and hence how smartups, real estate companies and cities can navigate their way to success. By presenting three distinct scenarios we wanted to highlight the fact that even when the future is full of uncertainty and surprises, investments in developing smart and climate neutral cities can pay off, regardless of how politics or technology evolve. Making the built environment resource-efficient and providing opportunities for the growth of smartups can yield both international fame and success as well as resilience for when the world moves in an unexpected direction.

”The three distinct scenarios highlight that even amidst future uncertainty and surprises, investments in developing smart and climate neutral cities pay off, regardless of how politics or technology evolve.”

The three scenarios all depart from the present day, but key events push the cities onto a distinct development path in each scenario. In all scenarios the focus of attention is on urban services, the built environment and their interaction. In the scenario timelines they are portrayed as part of international developments, significantly influenced by global events as well as local characteristics.

To illustrate this we have used the so-called multilevel perspective on socio-technical change (MLP) and used that as the canvas for our scenarios. The key asset of the MLP is that it provides a structure for temporal change without assuming that political drivers are substantially stronger than for instance longer pertaining structures (both physical and cultural) or technological and social innovations.

We have assumed that several trends remain important in all scenarios:

- Both digital technologies and renewable energy continue fast development
- Work and employment structures change towards a more diverse direction and industrial era full-time employment patterns gradually decline and eventually force change in the structures of social security.
- Urbanisation continues
- Nordic societies maintain their defining characteristics and the value-base of their unique welfare model
- People find new patterns of collaboration assisted by digital tools.

In this way, developments in each scenario can be seen as interplay between political decisions, citizen behaviour, technology and chance. All of the above are needed to bring about successful transition to low carbon society.

RECOMMENDATIONS

THE LESSONS LEARNT from the testbed exercise as well as the scenario exercise can be converted into nine policy recommendations for cities, businesses, and national governments.

1 MAKE YOUR ASSUMPTIONS ON FUTURE UNCERTAINTIES EXPLICIT. All decisions by built environment actors are based on some assumptions on long-term societal development and its drivers. Making these assumptions explicit facilitates communication and cooperation between different actors. In particular, cities need to map out the future developments that encourage commitment to carbon neutrality. The three scenarios of this report provide an accessible narrative to help make sense of future possibilities.

2 CREATE A LONG-TERM VISION. The city should draft a future roadmap or vision, based on the risks and opportunities perceived, to guide regulation and experimentation. The more plausible and attractive this vision is, the easier it will be to engage different organisations and individuals.

3 IMPROVE THE EXISTING BUILDING STOCK THROUGH SMART SERVICES. Improving the existing built environment is necessary, and can happen effectively via the incorporation of digitally driven smartups. The incorporation of smart services in the built environment can alter the division of labour between the public sector, private companies and individuals, and may even decrease the size of some of the biggest public investments. For example mobility-as-a-service applications potentially undermine the need for massive investments into rail infrastructure.

4 REMOVE THE BARRIERS OF URBAN TRANSFORMATION. Regulation and legislation by municipalities and states set unintended barriers to many start-up businesses, thus hindering the emergence of new markets. Regulations need to be reformed to give space for coworking, microwork, digital consumption, changes in retail, and sharing economy solutions, just to name a few.

5 ENCOURAGE INNOVATION IN CITY-OWNED ORGANISATIONS. A great part of services and infrastructure is being operated by city-owned organisations. Together these operations form a massive platform for smart city innovation and business. Communal companies should have a part of their budget allocated to innovations, which would enable them to try new ideas without fear of extra costs.

6 DIVERSIFY YOUR BUSINESS MODELS. Current real-estate business models produce spaces for long-term retail stores or offices of a single company, leaving the needs of new types of microwork, co-working schemes, pop-up concepts and service business start-ups unaddressed. Multifunctional and mixed-use spaces have the potential to enliven the centre during daytime, bringing in people flows. This also enables more efficient use of space by minimising the amount of heated space lying idle.

7 EXPERIMENT. In the complex, interconnected world, solutions cannot be planned to perfection. Built environment actors must therefore be braver to run experiments, accepting the risk of failure. Experimentation enables trying out new solutions without destroying old structures. It is also a way to find new contacts and establish new partnerships. The only way to make progress is to experiment with solutions whose technical side is still imperfect: it is important to realise that the aim of experimentation is to learn.

8 MANAGE EXPERIMENTS EFFICIENTLY. Cities need to commit to and take responsibility of experiments. However, it can be advantageous to leave implementation to the hands of other, more agile actors and organisations, and to find the right model for experimentative cooperation.

9 CREATE A PLATFORM FOR EXPERIMENTATION. Carrying out experiments as collaborative projects has many advantages. Ideally, an experimentative project should involve a big consortium of both smartups and bigger organisations. A big pool facilitates matchmaking: it makes it easier to find test users, and minimises the risk of failing merely due to clashing personal chemistries, for example.

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APPENDIX: BACKGROUND MATERIAL FOR THE SCENARIO STUDY

THE SCENARIO STUDY of this report is based on the multi-level perspective approach on socio-technical change (see pp. 18). This means that we first collected and analysed number of the most important current social, technical and economic phenomena and signals regarding our two case areas, Bagarmossen in Stockholm and Lahti centre. These were then arranged into three levels of socio-technical change: landscape, regime and niche. The table below lists the phenomena and signals collected.

Landscape

LANDSCAPE SIGNAL	ESTABLISHED	TRENDING
Ageing building stock in Nordic cities	●	
Climate change, energy and resource scarcity	●	
Slowing economic growth and investment cycle, high public debt	●	
Highly skilled population	●	
Ageing population	●	
Business and business models turning global	●	
Global and universal instant connectivity	●	
Secular societies	●	
Migration and multiculturalism	●	
Growing urban population	●	
Ageing building stock in Nordic cities	●	
Retail business disrupted by digitalisation		●
Employment structures changing from stable to more diverse		●
Smart city approach		●
Austerity mindset	●	
Renewables boom	●	
Startup economy		●

Regime

REGIME SIGNALS: POLICY	BAGARMOSSEN RELEVANT	LAHTI RELEVANT
UN level climate policy, emissions trading	●	●
High dependence on Russian energy discourages use of fossil fuels	●	●
UN level climate policy, emissions trading	●	●
European regional energy independence initiatives	●	●
EU 2030 targets on the share of renewables and GHG emissions	●	●
European research and innovation policies drive resource smart society and business	●	●
European roadmap for a competitive and resource efficient transport system	●	●
Cleantech at the core of industrial policy		●
New emphasis on entrepreneurship	●	●
Densification of urban regions	●	●
Strict energy efficiency standards for buildings	●	●
Emphasis on innovation-driven economy and increasing innovation funding	●	●
Public sector deficit, need to reform public services		●
Ceantech edge market, the city as a testbed		●
Ambitious greenhouse gas emission reduction targets	●	●
Walkable city, favouring public transportation	●	●
Investments in public transit	●	●
Accelerated building of new apartments	●	
Refurbishment programme of 1970s apartment buildings	●	
Revitalisation of the city centre		●

REGIME SIGNALS: SPATIAL AND TECHNOLOGICA CHARACTERISTICS	BAGARMOSSEN RELEVANT	LAHTI RELEVANT
Stockholm underground system is expanding	●	
Newly built underground parking system in Lahti city centre		●
District heating system with efficient CHP	●	●
Bagarmossen as a suburbian center and carfree roads for walking and biking	●	
Lots of building stock from the 1950s-80s	●	●
Plenty of hypermarkets on the outskirts of Lahti		●
Ongoing densification of the urban structure	●	●
Bagarmossen is a residential area with not many work spaces	●	
Bagarmossen is situated close to both the nature and the subway	●	
Lahti is close to the nature, with a lake and opportunities for outdoors sports		●
Regime signals: demography, population and attitudes		
Considerable number of aging people		●
A generation shift with younger families moving in	●	●
Growing population		●
An increasing amount of people commute from Lahti to Helsinki to work		●
Higher than average unemployment	●	●
Bagarmossen is suffering from problems with vandalism and fear created by youth gangs	●	
Empty shop spaces in the city centre of Lahti		●
The industrial profile of Lahti is weak		●
The city brand of Lahti is weak		●
Regime signal: business		
Good environment for small business due to the residents' lifestyles	●	
Lahti has some cleantech and design startups		●
Plenty of residents work as freelancers	●	
There is good access to inexpensive small business locations	●	●

Niche

NICHE SIGNALS: CULTURE AND SOCIAL MOVEMENTS, URBAN SMART SERVICES	BAGARMOSSEN RELEVANT	LAHTI RELEVANT
E-commerce consumption	●	●
New forms of urban activism	●	●
Urban gardening	●	●
Small-scale local trendy businesses	●	●
The digital culture of young people	●	●
New forms of entrepreneurship	●	●
P2p second hand business	●	●
Digital, local social networks (blogs, FB groups)	●	●
Local manufacturing, 3D printing, fab labs	●	●
Local repair businesses	●	
Mobility as a service: Ride-, car-, cargo- and bicycle sharing		
Space sharing systems, co-working spaces	●	
Neighborhood social apps		
Local food production and business	●	●
Smart home solutions connected to other digital systems		
p2p service/micro-work businesses	●	
Personal data driven services	●	●
Super-small affordable homes		
Solar energy as a service		