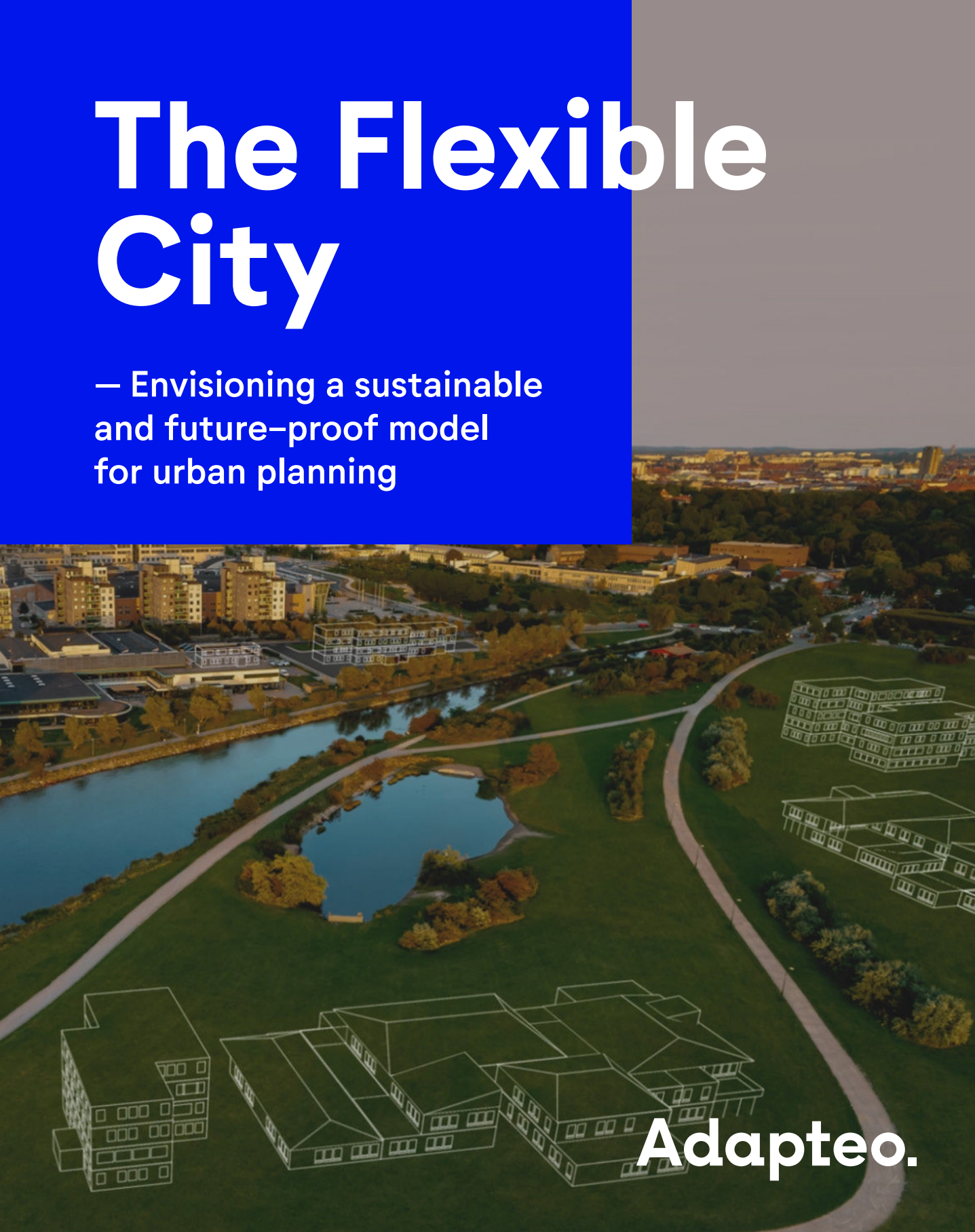


The Flexible City

— Envisioning a sustainable and future-proof model for urban planning



Adapteo.

Background

Back in 1937, the Swedish cultural geographer William William-Olsson described the city as a society whose buildings are a function of the needs of this society, in his thesis entitled Stockholm's geographical development 1850–1930.

As society changes, the needs that the city is expected to meet shift. The city also often struggles to keep up. Dead areas arise, others become overpopulated and in the worst case turn into slums. Individual modes of transport are prioritised, only to be replaced by others.

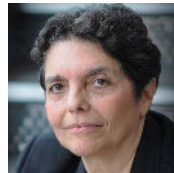
Today, the number of moving parameters in an urban plan seems perhaps more overwhelming than ever. Digitalisation, migration, e-commerce, new mobility solutions such as electric scooters and – just around the corner – autonomous cars, the climate crisis and, most recently, a paralysing pandemic, create new and sometimes sudden demands that the city finds difficult to meet. These changes can sometimes be predicted, but they tend to arrive at a different time and with far greater force than we initially imagined.

“After the bubble phase comes the “reconstruction phase”, a period in which regulations are adapted to the technology and conditions for new wealth are established”

Although we can predict changes such as digitalisation and new forms of mobility, paradigm shifts are rarely as we originally envisaged them. They take place at a different time than predicted, and they happen quickly. And it is only in hindsight that we understand that there has been a paradigm shift, that we have switched from one prevailing point of view to

another. The consequences are generally far more extensive and dramatic than predicted.

In the model proposed by Carlota Perez, an industrial historian, there are three stages of industrial transformation. The initial “bubble phase” is characterized by experimentation with new business models driven by novel technologies, which often leads to inflated valuations and significant financial setbacks. Following this is the “reconstruction phase,” during which regulations are realigned with the technological advancements, setting the stage for new economic growth. The culmination is a “golden age,” where the full benefits of the technology are harnessed.



Carlota Perez is a British-Venezuelan researcher specializing in technology and socioeconomic development.

Perez suggests that the bubble phase typically lasts 10-15 years; however, with digitalisation, this phase has stretched to nearly 30 years. Despite the dotcom crisis in 2001 and the financial crisis of 2008 resembling typical bubble collapses, a true reconstruction phase has not taken place. A reason for this might be the gradual nature of the shift towards digitalisation, which didn't render existing industries instantly redundant, unlike previous shifts such as the move away from horse-drawn carriages and manual sewing in the wake of industrialisation. Consequently, established industries have been able to resist and hinder the reforms necessary for a comprehensive transition that would maximize the advantages of digitalisation.

In an interview in the Belgian daily newspaper De Tijd, Perez believes that the coronavirus pandemic can be the crisis that can ultimately force the world to go through a paradigm shift in digitalisation, with a greener society and increased prosperity as the outcome.

Introduction

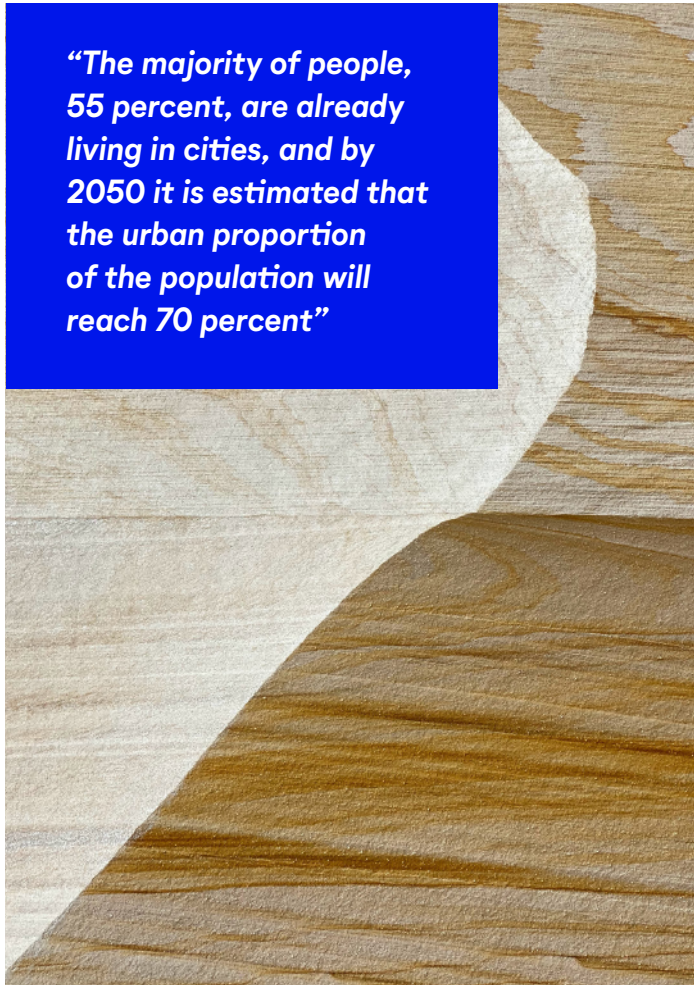
How will our cities meet the demands for sustainability and function in a time of continued urbanisation and dramatic climate change?

The majority of people, 55 percent, are already living in cities, and by 2050 it is estimated that the urban proportion of the population will reach 70 percent (UN World Urbanization Prospects, 2018). Cities need to continue to grow to meet this development, but the way we build and plan cities today, we are unable to meet these fluctuation demands sustainably. The construction and operation of buildings play a critical role in global emissions, contributing an estimated 20-40 percent of the world's greenhouse gases. This significant impact varies based on the methods used for calculation in the construction and real estate sector. When we talk about the climate impact of buildings, the focus is often on operations where a lot can be done in the form of renewable energy, efficiency improvement and automation. But if we are serious about reaching climate goals, we must focus even more on planning, flexibility, materials, and reuse.

The **'Net Zero Carbon Construction'** report by consultancy firm WSP reveals that 87 percent of emissions in the construction sector are attributed to 'capital carbon.' This term refers to the CO₂ emissions associated with building construction, encompassing everything from material manufacturing and transportation to the construction process itself. Critically, WSP calls for a shift in urban planning strategies. Instead of relying on projections of future needs – needs that are evolving more rapidly than the current models can accommodate – the report suggests a more goal-oriented approach to transform urban planning and development effectively.

WSP also highlights the need to build with flexibility in mind, emphasizing the need to minimize disturbances to rock and soil. This fully aligns with the hypothesis we examine in our report, which advocates for the development of flexible, modular buildings built from wood. These structures are designed to eliminate the necessity for traditional cast foundations, representing a significant step towards more sustainable construction practices.

The accelerating climate impact necessitates cities to adapt to changing precipitation, erosion, and sea level rise. In urban development, there's a consensus on the need for flexible cities. Buildings must adapt to changing conditions and needs, promoting reuse and eco-friendly materials to substantially reduce climate impact.



“The majority of people, 55 percent, are already living in cities, and by 2050 it is estimated that the urban proportion of the population will reach 70 percent”



In this report, we will explore at a general level the conditions and possibilities for a roadmap on how to get there, where we allocate a given share of the zoning plan to flexible buildings. The solution we present In In this report, we outline a roadmap for integrating flexible buildings into urban zoning plans. Our proposed solution focuses on modular wood buildings, utilising existing aesthetic and functional adaptations that are often overlooked. While not the sole answer to enhancing flexibility and sustainability in buildings, this approach is frequently dismissed prematurely and deserves more consideration.

Flexible buildings are often seen as a solution to the mismatch between rapid societal changes and slower urban planning. As our lifestyles and society evolve, urban plans are becoming

increasingly detailed to maintain building quality. This specificity can limit a city's ability to meet its citizens' needs within current plans. We argue for innovative approaches, including different building solutions and alternative urban planning methods.

This report has been produced in collaboration between Adapteo, which offers adaptable, premium space solutions for social infrastructure and BSK Arkitekter, an award-winning architectural firm in Stockholm with a strong focus on urban planning.

A time of accelerating change

Over the years, we have seen changes that were largely expected, but that had been predicted to take place 7–10 years into the future.

E-commerce has influenced all age groups across various goods categories. Remote work, now widely accepted, has become a staple in the new normal. According to a Kantar Sifo survey commissioned by Sodexo, the number of people working from home is expected to quadruple compared to pre-pandemic levels.

A special issue of The Economist titled ‘The Future of Work’ corroborates the findings of the Sifo survey from Sodexo, confirming that flexible work arrangements are here to stay. Citing U.S. studies, the magazine reports that American employees wish to work from home

for about half of their workweek post-pandemic. While American employers are more reserved, they still support remote work for an average of one day per week, a significant shift from the pre-pandemic level of 5 percent.

The evolving nature of work will impact more than just traffic patterns; it will also reshape the demand for premises and properties. Furthermore, the rise of e-commerce and new transportation methods, including electric scooters, autonomous cars, and drones, will fundamentally change how we move around. Consequently, it’s likely that many, often recently constructed, office and retail buildings will become obsolete in their current design and function.

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The city as a function of society's needs

Currently, it's challenging to foresee the specific requirements of future cities, even in the relatively near term from an urban planning viewpoint. However, we can already pinpoint key areas that will significantly influence urban development.

One is the climate aspect, city infrastructure, including buildings, must become more sustainable to meet the Paris Agreement's climate objectives. Furthermore, social sustainability must be addressed, considering factors like segregation, migratory trends, and the implications of an aging population. Additionally, the digital transformation, sped up by the pandemic, also plays a crucial role.

Despite these imminent changes, our urban planning tools are often so outdated that we end up constructing environments and properties suited to dated needs rather than future demands. In major cities, a decade can

elapse from recognizing a need to completing a building. Thus, we're not truly building for the future; rather, we're constructing for a bygone era by the time shovels hit the ground. The resulting structures are typically highly specialized for their original use, making them costly and labour-intensive to repurpose later. This approach also leads to resource waste and sustainability issues, as relatively new concrete buildings are often demolished and replaced with new ones when needs evolve.

The dynamics and evolution of cities have been continuously studied for nearly a century. It's now possible to classify buildings according to their susceptibility to change using a 'flexibility index.' Residential housing needs are relatively stable, given demographic trends are somewhat predictable. However, commercial spaces, workplaces, and social service facilities are more vulnerable to shifts in societal behavior, technological innovation, and economic fluctuations.

"In big cities, it is often the case that at least ten years passes from the time a need is identified to when the building has been completed. We are not building for the future, on the contrary, we are building for a time that has already passed when the ground is first broken"



Conversely, there are also challenges when temporary measures risk becoming unintentionally permanent. The 2015 refugee crisis illustrates this point. Several municipalities opted for modular structures with temporary permits to address urgent housing needs. However, these expedited solutions often lacked the typical residential environment standards, leading to new living areas without adequate recreational spaces or local amenities.

Erik Stenberg, senior lecturer at KTH's School of Architecture, observed these developments while working on sustainable housing projects during that time. He reflects, Overnight, temporary housing was at the top of the agenda for all municipalities. Everything else had to be put on hold. There haven't been many studies into what happened to those homes, but I'd speculate that they're still there, as there's still a housing shortage, and that the deficiencies have, therefore, become permanent".

Erik Stenberg advocates for increased adaptability in the planning and building permit processes. He argues for enhanced flexibility to improve the design and function of even temporary structures, recognizing the possibility they may become permanent fixtures. 'Additio-

nally, Stenberg emphasizes the importance for a more open-ended permitting process, one that doesn't require precise details from the outset because the specific reusable materials available may not be known in advance. He calls for a permitting framework that accommodates this level of flexibility.

"If we're to bring more reuse into construction, where it can be partly about reusing modules, but also about individual building elements such as ventilation pipes, for example, we must allow flexibility in the actual design. You cannot apply for a building permit today for something that you don't yet know exactly what it looks like, because you don't know which elements are available for reuse yet. We need a process with a more spacious framework."



A vision of a more sustainable and future-oriented city

The current, largely traditional approach to urban planning is not equipped to handle the swift and evolving demands of modern cities, nor is it sustainable.

To address the future's uncertain needs and the critical goal of advancing sustainability in construction and real estate, urban development must be restructured to incorporate greater flexibility and adaptability. It is recommended that a portion of zoning plans—specifically, 10-20%—be dedicated to flexible structures.

“A “Lego city” in which modular solutions can be quickly adapted or moved is an extremely attractive model from several perspectives”

Various models for such flexible buildings exist. As an example, one of the contributors to this report is Adapteo, a company specializing in flexible real estate, which showcases modular building units as a viable option. Contrary to the crude image of portacabins, modern modular buildings have greatly evolved. Today's flexible buildings are of such high quality, they match traditional permanent structures in functionality, interior comfort, and visual appeal. They can be easily scaled up or down, altered, disassembled, relocated, or repurposed according to shifting needs, usually without causing long-term damage to the land. As a sustainable choice, they offer a versatile and circular alternative to conventional static constructions.

Imagine a city where the urban landscape is moulded by the evolving needs of its inhabitants, workers, and visitors. Such a city would be vi-



brant and responsive, with the ability to adapt its spaces to current demands. Unused office spaces could be repurposed into early childhood education centres, unused shops might be reimagined as community gathering spots, and senior living facilities could be re-designed to support a more active lifestyle for the elderly. Parks could serve as pop-up vaccination sites, preschools could double as open-air eateries in the warmer months, and hybrid workspaces could accommodate a workforce that increasingly opts for remote work.

Karin Lindblad is a sustainability strategist at Sweco, argues for an inventive shift in urban planning to advance sustainability efforts. *“There’s a need for a system shift throughout the entire chain, from regulations to planning work and demand. Today, we see that a shift in demand is driving renovations, which is driving climate impact. The fact that we are demolishing and renovating buildings as societal needs shift, is a waste of resources. A ‘Lego city’ in which modular solutions can be quickly adapted or moved is an extremely attractive model from several perspectives, not only to prevent climate impact, but also to deal with the climate effects that we already know will come.”*

One pressing concern is the increasing need to mitigate flooding as precipitation patterns intensify. *“High levels of run-off from hard ground, such as paved or asphalted surfaces, result in overloaded surface water systems, generating major costs for property owners. We are already seeing a high demand for more green spaces in existing urban environments to counteract this, and the demand will increase. This model could be used to offer adaptability for challenges that are still difficult to imagine.”*

“Today’s flexible buildings are of such high quality, they match traditional permanent structures in functionality, interior comfort, and visual appeal”



The need for a reformed urban planning process

What's required for a transition towards flexible urban construction? To begin with, we must challenge traditional thinking. The outdated image of flexible buildings as portacabins stems from old prejudices and lower standards.

The status quo of resource waste will persist without stakeholders demanding flexible options that match the aesthetic, quality, and functionality we expect from permanent structures. Despite the potential for sustainable urban construction, public sector demand is lacking.

Bureaucratic hurdles further complicate matters. Although the Swedish Planning and Building Act allows for zoning plans to be completed in as little as six months, municipalities often prolong this process to ensure the final product matches their initial vision.

We propose that municipalities embed flexibility into the urban planning process, allowing each new development to adapt to society's swift changes. Planning for adaptable, movable, and reusable buildings will foster the innovation of sustainable urban construction solutions. This flexibility ensures that the built environment can meet society's fluctuating needs, balancing immediate financial returns with long-term sustainability.

Access to data via digitalisation gives us improved predictive power over societal shifts, enabling us to draft more effective contingency plans. Without policy reform, urban planning will fail to match the pace of societal evolution. We advocate for a dual approach: maintaining the stability of long-term urban planning while introducing a dynamic and adaptable element to act as a buffer for change.

“Planning for adaptable, movable, and reusable buildings will foster the innovation of sustainable urban construction solutions”



A sustainable city is possible

We call for an innovative approach to urban design that prioritizes adaptability and true sustainability. This involves building with a heightened awareness of environmental impact, social considerations, and the evolving necessities of society.

Our recommendation is to allocate 10 to 20 percent of urban development plans for flexible structures. These buildings would blend seamlessly into the cityscape while providing the versatility that current, predominantly static buildings cannot.

With a readiness to embrace change and a comprehensive reform of both urban planning and its associated bureaucracy, stakeholders—municipalities, policymakers, companies, and architects—have an exceptional chance to foster more socially sustainable, climate-friendly, and adaptable construction in our urban areas.

The pandemic's impact should be seen as a preliminary test and, optimistically, as a catalyst for essential transformation. As the authors of this report, it is our hope that it will indeed trigger the needed paradigm shift.



Lina K Wiles

Chief Sustainability Officer
Adapteo Group



Lise-Lott Söderlund

VD och chefsarkitekt
BSK Arkitekter



Welcome to Adapteo

Adapteo is a leading flexible real estate provider in Northern Europe. We build, rent out and sell adaptable buildings for schools, daycare centres, care, offices, accommodation and events.

Our society is facing significant changes in the coming years, and regardless of the challenges the future may bring, we believe adaptability is the best solution. With our buildings, we can transform, repurpose, scale up and scale down in a matter of weeks by using a modular and circular building concept.

Our buildings can be used for a few days or indefinitely, always optimized for current needs. This is how we build adaptable societies.

Feel free to call and discuss adaptable solutions with us at **+46 8-590 994 40** or send an email to **info@adapteo.com**

Best regards,
Adapteo

Would you like to know more? Contact us!



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