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Novel High-rise Typologies – Towards Vertical Urbanism



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Abstract

How can we translate the urban qualities of the horizontal city into the vertical tower?

Here, we present four projects that embody design strategies to address this issue. The aim is to show how a strategic approach towards the integration of tall buildings into the urban context can lead to novel urban high-rise typologies.

Keywords: Vertical Urbanism

We live in a rapidly urbanizing world: By 2050 almost 70 per cent of the world's population will live in cities. Around the world, the metropolises densify and within them, the average height of buildings increases exponentially. As a result, high-rise buildings will become constituent elements of our future cities.

While historically our cities are horizontally organized systems, this new vertical expansion poses a new set of challenges. Due to their size and number of inhabitants, high-rises can be considered as city districts themselves. On the contrary, their spatial qualities and the way they are interconnected with the urban fabric that surrounds them, disintegrates them from their context. If this issue is not addressed, an increasing number of inhabitants will live and work in city centers, yet detached from the urbanity they chose to live in before. Therefore, we are asking:

How can we translate the urban qualities of the horizontal city into the vertical tower?

Here, we present 4 projects that embody design strategies to address this issue. The aim is to show how a strategic approach towards the integration of tall buildings into the urban context can lead to novel urban high-rise typologies.

Integration by Program

The city is public. It is this paradigm that challenges the vertical expansion of the city. All of the activities and experiences that we associate with urban life today are directly connected to the fact that we can participate in, and are a part of, the city life that surrounds us. The Agora - the ancient "place" for trade, exchange, markets and politics forms the heart of what can be considered as the essence of urbanity, a void that is utilized and "programmed" by its occupants depending on demand.

In order to stimulate the vertical expansion of our cities, we need to aim at defining equivalent voids in our high-rise buildings, voids that are public and can be utilized in a flexible manner. This tendency can be observed when looking at abandoned buildings in functional urban fabrics: Warehouses become markets, Stores become galleries and Parking facilities turn into Event locations.

This re-use and re-programming of abandoned buildings is a key factor in the gentrification process of entire districts. The creativity and active participation of locals is a central aspect of our current perception of urban life. Technological trends have only accelerated this process, as users can instantly organize themselves and communicate across numerous (public and private) platforms.

When designing a new building, it is difficult to predict certain behaviors of future inhabitants. This is not only the case when introducing voids in fully functional buildings, but can be observed in almost every space: An example of such new interpretation on the small scale can be observed when looking at flats. Humans seek to individualize their surroundings by moving furniture, changing functions and switching rooms accordingly.



Figure 1. Analysis of Voids in Haikou Tower (Source: HENN Architekten)



Figure 2. Skylobby and Vertical Transport (Source: HENN Architekten)

As the prediction of user behavior by the architect is limited, the architects' intentions are often re-interpreted and sometimes ignored. On larger scales this unpredictability offers opportunities, by leaving certain parts of a building "un-programmed". While this un-programmed space or void can be considered as a lack of determinism, it offers flexibility in the future use of a building (see Figure 1 and 2). This is a feature often asked for in office environments, where potential tenants seek to accommodate a variety of work environments and scenarios that such a flexible space can offer. This flexibility offers opportunities for relevant future "determined" programs at a later stage in the life-cycle of buildings; making them more adaptable to the behaviors, needs and interpretations of the people who use them. For example: lobbies and circulation spaces offer potential for this type of flexible and informal space. It is not uncommon that news passed in hallways travels quicker than that circulated in official communication channels such as intranets or emails. It is specifically this kind of informal exchange that captures the Zeitgeist of forward thinking companies. The human capital has been identified as a key to successful business. This capital extends beyond mere skills and expertise, towards understanding basic human needs such as communication to be a driver for innovation. By implementing design strategies that not only allow, but potentially amplify this human notion of communication it will help to release the creative, participative potential of the individual. What if we open the communicative spaces such as lobbies, hallways and circulation spaces towards the public - even in highly controlled

environments such as high-rise buildings? Security concerns prevent a truly public vertical building that “belongs” to a single entity such as a company. But parts of these buildings can be made accessible and used for public events such as product launches, concerts, lectures and other events.

At HENN, we have implemented this strategy in various scales and contexts, ranging from the Volkswagen Autostadt in Wolfsburg and the Gläserne Manufaktur in Dresden, where highly controlled programs such as car assembly and delivery are placed next to public and semi-public functions. As a matter of fact, the Gläserne Manufaktur, the production plant for the VW Phaeton is placed in the urban context of Dresden as a transparent architecture to specifically attract public attention. During its lifecycle, the lobby of the building has been used as a concert hall, a lecture room and numerous media events have been hosted here.

We are aware, that this kind of (semi-)public usage is not yet a truly interactive model of participation similar to that of a city and its inhabitants. Our efforts in this field continue and are constantly being expanded as the understanding for the benefits and necessities of such programmatic flexibility grows between all involved parties in the process of designing and realizing a building.

The simulation of (mass) movement in case of emergencies (fire etc.) has gained attention in architectural planning for the design of stadia and transport hubs. While this strategy has largely been developed to prevent poor design decisions, we see a potential to extend the real-time analysis of agent-based simulations in order to predict user behavior. The intention is not to gain control of the space, but to identify regions that could benefit from un-programmed spaces in order to create (more) communicative spaces. While the simulation of user behavior remains a complex task with a lot of factors that have to be taken into account, we have identified other, related simulation strategies to be promising. The simulation of visual fields through isovists¹ (Turner, 2001) for example will help designers to understand what an inhabitant can see from a certain point of view (see Figure 3). This knowledge can help to create zones of communication, for example by maximizing the views into public meeting areas when leaving the elevator. Recent developments in Virtual Reality such as Oculus Rift and others are currently being utilized by our teams to test these scenarios in virtual 3D models. The goal is to find a high degree of predictability in the use of the building, by overlying analytical strategies

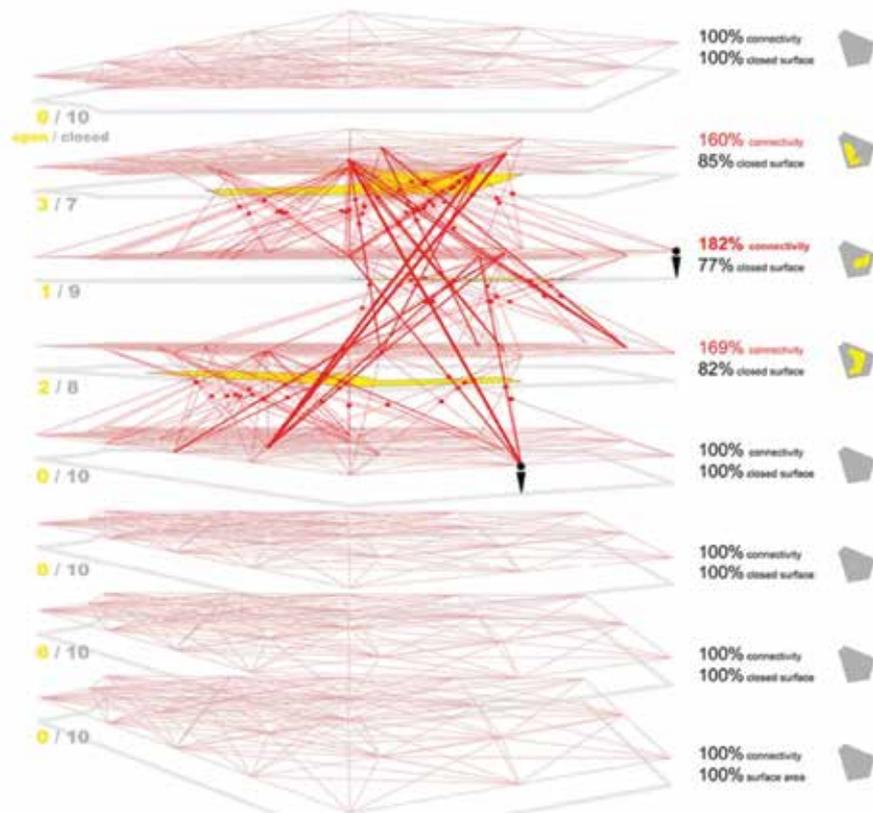


Figure 3. Visual connections (Source: HENN Architekten)

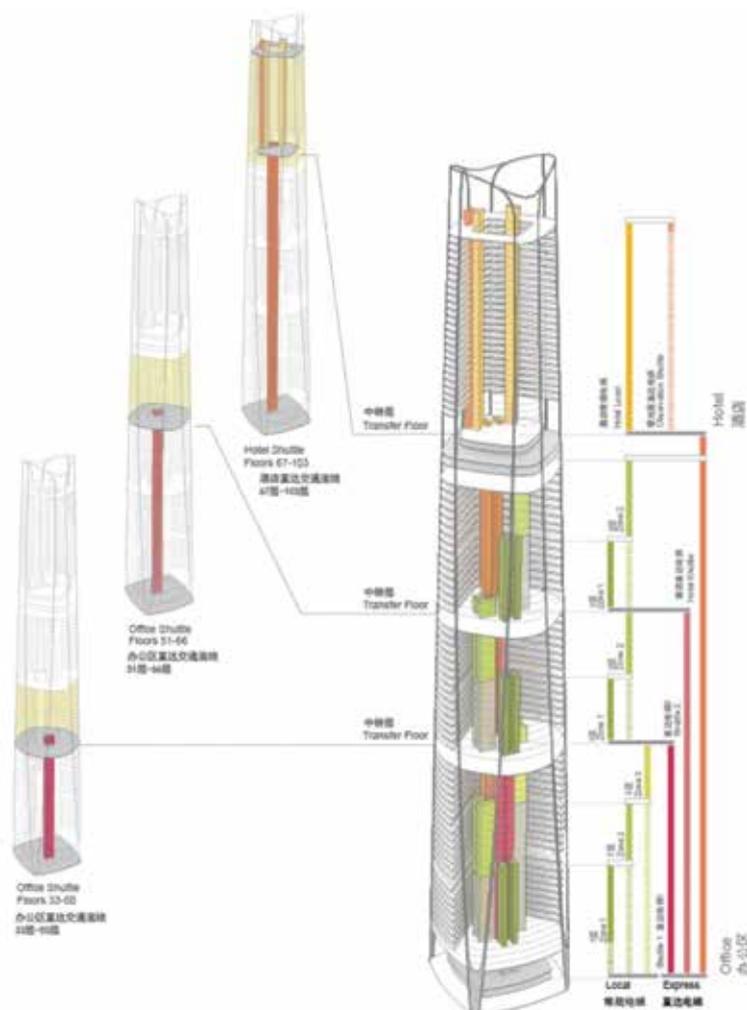


Figure 4. Vertical Transport (Source: HENN Architekten)

1: A single isovist is the volume of space visible from a given point in space, together with a specification of the location of that point.

(isovists) with simulation strategies (agent-based user behavior, Virtual Reality).

Integration by Infrastructure Circulation

As mentioned before, circulation spaces are

somewhat undefined programmatically. While in the case of hotels and offices, hallways have often been considered as a “waste of space” the potential that these zones offer to become places for communication is inevitable. Therefore we understand the circulation space, not only within a

building, but from your home, through the commute and doorstep all the way into the building as a key experience. The seamless transition between these spaces through time is a key feature that we are addressing. In a society where boundaries between what is public and private, what is considered work and leisure is also constantly dissolving, and we need to address and articulate this architecturally.

In the case of high-rise buildings, the context of site and the link to infrastructure such as railways and public / underground transport and streets have always been important. Nowadays we seek to extend this existing network, rather than just “connecting to it”. From a network point of view the result may look the same, but the strategy differs profoundly: where a mere connectivity implies a passive strategy, that only seeks to make use of existing infrastructure, an active extension therefore reaches further: It aims to become part of the network, by dissolving the boundaries. This seamless extension of commuting into the building poses an immense challenge, as anybody, who has ever been inside of an elevator knows: The atmosphere of the spaces that we travel in informs how we behave. While the seamless transition from car to elevator will be addressed and potentially solved in the future from a technological standpoint, it remains uncertain, how we can address the necessary change in human behavior within these spaces. An approach we have identified is to blur the boundary between public and private modes of transportation and travel. If your “journey” within a building is similar to your experience within a city, potentially your experience of the building is stronger related to your experience of urban qualities. In other words: If you can stroll through a city and end up in a building, the building might be considered as part of the city. As we aim to integrate our buildings more into the urban contexts on which they reside, blurring the boundaries between modes of transportation and dissolving barriers in the transition between spaces might be one of many suitable approaches (see Figure 4, 5, 6 and 7).

While the high-rise building has been enabled by the escalator and the elevator, the impact of technological innovations on the overall typology has faded. Similar to the airplane, quantum steps in the evolution of building technologies have led to a certain equilibrium state where optimization of features has taken over from radical changes. The change of modes of transportation in our society is a fact. The repercussions that will occur from car sharing, car elevators, e-cars and bikes on



Figure 5. Skybridges (Source: HENN Architekten)



Figure 6. Skylobbies (Source: HENN Architekten)



Figure 7. Vertical Gardens (Source: HENN Architekten)

Integration by Experience and Atmosphere

We have referred to the atmosphere of the elevator in the previous paragraph. This is just one example of an atmosphere that diametrically differs from any atmosphere that one would relate to an urban experience: We think of pedestrian zones, commute, sunlight, noise, smell, light. In short: The rich environment and input that any city provides to stir human communication, creativity and experience is difficult to translate into sealed interiors. While this observation might seem trivial at first it poses one of the biggest architectural challenges in the development of vertical cities. We need to understand that in order to truly extend our dense urban areas into vertical ones, we need to find ways to extend our experience thereof as well. While in the previous paragraphs we addressed program (or better: the absence thereof) and circulation as 2 key strategies, the third one is to address the experience. While attempts to mimic the flair of entire cities such as Venice in malls can be considered a failure, there is something to be learned from these hermetic indoor experiences that are created. We need to carefully transpose urban elements into new (vertical) contexts. Not all elements that exist in an urban fabric can or should be translated. Rather elements that have been identified as catalysts for urban life, such as the plaza or marketplace should be the focus.

The sky garden has become an integral feature in the design of high-rise buildings. We aim to understand the sky garden as an extension of the public park. If they can be reached by the public, they have the potential to become zones of interaction and rest within highly densified urban contexts. Not only do plants produce oxygen and produce shade. They are living organisms that can enrich our experience of building interiors by bridging the gap between the controlled, cultural space and the uncontrolled, natural environment. Rooftops and viewing platforms are examples of exterior spaces, where the weather can be observed and experienced. It is not only the view of a building's surroundings that draws people onto these platforms. It is also the ability to experience the climate at the top of the building that is unique.

Sky lobbies and viewing platforms are considered as features of a high-rise building. We aim to understand them as possible extensions of the urban fabric into the vertical.



Figure 8. Car Tower Wolfsburg (Source: HENN Architekten)

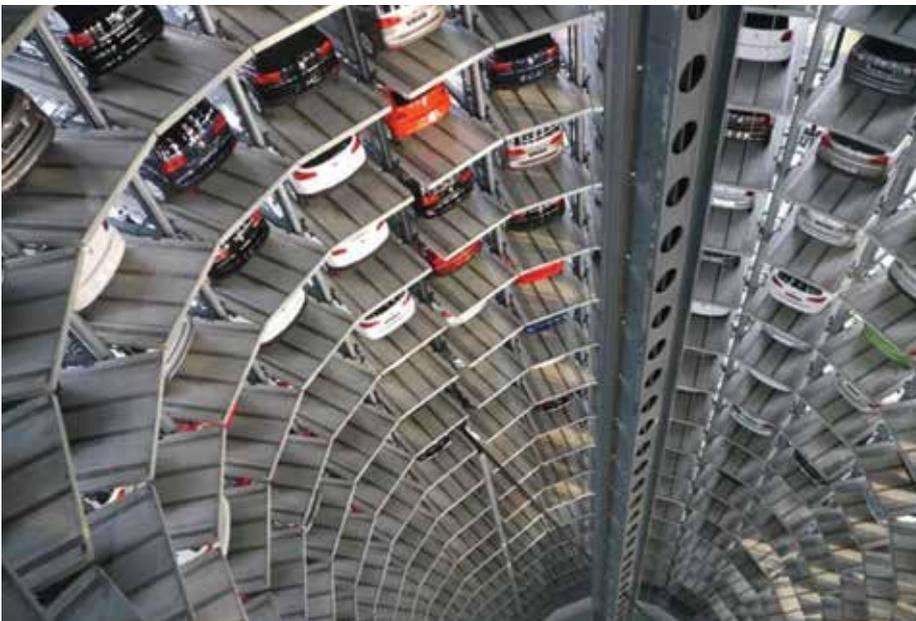


Figure 9. Car Tower Wolfsburg (Source: HENN Architekten)

high-rise buildings remain speculative. The potential of 0-emission transport to extend into the building is obvious. While HENN has been designing for and with the leaders of the automotive industry, we aim to include these novel technologies into our designs and test them wherever possible. For the Autostadt we incorporated a car tower that consists of robotically controlled car elevators without shafts in the late 1990's. Our expertise in this field has led to interesting competitions and projects (see Figure 8 and 9).

For the future we aim to further facilitate technological advances such as car towers, especially regarding the transportation modes of individuals, in order to blend outside and inside spaces. Another example of such a space is the expansion of the Forschungs und Innovationszentrum (FIZ Future) for BMW. The project is a winning entry for a

multistage international competition. FIZ Future looks at the design of the future master plan and extension of the BMW Research and Innovation Centre (FIZ). People working in a huge variety of specialist fields will need to meet and pool their thoughts to create the innovations of tomorrow. A central axis accelerates movement and provides an enhanced spatial experience to encourage a greater number of such encounters. All cultures of expertise in automobile construction and mobility are always on view. Towards the edges of the campus, this perception reduces and becomes more focused to allow the various specialist fields and disciplines to further develop their ideas. This effect also promotes integration with the surrounding urban quarters. Here, the design of the new BMW FIZ opens up to its neighbors with a park, cafés, leisure and sports facilities as well as a civic center.

Conclusion

The extension of the urban fabric into the vertical poses an immense challenge. We have derived 3 strategic approaches towards this challenge: A) allowing public access to parts of buildings and offer space for communication and interpretation B) extending the urban infrastructure into the building in order to dissolve boundaries C) Blending the atmosphere between inside and outside by promoting green vertical (outdoor) spaces.

We have shown that these approaches have been addressed in the past, but these efforts remain punctual. By relating these interventions to our understanding of the urban fabric, we aim to define a new awareness thereof. If our buildings have the size of small cities, why shouldn't we consider the building as a part of the city that surrounds it?

Case Studies

Twin Towers (Foshan, CN)

To increase cooperation between German and Chinese companies, and grant easier access, particularly for small and medium-sized enterprises to enter the People's Republic Market, a new service zone is being created in the industrial metropolis of Foshan in southern China. The Sino-German Industrial Service Platform is the architectural starting point for this development area. Situated on the important north-south axis and well-served with transportation links, some 200,000 square meters of office space for German and Chinese companies will contribute to future knowledge transfer.

The design concept is based on two unpretentious volumes which stand adjacent to one another and symbolize the bond between the cultures. The buildings are symbolically interlocked and set in a staggered arrangement, allowing spacious connecting levels, which break up the vertical aspect and offer generous meeting spaces over several floors for the companies in both buildings. Their depth increases successively towards the podium

story and due to the planted outdoor areas and short internal access by escalators, a bustling transitional zone between the office floors and the surrounding public space is created. This effect is enhanced by a shopping center in the bottom story which subtly integrates the neighboring park into the building's use. The special feature of the building envelope skin is its transparent glass façade at the "interface" of the two towers, which allows the interior events visible to an outdoor viewer. The remaining sides set themselves apart from this openness with an increasingly dense opaque surface emphasizing the symbolically staggered shift of the buildings

Haikou Tower (Hainan, CN)

The Haikou Towers are projected to become the heart of the new Central Business District of Haikou, the capital city of Hainan, a tropical island in the South China Sea. The master plan comprises an ensemble of 10 towers ranging from 150 to 450 meters in height with an overall building area of 1.5 million square meters. The proposal's centerpiece is the 450 metre high middle tower. Form and structure have been directly influenced by the program requirements and the drive for a highly efficient structural scheme. The occupant's needs for large and flexible office spaces on the lower floors and an unobstructed view from the hotel rooms on the upper levels have led to a shift of the cross-bracing system at the boundary between the two functions.

The shift in systems occurs at the hotel lobby area in the form of a large outrigger truss. This truss is purposefully exposed and integrated into the architecture to articulate a multistory high atrium on the upper floors and to provide a clear distinction between functions and structural systems. The building height of 450 metres requires an intelligent, highly performance building envelope. The facade system reacts to differing sunlight conditions depending on the buildings orientation. The proposed facade

achieves this with a panel unit system which is divided into two parts - an upper opaque part that blocks sunlight and a lower transparent part. The opaque spandrel panels provide both external shading to reduce cooling loads and energy production by a photovoltaic coating on the south facade. The transparent glass facade in the lower part maximizes the use of daylight. The division in each facade units allows folding in and out. The folding angles vary according to the different sun-shading requirements, from north to south, from bottom to top. The continuous differentiation of the facade harmoniously blends with the large-scale structure of the tower.

Autostadt Konzernhaus (Wolfsburg, Germany)

The entrance of the Autostadt Wolfsburg is oriented toward the south. A pedestrian bridge extends the historic city's axis across Mittellandkanal and links the city of Wolfsburg with Autostadt Wolfsburg. It leads directly to the portal of the KonzernForum. As the reception hall of the KonzernForum the Piazza creates the first large space in the Autostadt Wolfsburg. Six high, pivoting glass doors directed toward the south constitute as flat pillars: the gate to the city of Wolfsburg. A further six glass doors to the north create the entrance to the Autostadt Wolfsburg. The doors are vaulted like aircraft doors and tend to be open. This open pillar architecture can be seen as a modern translation of historic hall construction which dates back to classic antiquity. To close the hall, the glass doors are turned in like lamellas of a blind. Between the glass pillars lies the Piazza as a high spacious room.

The town planning elements repeat themselves in this high room similar to an orangery. The hall is the carrying structure of events such as secretive colored cubes, restaurants, cinemas and movie attractions. While the events change and renew in time, the hall, as a representative of the Volkswagen Group, remains consistent in its structure.

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