Longue Durée - A matter of time

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The existence of a long-term past impacts present and future design through the existence of built spaces and long-standing formal or informal institutions. The concept of path dependencies, developed in the political sciences as part of the concept of historical institutionalism (Sorensen 2015, 2017), highlights the role that decisions of the past have on decisions for the future. This impact is particularly significant when it relates to structures that require extensive investment and are designed to last for a long time. The concept of the Longue Durée, introduced by Fernand Braudel (Braudel, 1968), emphasises the relationship between natural conditions and human interaction, creating specific geographies. The concept supports an approach based on understanding earlier typologies and development patterns. It allows for contextualised understanding and avoids uninformed copying and pasting of designs from the past into current cities. It allows designers to identify critical junctures in previous decades and understand the underlying political, social, and cultural contexts of contemporary redevelopment. This influence across time is particularly strong when it has been solidified into concrete or built into extensive and expensive infrastructures, including for water management or ports.

The passage of time is also central to the design and use of infrastructures. From planning to construction and ultimately to rebuilding, each spatial intervention is a reaction to the natural environment or the cultural setting in which it is situated. Sociologists have argued that our understanding and perception of time are socially constructed. Time is lived and understood differently depending on whether it is experienced by individuals in the everyday or applied to economic, political, or legal processes, which may take years or even decades. In spatial planning and design, professionals constantly deal with places designed based on values and concepts of the past. The form and function of these structures depend as much on technological innovation as on institutional frameworks and socio-cultural contexts. Faced with multiple urgencies, humanity must look both back and forward. Careful assessment of the past can also provide insight into the workings of ecosystems in the past and inform future living strategies (Hein et al. 2023). We need to learn from the mistakes of the past that have brought about the current situation and understand how long-term investments in infrastructure form the foundation for today's changes.

Design processes also require awareness of the multiple layers of time embedded in nature (seasons, day-night) and cultures (working hours, traffic jams), and the time it takes to bring a project from initial sketches to completion. Each city has its own rhythm of change, as argued by Dietrich Henckel and Susanne Thomaier (Henckel, Thomaier, 2013; Zhu, Hein 2020). Whether a city or territory adapts quickly, largely depends on the relationship between different groups within the city and how they negotiate time. The various stakeholders are in constant dialogue (or struggle) over space – a dialogue that often continues over decades or centuries and is written into local institutions and processes as well as into the built form. These long-term histories and experiences often allow cities and territories to adjust to changing conditions as they prioritise, distribute, and organise their resources.

Path dependencies can have both positive and negative impacts. They can form the foundation for resilience, as actors and the built environment maintain structures during critical junctures. Conversely, they can also be a foundation for an inability to change. By studying the history of a place, one gains insight into the socioeconomic forces that have shaped this place over time (Hein and Hanna, 2023). Awareness of historical paths can help designers provide solutions that produce changes and help readers understand where current conditions may obstruct innovative solutions. The particular relevance of time to the built environment is also reflected in the disciplinary attention to history for spatial planning and design. History and historiography are important ways of positioning spatial planners and designers. Recent decades have seen increased calls by historians for the critical use of history in the field, as discussed in the journal Critical History Studies,1 which has also prompted a rethinking of the role of designers in relation to power. How can spatial designers be aware of the historical contexts of the buildings and landscapes they work in and ensure they do not perpetuate historic, colonial, and other exploitative practices?

Designers need to acknowledge future needs and potential developments. To achieve this, we need to develop adaptive strategies in line with the theory of change that pinpoint a long-term perspective and identify intermediary development steps. Such an approach requires an awareness of values and their dynamics and changing perspectives of space. Adaptive histories consider the passing of time. Adaptive strategies can facilitate new spatial configurations that go beyond fragmentation, encourage new collaborations at the scale of the city and the region, and promote a profound shift in the governance structure (Hein, Van Mil and Azman, 2023). This thinking requires an openness to potential disasters, from pandemics to wars, and the ways in which the built environment may need to respond to dynamics of change and even temporalities of trauma. Such adaptive strategies need to question the longevity of infrastructural and other interventions. Design studios in practice and in educational contexts need to acknowledge these path dependencies and the role of history.

Projects in the built environment need to include historical developments, understand the current situation, and anticipate potential future directions. The built environment is the outcome of a series of decisions made in the past that also constructs the legibility and logic of space. Learning from the past can assist us in understanding and shaping current challenges based on the recognition of patterns and understanding of path dependence. Within this, the fact that related elements operate on different time scales needs to be taken into account.

Flood Risk

The Longue Durée in managing flood risk within the Dutch context was analysed by Van der Ham (2002) and Van Dam (2010). Van der Ham (2002) establishes a framework for analysing the Dutch landscape based on water-state historical criteria. He references Bijhouwer (1977), Het Nederlandse Landschap (The Dutch Landscape), the *Atlas van Nederland* (Atlas of the

Netherlands, Piket, 1987), Van de Ven's Manmade Lowlands (Van de Ven, 1993) and *The Making of Dutch Landscape, a historical geography of the Netherlands* by Lambert (1971), to formulate the following phases:

I. **Natural water state** (until around 1000): Nature over culture, coastal development, young dunes, thick peat layers, free rivers, and wild grounds.
II. **Defensive water state** (1000 – 1500): Territory exploitation leads to protective measures, land loss, subsidence, sea and river dikes, mounds, dams, ditches, waterways, and sluices.
III. **Offensive water state** (1500 - 1800): Aggressive diking, reclamations, windmills for pumping, and large-scale land exploitation.
IV. **Manipulative water state** (1800 – present): intervention in systems, including new riverbeds, redefining rivers, damming larger waters, artificial water levels, and the loss of old structures

These phases are marked by a certain attitude and technology used to manage the wet conditions of the Dutch territory. On a larger scale, Van Dam (2010) identifies the 'Amphibious Culture', the tradition of cultural adaptation to a landscape riddled with waterways: rivers, canals, ditches, and lakes. In this culture, transport is predominantly by ship: every farmer or city merchant is also a shipper. The boat is simply the principal means of transport, facilitating amphibious behaviour as people navigate between wet and dry parts of the landscape. The land features are man-made, utilising the slight elevation difference between sea and average field levels. The land is compartmentalised with interior dikes, and many settlements are situated high enough above the field level to avoid flooding when dikes break. Daily life is disrupted during flood disasters, but people continue to function in this partially submerged environment. Like islands in the landscape, cities play a crucial role in providing resources for restarting terrestrial life, offering refuge, labour, food, technological expertise, organisational capacity, and financial capital (Van Dam, 2010).
Understanding the cultural aspects of the Dutch attitude over time is important in relating it to the geography and how flood risk management has evolved to the present day, where efforts are made to reintegrate natural systems. This is exemplified in the project ***The Rhine River Mouth as an Estuary*** (P 72), which explores how to re-adopt the natural system in synergy with economic developments for a safe and sustainable future.

Another aspect of flood risk and its Longue Durée is highlighted in the project ***Japan Tsunami Reconstruction in Yuriage & Otsuchi*** (P 92), where the irregular and extended intervals between tsunamis cause people to forget about this natural hazard over time. In this case, the Longue Durée pertains to the historical approach to tsunamis that occur far apart in time. The study revealed that despite the risks, people have consistently rebuilt houses in the flood risk zone. Students in both groups addressed this by creating spatial interventions as reminders of the risks and programming the flood zone for temporal functions.

Another interesting way to consider this Longue Durée perspective is by adopting long-term tactics rather than focusing on singular projects. The Long Now Foundation, a nonprofit organisation established in 1996 to promote long-term thinking, exemplifies this approach. Their work fosters imagination on a timescale spanning civilisation – the next and last 10,000 years, a concept they refer to as 'the long now.[2] This perspective is evident in the ***Living Lab Building with Sediment*** (P 102), where integrating the natural system has become part of the strategic approach.

1. www.journals.uchicago.edu/toc/chs/current
2. https://longnow.org

Infrastructure Innovation

Adhering to the Layers Approach, as outlined by De Hoog, Sijmons, and Verschuren (1998), is a systematic method widely employed in contemporary Dutch spatial planning and design, in which infrastructure serves as the mediator layer between the substratum and occupation. This concept, rooted in Ian McHarg's Ecological Inventory Approach (McHarg 1967), colloquially referred to as 'the layer cake' by his students (Whiston Spirn 2000), was introduced to the Netherlands by Meto Vroom, a professor of landscape architecture in Wageningen. It was further developed as a strategic planning concept in the 1990s (de Hoog, Sijmons, and Verschuren 1998). The original approach delineated three interconnected strata – occupation, network, and substratum layers – that constitute a spatial system encompassing various rates and types of potential and actual spatial development and change (see Figure 12). The authors envisioned the model as a swift and straightforward strategic planning tool, explicitly not designed to describe or explain the environment and its uses.

The Longue Durée in infrastructure innovation is inherent to the object: these constructs are built to last and impact the space over extended periods. This concept is explored in the ***Highway X City*** project (P 118), which examines how new mobility technologies, such as self-driving and electric cars, redefine the relationship between highways and cities, prompting a redesign of this historically evolved interaction. In projects such as the ***Sustainable E-bike Charging Station*** (P 138) and the ***Biobridge*** (P 148), the Longue Durée is captured in the concept of renewability – where energy or materials that are renewable and sustainable do not overburden resources or produce environmental waste over time.

	Object	Planning Horizon	Role of Nature
Layer 3	Occupation Living Working Recreation	T=10 – 30	Nature as a Side-effect
Layer 2	Networks Nodes	T=30 – 100	Nature as a Goal EHS
Layer 1	Hydraulics Sea-level rise Groundwater Subsidence	T=50 – 500	Nature as meens

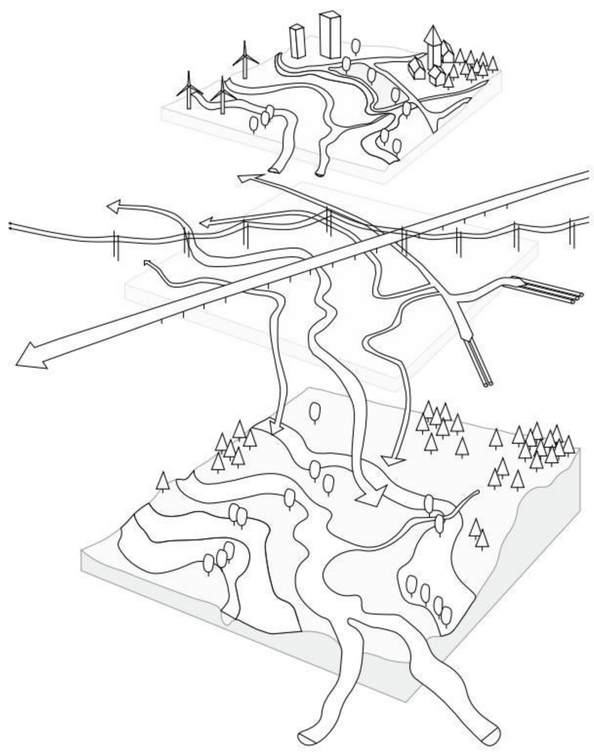

Figure 12: The Layers Approach by De Hoog, Sijmons, and Verschuuren (1998)

Sustainable Urban Development

The Longue Durée in sustainable urban development is encapsulated in the concept of durability that is integral to sustainability, as articulated by the Brundtland Commission in a widely accepted definition: "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (United Nations 1987).

This aspect of Longue Durée is evident in the ***Intelligent Subsurface Quality*** project (P 184). The project acknowledges the longevity of certain natural and human-made structures, arguing that they should be considered valuable elements in development projects. Urban systems leave artefacts in the subsurface, providing insights into historical contexts and influencing redevelopment plans in terms of risks and opportunities. Furthermore, the water and geomorphological systems in the subsurface serve as enduring spatial elements. Man-made systems, such as networks of cables and pipes, contribute to the Longue Durée by shaping urban layouts that are challenging to modify. These projects have facilitated the creation of a community of practice at TU Delft and its partners, offering tested instruments and knowledge for practice and education. They also highlight the importance of speculative design in envisioning the impact of future developments on urban operations and raising awareness among municipal participants about the significance of subsurface elements for surface development.

The ***City of the Future*** project (P 174) addresses the concept of Longue Durée, emphasising long-term thinking and gradual changes in various aspects such as mobility, energy, and circularity, all impacting the use of public space. The results underscore that transitioning systems and redesigning public spaces, including infrastructure, are not quick fixes but processes that take decades and involve multiple generations. Just as the effects of climate change unfold gradually, social processes also require time to gain momentum, political support, and professional expertise. Changing the built environment is a slow process, leading to incremental, specific, and small-scale changes, with a new sense of place often taking generations to emerge.

Ports & Hubs

The Longue Durée is highly relevant for infrastructural hubs, such as railway stations, airports, and ports. These structures are large in size and take a long time to build. They require long-term investments and planning and can shape urban form and function over decades and even centuries. These nodes also depend on other large infrastructures and spatial developments in their vicinity. Decisions on the transfer of goods and people through infrastructure nodes – stations, ports, or airports – impact nearby lived-in urban spaces and other built-up and natural areas. Often considered primarily as engineering structures, infrastructures serve effectively as hidden designers and are key to changing territories. Transport activities can be both supportive and detrimental to the nearby cities and territories. As Hein and Schubert have demonstrated through port- and city-related urban developments in London, Hamburg, and Philadelphia, historical institutional and governance dynamics impact design over the centuries (Hein, Schubert 2020). The form and function of transport infrastructure and their relationship to cities provide a vivid example of the power of path dependencies as spatial conditions, institutional settings, and local values inform future decisions. Common respect for temporalities is crucial in healthy and just development and is a condition for planned adaptation to climate change (Henckel et al. 2013). Infrastructure construction engages with both the natural and cultural environment and evolves in relation to the political, economic, or institutional conditions in which they are located. The transport structures themselves have a major impact in and beyond cities.

The ***Role of Stations*** (P 222) project examines the potential of stations beyond their traditional role as mobility hubs, focusing on their integration into urban development. Underused stations in peri-urban areas can benefit from targeted design interventions.

Collaborations among diverse stakeholders, both public and private, are key to developing new solutions from a long-term perspective. The LDE PortCityFutures Center has undertaken this challenge, aiming to explore the multiple forces that shape these spaces and propose spatial planning and design measures to enable the port, city, and region to evolve jointly.

The project ***PortCityFutures Dualities*** (P 232) explores the dynamic relationship between ports, waterfronts, and cities, which operate in different time regimes. This ongoing dialogue, or struggle, over spaces in and around the port is a critical area of competition between economic and citizen time, influencing the built environment significantly. Shipping elites have historically imposed their schedules on these urban areas, affecting the daily lives of shippers, workers, tourists, and residents in diverse and sometimes non-democratic ways. Adapting urban areas to the evolving needs of the port requires flexible political and economic strategies, particularly in selecting which areas within the port, city, and metropolitan zones should be modified. This rapid adaptation also affects the city's spatial dynamics, transforming different parts at varying speeds. Despite a shift away from traditional city connections, ports still rely heavily on the broader metropolitan support to thrive. Emphasising mutual respect for different temporalities is key for just and effective urban development and is crucial to adapting strategically to climate change.

The PortCityFutures Dualities' exploration of the relationship between ports and cities was presented as part of the exhibition ***The Port and the Fall of Icarus*** (P 242) in a public installation made of corten steel on the Riva dei Sette Martiri, Venice. The project examined the architecture of logistics, providing a transdisciplinary platform for exploring the changing paradigm in logistics. The reference to the character from Greek mythology who fell to his death when the sun melted the wax holding his wings together emphasises the longue durée. Like all Greek mythologies, this tale represents human behaviour that essentially remains unchanged over time, yet profoundly affects the environment. Linking this historical figure to future scenarios in terms of change magnitude and pace, the modes of coexistence required, safety and reliability concerns, and operational, environmental, and energy performance connects long time with space.

The ***Airport Technology Lab*** (P 252) focused on aviation as another major transport node, aiming to minimise environmental impact and transition to sustainable aviation. Airports are the focus of this project, with students involved in several of its elements. Multiple approaches and data sets were used, with input from the behavioural and cognitive sciences. A concluding point was the need to develop new approaches in response to the development of alternative fuels, such as liquid hydrogen and electric-powered aircraft.

Colophon

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