International Journal of High-Rise Buildings
March 2018, Vol 7, No 1, 75-84
https://doi.org/10.21022/IJHRB.2018.7.1.75

International Journal of
High-Rise Buildings
www.ctbuh-korea.org/ijhrb/index.php

Designing the High-Rise Building from the Inside/Out

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Abstract

For over 100 years, the tall building has largely advanced in technological innovation; however very little has been done in the terms of understanding the changing needs of the occupant needs and experience. The vast changes occurring due to technology and mobility demand reconsidering the tall building today and for the future. This paper will briefly survey the past eras of tall building design and will propose considerations and solutions for the future.

Keywords: Tall buildings, Designing from the inside/out



Figure 1.



Figure 2.

1. Introduction

Simply put, upon the invention of the steel frame by William Le Baron Jenny and the elevator safety break by Elisha Otis, the high-rise building was born (Ref. 1). In 1885, the 10-story Home Insurance Building became the first high-rise office building in the world (Fig. 1).

Looking back, it appears that invention has only made a few small leaps forward since then. The roaring 1920's brought an insatiable appetite for taller and taller buildings due to the large increase in land values in cities like New York and Chicago, and the egotistical desire to show man's ability and power. Buildings such as the Chrysler Building (Fig. 2) and the Empire State Building cloaked in their Art Deco attire are exemplars. Here, the world's tallest buildings were clad in a 'thin skin' of stone or brick

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Figure 3.

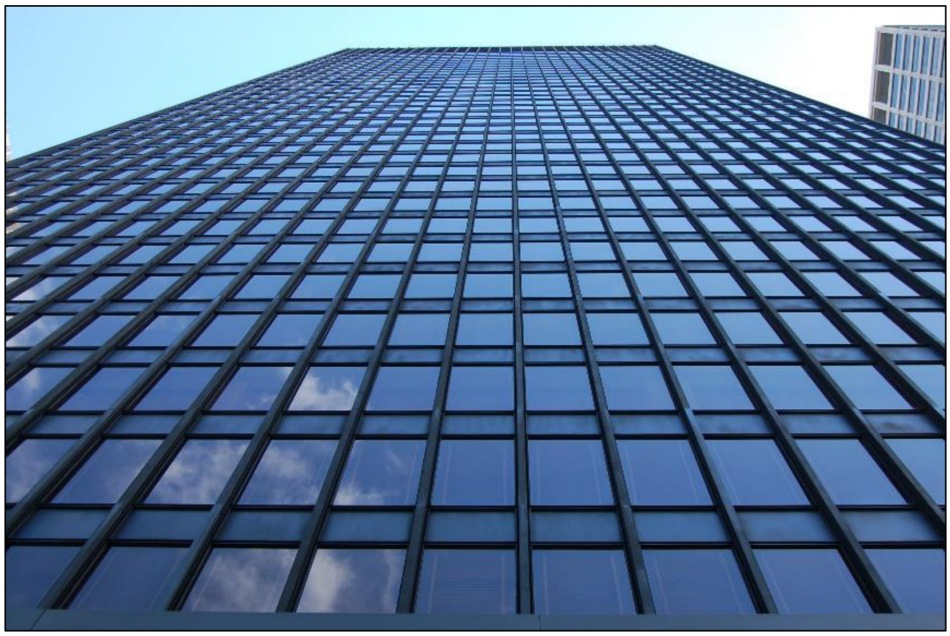


Figure 4.

with small, metal frame, double hung windows. The floor plates were dotted with columns and the exposed slab and beam structural system created a cell-like spatial experience. The interiors often carried out a cellular feeling, with law offices and banks fitting out private offices for the executives and bench desks for the minions (Fig. 3).

It wasn't until the 1950's, after World War II, that another step was taken. Mass production, standardization, and the idea of a modernist pure form, drove the industry to a new typology. Ludwig Mies van der Rohe's new vision of form and space was captured in the Seagram Building (Fig. 4) on Park Avenue in New York City. The 'curtain wall' was invented and allowed the exterior form of the building to be clean and repetitious. Floor-to-ceiling glass was now possible and, with continuous horizontal bands of uninterrupted glass, internal spaces seemed limitless. Inhabitants were in awe of the extraordinary views, which were, again, often reserved for the executives and



Figure 5.

the 'board' room. The secretarial pool was created to support these otherworldly executives (e.g.,"Mad Men"), and the minions were again sat at the infamous bench seating, often shoulder to shoulder with their compatriots, now typing away on documents of significance.

There was a brief moment of exuberance and excess in the 1980's when the two eras I just described seemed to merge. The eclectic character of the 1920's and the pure form and standardization of the 1950's generated the 'gilded temples' of the post-modern era. The desire to reference historical styles of architecture and design created a questionable step forward in the design of the high-rise. Buildings such as Philip Johnson's AT&T Building in New York (Fig. 5), with a pediment that recalls a piece of Chippendale furniture, showcase that era's sensibility. Not much had changed from an interior spatial perspective, albeit interior finishes had perhaps more glitz to fuel the savings and loan debacle. Systems furniture – the Dilbert cube – were in full force (Fig. 6)!

2. Tall Buildings from the Inside/Out

Usher in the new Millennium! Extraordinary change brought on by the realization of climate change, information technology, and exponential growth in computing capacity has created the sustainability movement, innovation in materiality and systems, and mobility like nothing seen before in human history. Harmonize that with a younger and more free-thinking workforce called the Millennials, and the conditions are ripe for dramatic change in the tall building.

It has been hard to see radical innovation and consideration for the significance of the inhabitant in tall buildings over the last 100 years. Perhaps the most substantial was when tests were done on human perception of motion when the World Trade Center was being designed and consideration for the building sway was of concern. However NOW is one of the threshold moments that we need to seize upon the conditions at hand and drive innovation in tall building design. There are many new questions that can be asked of the next generation of high-rise buildings.



Figure 6.

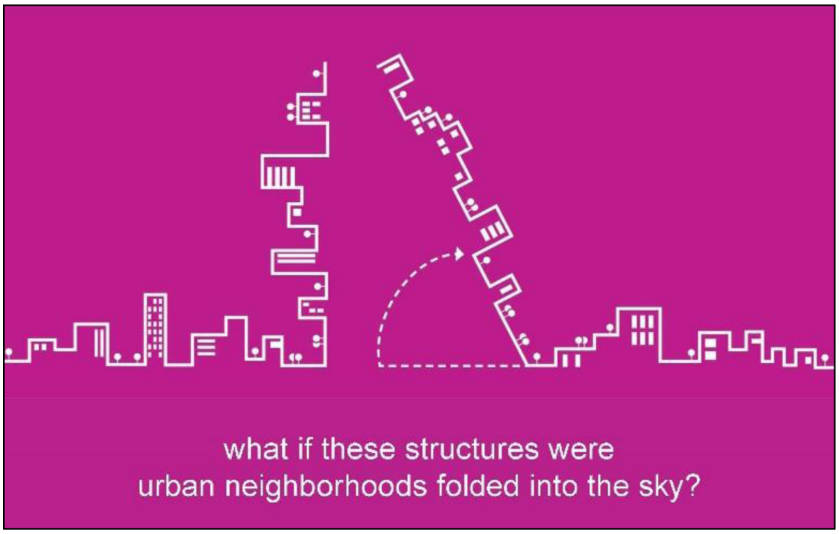


Figure 7. Image courtesy of NBBJ

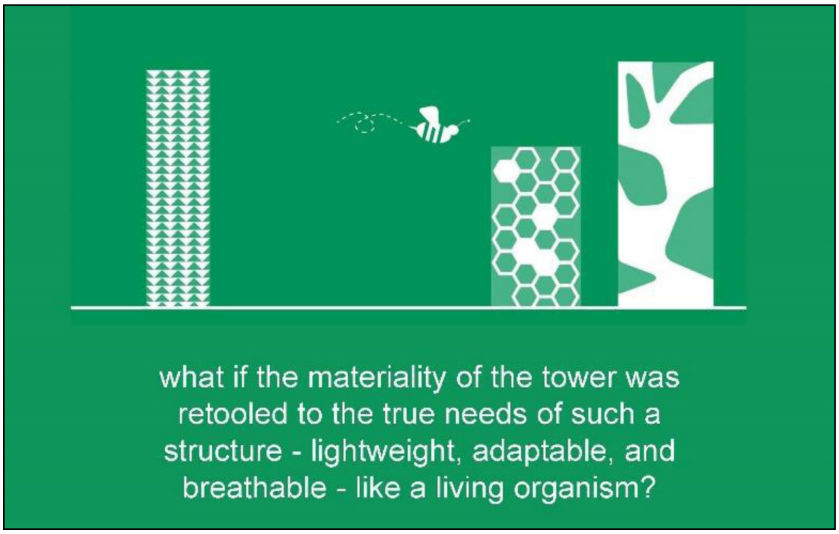


Figure 8. Image courtesy of NBBJ

Currently, much is being written about the technical aspects of high-rise buildings – and rightly so. We are in unprecedented times when it comes to tall buildings – buildings of extraordinary new heights, advancements in conveyance systems, and improvements in safety are coming every day.

However, there should be new questions. With more and more mixed-use buildings, can towers become vertical neighborhoods (Fig. 7)? With climate change, can buildings reduce their ecologic footprint and start producing their own power? Can buildings actually start to talk to and share power and information? Can buildings set up eco-systems that foster habitats for plants and animals as well as humans (Fig. 6)? These are the questions that need further development so that tall buildings contribute more than just creating vertically-stacked pancakes for shelter.

Another topic, and the subject of this paper, is how humans will want and use tall buildings in the future. How does the high-rise need to change to accommodate its inhabitants? This is a big question. These answers need to be discovered by starting to think from within the buildings.

Human beings strive for integration with nature. For over 60 years, tall buildings have sealed their enclosures and prevented occupants from connecting with nature. If you live and work in a high-rise building, you may spend at least 16 hours a day in a hermetically-sealed box. We have scientific proof that people are 23% more productive (Ref. 2) when they have access to sunlight, and with access to fresh air we can reduce sick leave by 35% (Ref. 3). Therefore it makes sense that tall buildings (or any building for that matter) become more porous and open.



Figure 9.

We know the challenges of this within the context of tall buildings, however I would like to highlight two stellar examples where tall buildings have integrated this successfully: the Commerz Bank Tower in Frankfurt, Germany (Foster & Partners) (Fig. 9) and the PNC Tower in Pittsburgh, Pennsylvania (Gensler). Both of these buildings can be departure points for further development on this topic.

Can buildings begin to create new social structures? Can they create community and positive interaction? Much of the success of the 'sprawl' in Silicon Valley – a hot bed for innovation – has occurred because of buildings with large horizontal floor plates that encourage interaction and exchange. As Jane Jacobs points out in her seminal book, The Death and Life of Great American Cities (1966) (Ref. 4), Greenwich Village in the 1920's had the highest number of patents pending per capita. Why? Because of a dense and diverse urban fabric that resulted in people seamlessly interacting in the streets, coffees shops, and on building stoops. Is there a way to encourage this type of connectivity in a vertical format?

Diagrammatically, a shift from the hermetically-sealed, continuous shaft to a series of separate-yet-linked volumes would dramatically change the nature of this building typology. We explored this via the shift in the workplace and the fabric of the city and came to a new name for the high-rise of the future: The Synergy Tower (Fig. 10).

Exploration of this concept took place in NBBJ's study for Samsung Electronics for a learning center outside Seoul, Korea. The basic program was delivered by the client and required a high-rise building. However, an unconventional strategy was considered to foster heightened interaction between the programs and the occupants. First we split the program mass, which brought light into the 'middle' of what would typically be the darkest part of the tower floor plan. In addition, we adjusted the sectional stack to foster more unique relationships. Then we added a series of 'polarizing' objects that acted as connectors or facilitators of interaction. These volumes became special meeting spaces that brought unique combinations of people together (Figs. 11, 12).

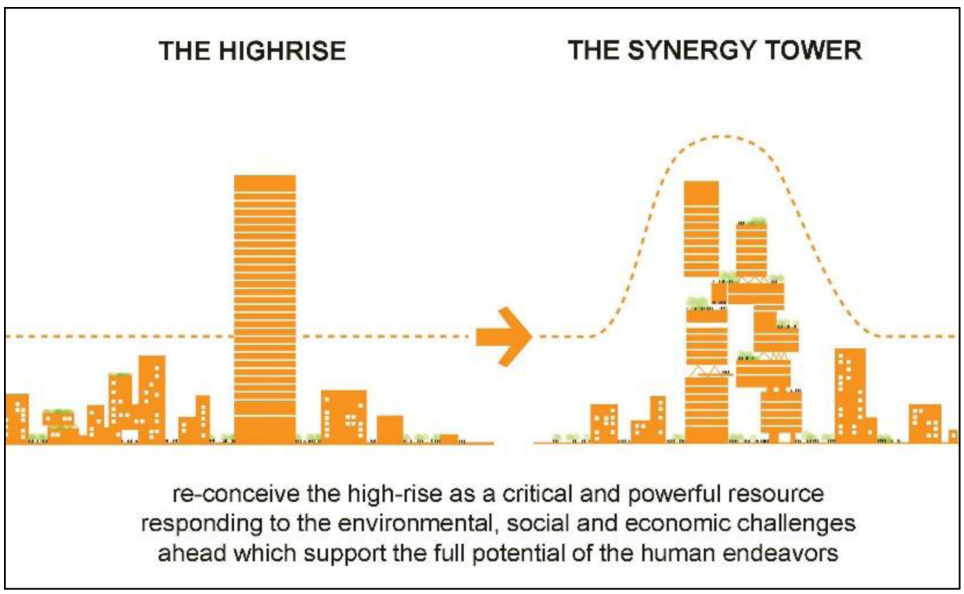


Figure 10. Image courtesy of NBBJ

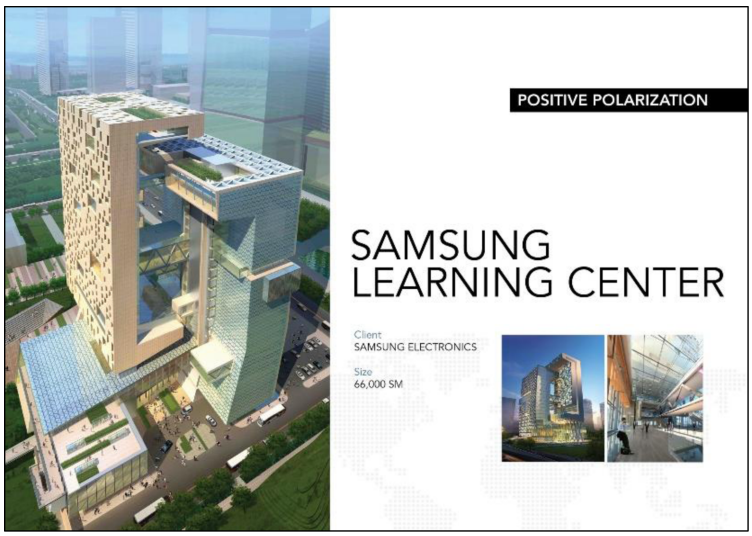


Figure 11. Image courtesy of NBBJ

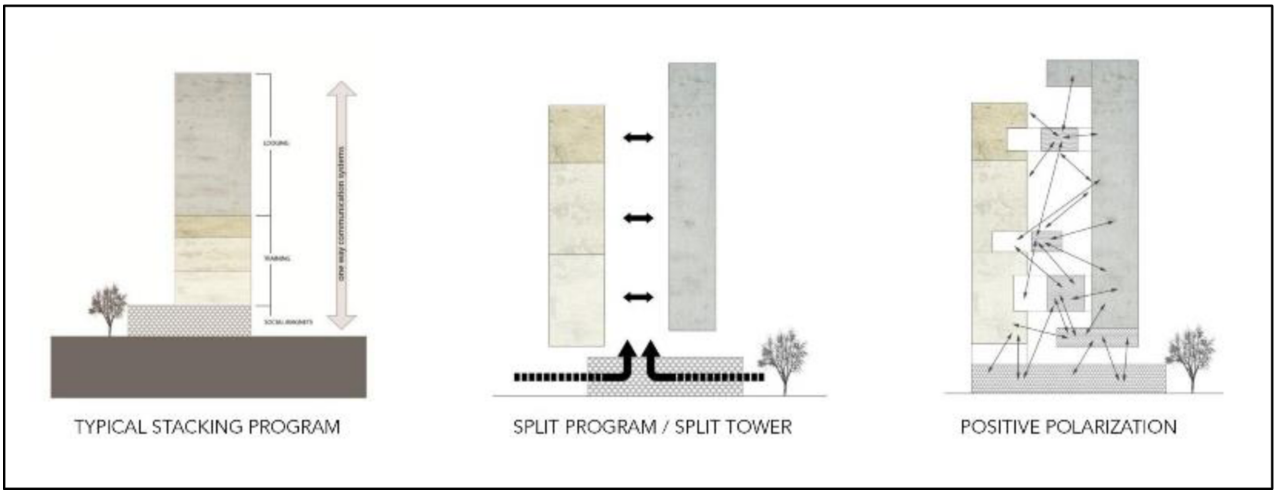


Figure 12. Image courtesy of NBBJ

Central core office buildings have been the mainstay of commercial real estate since the 1950's. However, recent studies in human interaction show that the 'center' core actually prevents people from making contact. Studies show that a person who is more than 50 feet away from someone is 50% less likely to interact with them. Additional research shows that people with visibility across a space are twice as likely to get up and seek out new relationships. With optimized lease spans of 45 feet, core to outside wall, you can see that a core placed in the middle of a building essentially divides a floor's occupants in two halves and hinders their ability to interact.

Asymmetrically-placed cores offer a larger field of open space and foster better interaction among occupants. NBBJ's design for NHN Venture Tower in Bundang, Korea took this approach in its 93,000 sqm new office tower. NHN, one of Korea's largest technology companies, needed space for its young workforce to interact and innovate. By placing the core in the southwest quadrant of the building footprint, it allowed for greater floor space for workstations and interaction. These loft-like spaces have proven to be far more effective than the floors in a conventional center core buildings. Similarly, creating multiple and varied sets of connecting staircases between floors reduces the size of a building core and breaks down the 'pancake stack' effect of a typical office building (Figs. 13, 14).

A building that implements both concepts described above is NBBJ's new Tencent Seafront Towers located in Shenzhen, China. The design essentially takes a standard office block, splits it apart, and re-connects them with bridging elements. This was driven by the client's requirement for a large floor plate building to house its young, tech-driven workforce. The result is a radically new build-

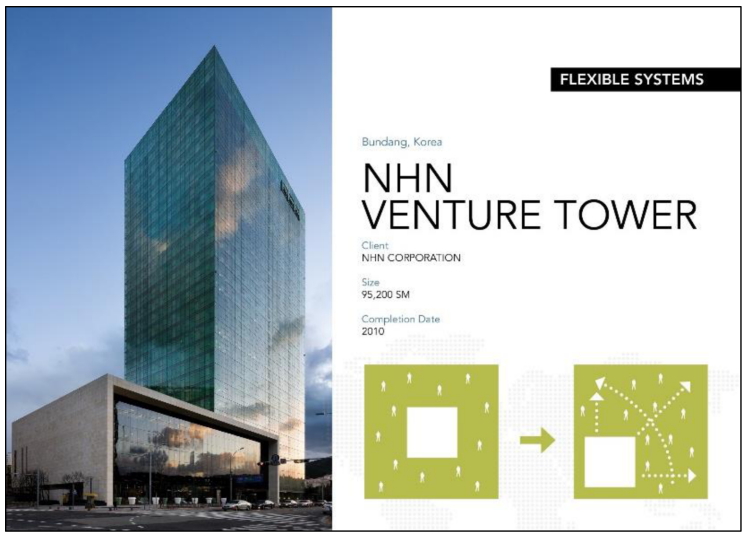


Figure 13. Image courtesy of NBBJ

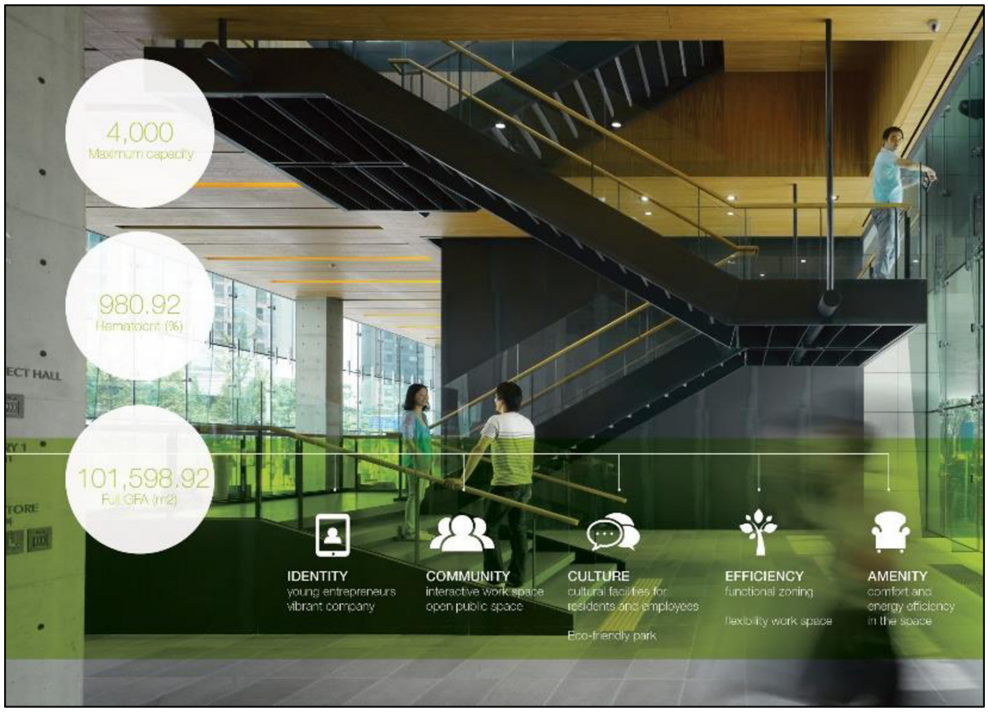


Figure 14. Image courtesy of NBBJ

ing typology that creates a vertical campus (Figs. 15, 16).

The two towers are connected by three 'bridges' that each take on a unique role in connecting the campus. The first bridge, closest to the ground, includes many spaces that encourage interaction with the Tencent brand and the outside world. The middle bridge, referred to as the 'heart,' is for recreation and fitness. Elements such as a gymnasium and an indoor running track help keep the workforce healthy, mobile, and fresh. The top bridge, referred to as the 'brain,' includes a variety of meeting spaces and interaction labs for gathering and collaboration (Fig. 17, 18).

Due to its complex section, deeper analysis of movement systems — both vertically and horizontally — needed to occur. In addition to traditional elevatoring analysis, parametric human flow models were created to understand how different departments could serendipitously come together. The result was a more programmed elevatoring system that purposefully brought people together in unexpected ways. This led to more complex work-related and socially dynamic interactions, which will drive innovation



Figure 15. Image courtesy of NBBJ

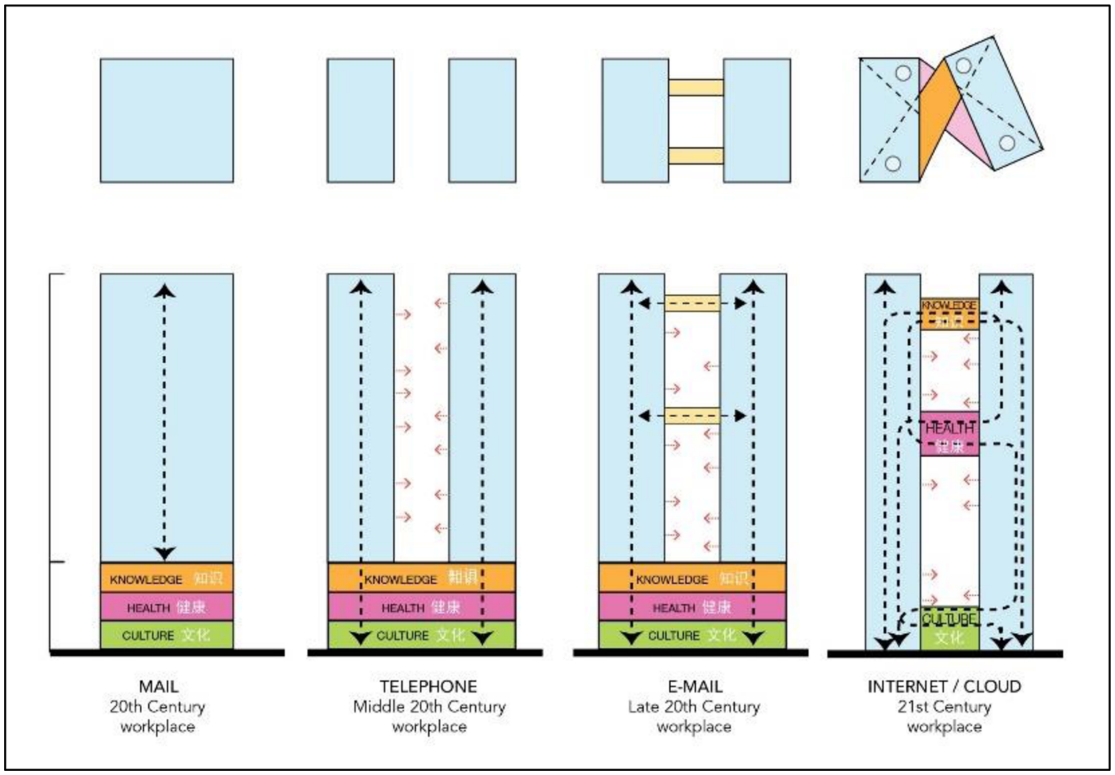


Figure 16. Image courtesy of NBBJ

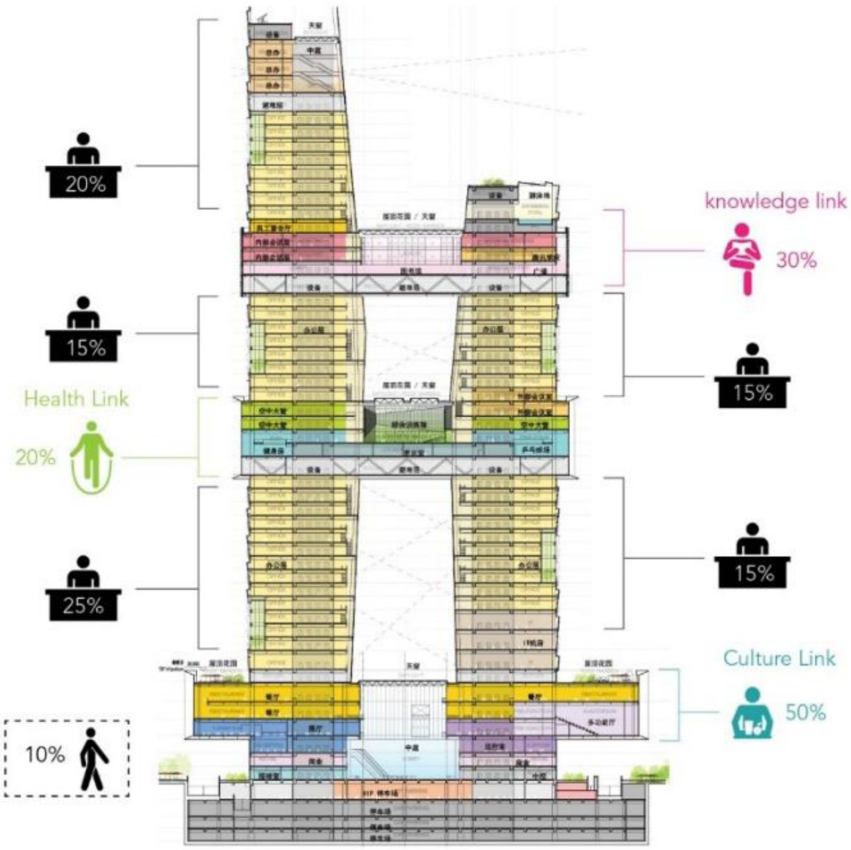


Figure 17. Image courtesy of NBBJ

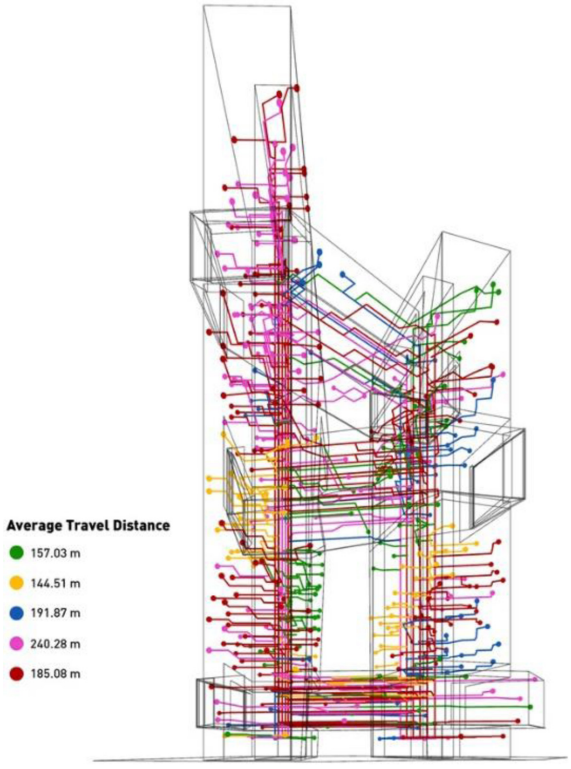


Figure 18. Image courtesy of NBBJ

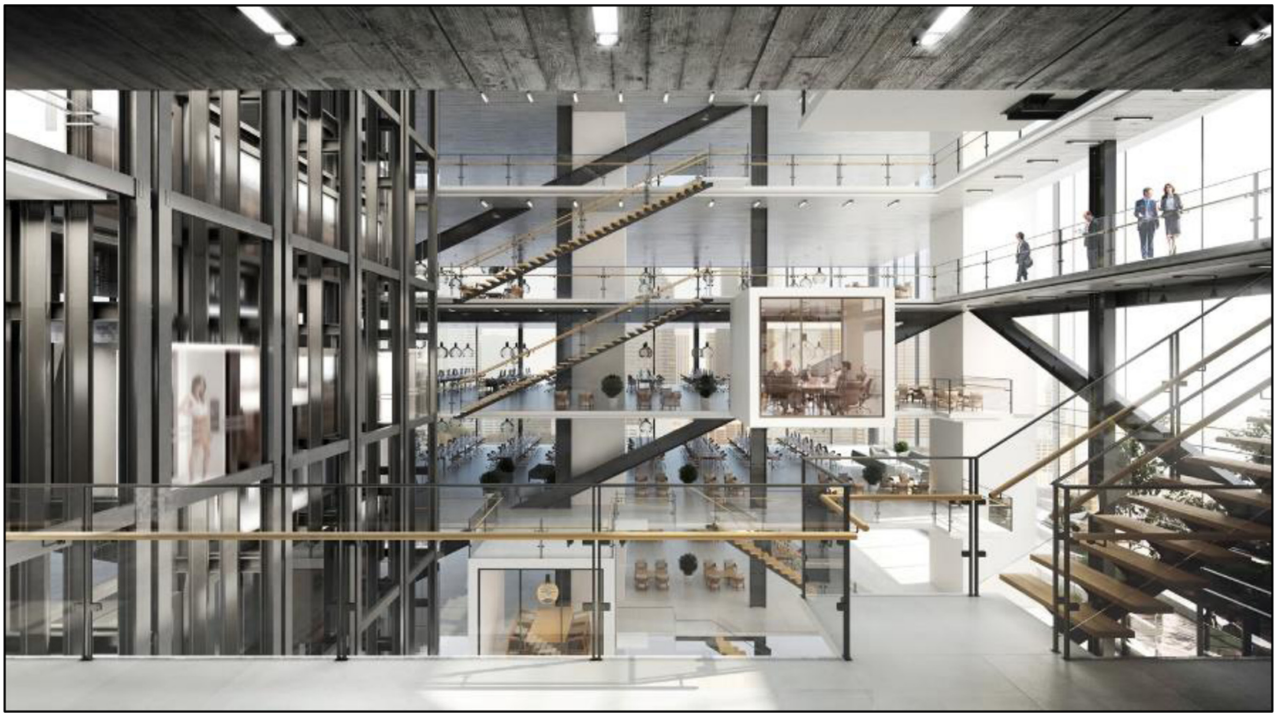


Figure 19. Image courtesy of NBBJ

and new ideas within the company (Fig. 19).

3. Conclusion

Although these examples are bespoke solutions for single tenant occupiers, there is merit in many aspects of these designs for commercial spec buildings. Bringing natural light and nature deeper into the space improves the human experience and performance. Creating spaces that are varied, open, and connected foster more interesting and inspiring environments for people who inhabit the buildings. These ideas, coupled with additional environmental innovations, could lead us to a complete new and more relevant tall building solution for the future.

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