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Author:	Suruchi Modi, Associate Professor, Ansal University
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Improving the Social Sustainability of High-Rises

Suruchi Modi

Authors

Suruchi Modi, Associate Professor
Sushant School of Art & Architecture
Ansal University
Sector 55, District Gurgaon
122 003, Haryana, India
t: +91 7838 332 206
e: suruchimodi@ansaluniversity.edu.in
www.ansaluniversity.edu.in

Suruchi Modi
Suruchi Modi is currently an Associate Professor
and Assistant Dean at Sushant School of Art &
Architecture, India. She is a gold medalist with a
double masters in Urban Design from Cept University
and Tall Building Design from the University of
Nottingham, United Kingdom. She has received
the Sir Patrick Geddes Award for her innovative
project – revival of the mixed land-use concept as a
tool to develop a sustainable city model. She is also
an international award winner of the Passivhaus
skyscraper design for New York City, facilitated at the
University of Prague. Modi has worked on large-scale
masterplanning and urban revitalization projects
throughout India, and has been actively involved in
academia and research on sustainable architecture
for over 10 years. Her work aims to extend the realm
of sustainability to the real estate-driven high-rise
development of today's cities.

For most of the postwar period, people moved to the suburbs in search of a better life. But if cities can offer them substantial reasons to keep coming back, such as jobs, entertainment, and amenities, dense urban areas can be an equally viable and socially sustainable habitat. In many parts of the world, tall housing has been mostly restricted to social housing and to upscale market-rate residences. Middle-class families have historically been left out of the equation. This paper studies the social benefits of horizontal neighborhood communities that have for decades been the preferred environment for raising families, and explores the challenges and rewards of transferring those features to a vertical format.

Recent trends of urbanization have caused a dramatic increase in the worldwide urban population. The failures of the tower block schemes of the 1960s made living in high-rises unpopular in Europe and North America. For much of the last century, developers have historically found tall buildings appropriate only for office and commercial uses. However, limited buildable land resources have inevitably changed city growth patterns from outward horizontal spread to vertical growth. The re-emergence of the high-rise as a housing typology presents the opportunity to consider the mistakes of the past and address the demands of a wider population.

The current trends of residential living in the sky reveal that home buyers today hold a different perspective on high-rise living. They expect a vibrant urban setting. They are moving to developments that require little maintenance and provide communal space for recreation and socializing. As these shifts occur, designers and developers have a

mission: to understand these needs and desires and translate them into sustainable, integrated residential places.

Residential Tall Buildings' Re-emergence

Today the world is facing escalating rates of urbanization and exponential growth in the use of energy and resources. The world population presently stands at 6.9 billion – a figure expected to reach 10.1 billion by the year 2100 (United Nations 2011). Furthermore, statistics indicate that "… in developing countries, the urban population is expected to double from 2.6 billion in the year 2010 to 5.2 billion by 2050. Developed nations show an increase in urbanized populations from 0.9 billion in 2010 to 1.1 billion in 2050. However, during the same period the world's rural population decline is 0.6 billion"(ibid). This has been the principal cause of the ever-increasing demand for homes – a challenge for all cities across the world (see Figure 1).

History has witnessed various planning discourses intended to solve the problem of housing, such as "urban sprawl," which loosely follows the principles laid down by Ebenezer Howard and Le Corbusier. This single-use, automobile-driven suburban development had dominated the urban milieu in the latter half of the 20th century, which has been condemned due to its negative environmental and social impact. By the 1990s, the "Compact City" model, based on the principles of "New Urbanism," was envisioned as a solution to urbanization. It promotes "mixed-use, high-density living,

> **"A deficit of social support, reduced exposure to divergent views, the lack of ability to consider opposing viewpoints and the gestation of mistrust or general disengagement from the community are all results of reduced physical interaction."**
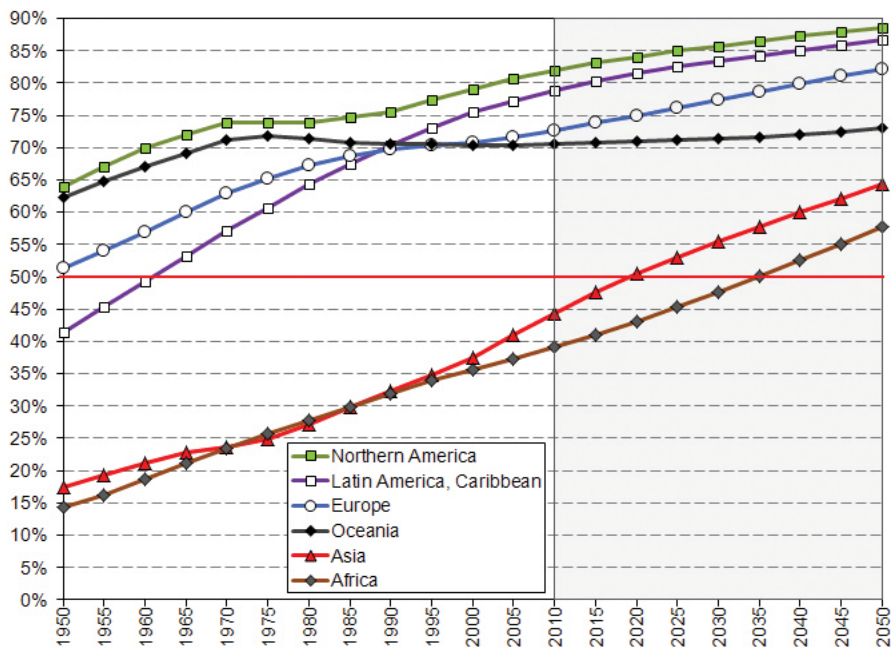
Figure 1. Urbanization trends. Source: UN, Department of Economic and Social Affairs. 2012. ***World Urbanization Prospects, the 2011 Revision.***

based on efficient public transport systems, walkable neighborhoods, increased opportunities for social interaction and an overall sustainable system with low energy consumption and reduced pollution" (Burton et al. 1996).

Dense urban living proves better for the people and the city in terms of retaining countryside, saving time and money on travel, reducing infrastructure, and allowing people to enjoy the vibrancy of city life. However, a challenge to architects and planners lies in translating this urban compaction into a sustainable future for our cities. In pursuit of this goal, the beginning of the 21st century saw planners and municipalities choose developments with smarter, more community-focused plans. These movements aim to achieve sustainable neighborhoods. "Smart growth" does so by focusing on regional characteristics to foster a unique sense of place and community, offering better employment, transportation, and housing solutions. Urban infill focuses on development of vacant, undeveloped, and underdeveloped land parcels within an existing community and organizing populations densely, and increasing work and play opportunities through adjacency.

Such trends, when combined with scarcity of land and increasing need for affordable housing, are pushing high-density residential buildings to the forefront. Though the idea of living in supertall buildings has gained momentum with the introduction of high-end luxury apartments, the experience of high-rise affordable housing has not been as satisfactory. Despite the middle class' increasing difficulty in purchasing homes, and the fact that the designs of residential high-rise solutions for this demographic are not backed up by much research into the actual experience of living in them. Many of these projects still continue to resonate with the fears and problems of the past; they are considered to be socially unsustainable.

The Significance of Social Sustainability

Today, social sustainability is regarded as an important pillar of sustainability in general. As per the 1992 UN Earth Summit and the 2000 Presidency Conclusions of the European Council, "social concerns will be taken up for due consideration in the sustainability agenda" (United Nations 1993). Social sustainability is defined as a "development that is compatible with the harmonious

evolution of civil society, fostering an environment favorable to the compatible cohabitation of culturally and socially diverse groups, while at the same time encouraging social integration, with improvement in the quality of life for all segments of the population" (Polese & Stren 2000). Also, social communities are defined as "places where people want to live and work, now and in the future. They meet the diverse needs of existing residents without compromising on those of the future, by being sensitive to their environment and contributing to a high quality of life."

Social sustainability is now of paramount concern alongside mankind's withdrawal from traditional social structures. This has happened with the invasion of electronic social networking and the diminishment of outdoor spaces in which children can play and adults can interact. Technology enables leisure and work from home but is making people less social in the physical world (Beld 2012). A deficit of social support, reduced exposure to divergent views, the lack of ability to consider opposing viewpoints and the gestation of mistrust or general disengagement from the community are all results of reduced physical interaction. A generation conditioned to isolation could have devastating effects on society.

Evolution of Social Spaces in Residential High-rises

The practice of living in multistory structures dates back to ancient Rome, where such structures often appeared as mixed-use buildings with shops for the rich on the lower floors and housing for the lower-class residences above. Medieval city skylines also reveal such mixed-use towers. However, purely residential tall buildings did not begin to dominate the city skylines until after the Second World War. In the years that followed, social movements motivated architects to conceptualize housing for the masses, as well as the growing middle class in the cities. The Modernist, Humanist, and Rationalist movements laid out their visions of ideal residential living, which reached their zenith in

MID TO LATE 19TH CENTURY		EARLY 20TH C	1930S TO EARLY 1940S		1945 TO 1955		1955 TO 1960

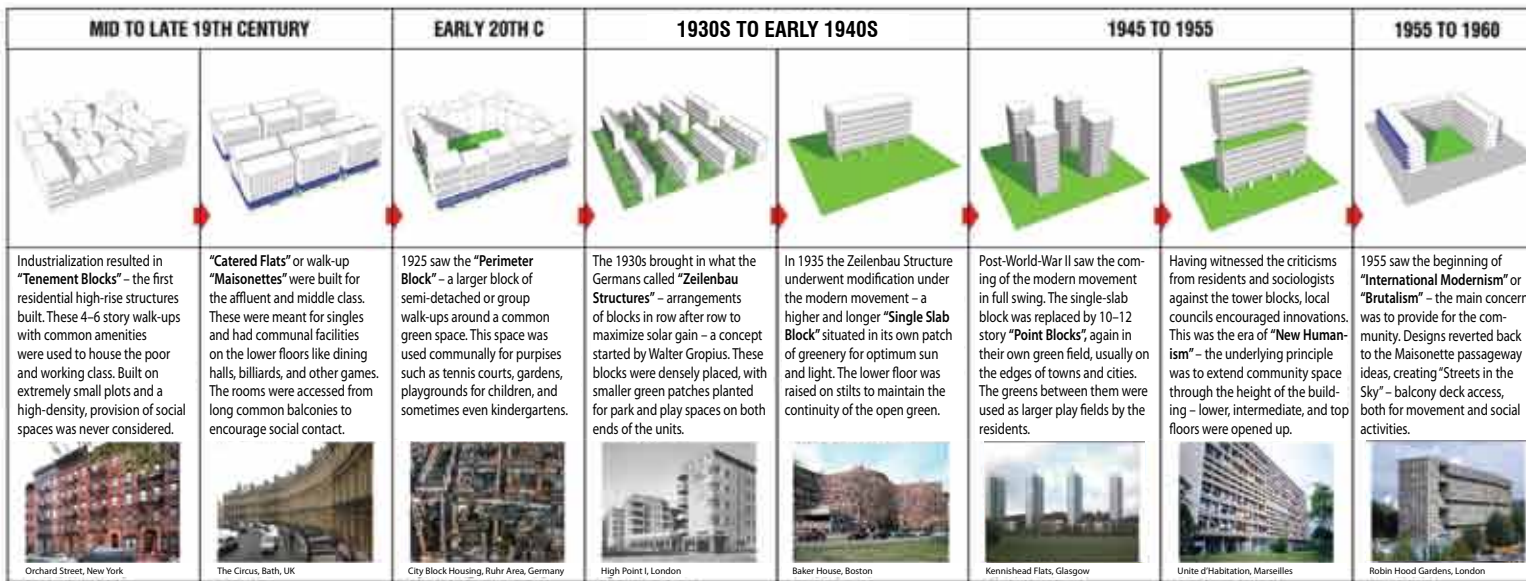|							
Industrialization resulted in **"Tenement Blocks"** – the first residential high-rise structures built. These 4–6 story walk-ups with common amenities were used to house the poor and working class. Built on extremely small plots and a high-density, provision of social spaces was never considered.	**"Catered Flats"** or walk-up **"Maisonettes"** were built for the affluent and middle class. These were meant for singles and had communal facilities on the lower floors like dining halls, billiards, and other games. The rooms were accessed from long common balconies to encourage social contact.	1925 saw the **"Perimeter Block"** – a larger block of semi-detached or group walk-ups around a common green space. This space was used communally for purpises such as tennis courts, gardens, playgrounds for children, and sometimes even kindergartens.	The 1930s brought in what the Germans called **"Zeilenbau Structures"** – arrangements of blocks in row after row to maximize solar gain – a concept started by Walter Gropius. These blocks were densely placed, with smaller green patches planted for park and play spaces on both ends of the units.	In 1935 the Zeilenbau Structure underwent modification under the modern movement – a higher and longer **"Single Slab Block"** situated in its own patch of greenery for optimum sun and light. The lower floor was raised on stilts to maintain the continuity of the open green.	Post-World-War II saw the coming of the modern movement in full swing. The single-slab block was replaced by 10–12 story **"Point Blocks"**, again in their own green field, usually on the edges of towns and cities. The greens between them were used as larger play fields by the residents.	Having witnessed the criticisms from residents and sociologists against the tower blocks, local councils encouraged innovations. This was the era of **"New Humanism"** – the underlying principle was to extend community space through the height of the building – lower, intermediate, and top floors were opened up.	1955 saw the beginning of **"International Modernism"** or **"Brutalism"** – the main concern was to provide for the community. Designs reverted back to the Maisonette passageway ideas, creating "Streets in the Sky" – balcony deck access, both for movement and social activities.
Orchard Street, New York	The Circus, Bath, UK	City Block Housing, Ruhr Area, Germany	High Point I, London	Baker House, Boston	Kennishead Flats, Glasgow	Unite d'Habitation, Marseilles	Robin Hood Gardens, London

Figure 2. Evolution of social spaces in residential high-rises.

the 1950s and 1960s. This period was followed by the oil crisis of 1973, which resulted in loss of public funding and stagnation in the incomes of households, which had a direct impact on the housing market. Such situations provided little incentive for developers to venture forth with new ideas and methods.

The trend toward standardizing housing began to exhibit little consideration for social spaces. However, the housing market made a comeback with the economic boom and the advent of the luxury skyscrapers in the late 1990s. Private developers came into the picture to provide better amenities and maintenance of shared spaces. They noted the change in client response and became aware of the media-friendly qualities of architecture. By the late 1990s, developers were less hesitant to use innovative concepts that have shaped contemporary towers in recent years. Both affordable and luxury housing markets are being brought up to par with increasing sophistication in design and quality of projects. Figure 2 shows the evolutionary timeline of social spaces in residential high-rises.

OUTWARD or UPWARD: Social Spaces in Low-rise and High-rise Neighborhoods

Although new trends of incorporating social spaces in tower blocks have been explored experimentally, their realization in the city fabric is still a rare phenomenon. Why is it that many people still prefer living in the horizontal format, that is, owning a large house with private open spaces? Is it because the high-rises are still unable to offer comparable conditions to those of a suburban single-family home? A comparison of the two types draws attention to the missing links.

Typical Advantages of Social Spaces in Low-rise Development Over High-rise Development

Access
In a low-rise neighborhood, most movement is along the horizontal plane, offering residents an opportunity to experience the social spaces, both physically and visually, while continuing their journey to a specific destination. By contrast, in a high-rise, most movement happens along an interior hallway and through elevators. Thus, the high-rise format is unable to offer the same experiential quality. The hallways are usually devoid of people, and the elevator directly takes one to the desired destination, bypassing and curtailing many opportunities for social interaction.

Participation
Most units in low-rise neighborhoods possess semi-private front gardens. These spaces support hobbies, such as gardening and tinkering, which can involve the family members of the household, as well as neighbors. Thus, they create opportunities for unplanned participation. High-rises, by virtue of their vertical assemblages of floor plates, are unable to provide for this form of interaction. Hence, one is inhibited from discovering and participating in the activities below or above one's floor or line of vision.
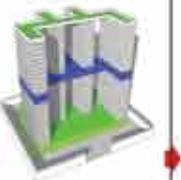
Individuality
The expression of uniqueness and personalization of private and semi-private spaces along streets and courts in low-rise neighborhoods naturally lends heterogeneity to the social environment. It makes the walks and outdoor stays pleasurable and exciting. In high-rise living, analogous corridors and lobbies, stacked floor after floor, make the environment monotonous and boring.

Adaptability
The ability to expand or mold one's unit to the growing needs of the family is easily enabled in the case of a low-rise, detached home, which often has its own private back yard and front garden as augmentative spaces. This adaptability allows people to continue staying in one place over a lifetime, strengthening their social bonds within the community. Also, the longer stay develops a feeling of ownership and responsibility for the neighborhood. Comparatively speaking, most high-rise environments are less adaptive to such changes, and the floor space is usually fixed.

1960S TO EARLY 1970S			1975 TO EARLY 1990S	1995 TO 2005		2005 TO PRESENT DAY	
The 1960s brought 4 deviations: 1. The Point Blocks continued in the suburbs. 2. Providing for the car resulted in the "Podium Block" typology – separating vehicles and pedestrians. These were a combination of Point and linear Slab Blocks.	3. Prefabrication and ideas of arranging discrete boxes on the surface of an open site. Concepts of **"Totality"**, **"Complexity"**, **"Flexibility"** and **"Open-endedness"** – involved arranging of parts into a group to create multiple types of social communal spaces.	4. Common spaces were narrowed in the projects within the city. Movement was further expressed by separating out the vertical circulation block from the main tower. Amenities moved to the surrounding areas in the city, and sometimes within the confines of the building.	Reductions in public funding and stagnation in incomes had an impact on housing. Thus developers did not venture into anything new. The aim was to merely provide for the need, hence point blocks continued to be built, but much closer together and within the confines of a territory for security.	By 1995, housing returned to the forefront of the scene with the growth in the economy. This time it was designed for families, resulting in less-dense gated environments within the territory. A number of communal facilities were provided for, such as club houses, sports, kindergartens, and convenient shopping.	Luxury apartments gave high-rise a kick start. Provision of high-end facilities within the confines of a tower and beautiful panoramic views of the city center from individual apartments changed the perception of living in high-rises.	Recent years have seen an increase in the demand for high-rise living with larger comfort and amenities. On one end, the housing projects are huge complexes of 60–80 story towers on a much larger site, creating a unique world of its own.	On the other end, innovative ideas for a single supertall building with social and green spaces are being experimented with in the form of sky podiums, connecting bridges, overhanging gardens, etc. However few such projects have yet been built.
Barbican Estate, London	Habitat 67, Montreal	Trellick Tower, London	HDB Housing, Singapore	Punggol Roof Garden, Singapore	Battery Park City, Lower Manhattan	Interlace, Singapore	Museum Plaza, Louisville

Hierarchy of spaces

A low-rise neighborhood contains a wide hierarchy of spaces that are key to fostering social interaction. Beginning with the unit, the presence of a semi-private front garden instigates interaction with the neighbor across the yard, leading onto a street that can be overseen from this space, which is often used for play. This street connects to multiple shared courts and pocket parks, followed by larger play areas. These direct one to the main street, which further leads to larger communal spaces and playgrounds, and finally to the boundaries of the neighborhood. Though it ultimately supports a much more walkable neighborhood, high-rise development lacks this multiplicity of interactive opportunities on the way to a shared space – "semi-private" spaces being the missing link.

Typical Advantages of Social Spaces in High-rise Development Over Low-rise Development

Footprint

Low-rise developments usually occupy a much larger ground area, leaving less room for green and communal spaces. Tall buildings having smaller footprints consume less land area. This, in principle, leaves more room for green and communal spaces.

Views

Having good city views is one of the positive attributes of social spaces in high-rise buildings. This in itself is substantial enough of a reason to bring people into outdoor social environments. The attractive power of such spaces can be measured from the fact that the observation deck at the Empire State Building receives approximately 3.5 million visitors each year.

Security

Social spaces in contemporary tall buildings tend to be highly secure environments, whereas in the past, staircases and dark corridors had been places of crime and fear. Social spaces in tower blocks are not open to passers-by, as in low-rise neighborhoods. High-rises usually have controlled, single entrances that act to reduce crime and the fear of crime. This encourages people to use common facilities, however, in these facilities they are likely to encounter only other resident families.

Pollution

As one moves higher, the air gets cleaner and purer. Given the adverse affects of air pollution, clean air is a highly valued commodity. Beyond air quality, noise can be a concern, especially for elderly people who tend to visit the social spaces such as gardens and parks, with the intention of experiencing tranquility. In the case of low-rise layouts, most units have on-plot parking, which means the road network leads right to the unit edge. Writ large, this pattern degrades air quality and increases noise.

Safety

Communal spaces such as streets become unsafe for play and other activities due to the fear of encountering a speeding vehicle. Parents are afraid of sending their children alone to a friend's place, cycling, or across the road to a park. In case of high-rises, all social spaces and units are safely within the confines of the building, with no threats of vehicular traffic. Hence, movement within a tall building complex is much easier and safer, which can result in more social interactions.

Challenges and Solutions to the Provision of Social Spaces in Residential High-rises

As more residential skyscrapers are being built in cities today, there are three main players – the regulatory bodies, the developers, and the designers – who are responsible for the successes and failures of this typology. Despite knowing the advantages, developments in recent years, apart from an exceptional few, do not reflect a realization of social spaces as a high priority. This problem needs to be addressed before it results in the creation of another set of housing typologies that are prone to failure in the coming years. It becomes important to ask: "What are the challenges in providing communal facilities in

tall buildings like those of their low-rise counterparts, and what could be the probable solutions?"

Building regulations
Building regulations are often seen as a hindrance by developers, due to the multiple sanctions and clearances that need to be satisfied in order to fulfill requirements. However, on the contrary, regulations can play a big role in the creation of social spaces in tall projects. Towers in Singapore have many sky gardens, as building regulations allow for developers to build taller or offer a higher floor area ratio (FAR) if they provide open green space at height. This Green Roof Incentive Scheme (GRIS) encourages the installation of green roofs on existing buildings in the downtown area by offering multiple tax benefits to the developer. Regulatory bodies need to consider the advantages of such enterprises, and play a stronger facilitator role in acquiring such benefits for the larger benefit of the vertical neighborhood and its people.

Cost
High land prices and construction costs characterize urban skyscraper development. To enable the developer to get optimum returns, the skyscraper needs to have sufficient sellable area. Models such as Germany's Commerzbank Headquarters and Singapore's Pinnacle@Duxton provide some useful examples of cost optimization.

The Pinnacle@Duxton was the result of the first international design competition for public housing in Singapore, held in 2001 by the Housing & Development Board (HDB). The selected entry was designed by ARC Studios, Singapore, which was commended for its simple, yet urbanistically effective solution. With approximately 1,800 units on a 2.5-hectare site, it is the highest-density high-rise development in Singapore (see Figure 3).

It consists of seven tower blocks interspersed with skybridges that create one of the longest continuous sky gardens in the world, offering communal spaces with panoramic views of the city skyline. Provision of such social spaces opens the high-rise residential market to a much larger segment of the population – families for whom this is meant to be a lifetime home and hence a one-time investment. The incitement to live in the city increases if the developments can match the suburbs' ability to cater to family needs. In the case of the Pinnacle@Duxton, the project recorded the highest average price and fastest sale record of new flats sold by HDB in Singapore. "The units became oversubscribed with HDB, and were sold at a 65% higher price than any other HDB [housing]."

The tags of "social sustainability" and "green" certification can by themselves fetch premium rents for the developer. With such incentives in the market, developers are

discouraged from permitting their investments to falter for the simple reason that they do not provide social sustainability. Not only does the provision of such spaces increase property value; it also improves marketability. If people are happy with the provisions made, they tend to develop faith in the brand name and are willing to invest in the future endeavors of the developer.

Ownership and maintenance
Most forms of housing developments are difficult to manage. Unlike detached houses in a low-rise development, high-rise neighborhoods suffer "the tragedy of the commons": The social spaces and facilities are shared by a large community, with no one taking the responsibility for their management and maintenance.

Forming community development trusts as mechanisms for tapping voluntary efforts of residents has been difficult to realize and sustain, as residents often lack the time to take good care of, or the ability to generate funds to hire management. However, many high-rises in the past, including the Pinnacle@Duxton, refute these prophecies of failure and have sought new mechanisms, resulting in better care and resident satisfaction.

At Pinnacle@Duxton, the shared spaces are looked after by the Housing & Development Board of Singapore, which has managed to generate revenue from this opportunity by

Figure 3. Pinnacle@Duxton, Singapore. © ARC Studios

Figure 4. Pinnacle@Duxton sky garden. © ARC Studios

Figure 5. Linked Hybrid, Beijing. © Steven Holl Architects / Shu He

opening up the 50th-floor sky garden to the public for a fee (see Figure 4). It is essential to consider such management and maintenance objectives and responsibilities in the early stages of the project to ensure that shared communal spaces in high-rises are well cared-for and safeguarded for their residents.

Footprint
Tall buildings have smaller footprints. Thus it becomes difficult to create the necessary open space for certain activities, such as sports, at height. Also, the continuity of social spaces can be interrupted, owing to the limited floor space in a vertical format. Such problems have been innovatively tackled in projects such as the Pinnacle@Duxton in Singapore and Linked Hybrid in Beijing, where the connections between buildings account for the extra floor space, accommodating popular activities and maintaining the continuity of communal spaces, as a street does in a horizontally formatted development (see Figure 5). Regulatory bodies can drive such solutions by offering exemptions to the developer on the required ground coverage of the project. This helps in creating vertical counterparts to horizontal public parks.

Optimization
The social spaces should cater to a variety of populations and functions in order to lend dynamism to the place. A single-use residential building tends to support interaction during the mornings or evenings, and very little during the day. A subtle mix of

residential with other uses would not only add to the diversity quotient and promote social interaction, but would also help the developer generate more value for his property by optimizing its use. Additionally, many occupants would save on energy and time by living and working in the same building, paving the way for a sustainable future.

Access
Most communal spaces or amenities are placed on rooftops, or in such a way that they are visually and physically cut off from the daily paths of movement. Such separation from the course of necessary activities results in reduced use of the space, with people preferring to be there only during certain

times of the day – particularly when they anticipate the presence of others. Solutions have arisen, such as Mirador in Madrid, where alternative paths and routes other than elevators are provided, along with cut-outs in slabs to encourage visual interaction and the possibility of social exchange while en-route to the shared space (see Figure 6). Residents can take a combination of movement systems such as high- and low-speed elevators, walking along sky streets, and staircases for short journeys and the like. Provision of atriums in the building can also be a good solution, offering visual connections through the common space.

Public-private interface
Articulating the threshold between public

Figure 6. Mirador, Madrid. © Luis Garcia / Architecturtrips.com

> **"High-rise design solutions need to consider alternatives to the front gardens of independent houses that open onto streets. Such semi-private spaces should extend from the movement spines, such as corridors and elevator lobbies, forming a hierarchy of interactive spaces."**

and private domains by introducing the missing element of the semi-private realm has long been a challenge; failure to do so has long been a drawback of the high-rise residential typology. High-rise design solutions need to consider alternatives to the front gardens of independent houses that open onto streets. Such semi-private spaces should extend from the movement spines, such as corridors and elevator lobbies, forming a hierarchy of interactive spaces.

Space Design
The social spaces should be well distributed through the height of the building, rather than concentrated on only on one level. This helps in establishing a hierarchy of spaces that

vary according to scale, proportion, number of occupants, and function, as is the case in low-rise neighborhoods. Also, the designers need to move away from "gray" to "green," adopting more soft and humane materials and equipment. To ensure a year-round usage, the spaces need to be conducive to the climatic conditions. Weather-shield systems, such as windbreakers and semi- or fully indoor spaces, like the sky gardens of Commerzbank Headquarters in Frankfurt (see Figure 7), need to be applied in temperate climates. Tree covers and other shading devices become a necessity in hot and humid zones, which can offer favorable conditions for the users.

It is essential to state that, though housing is bought or sold, it is much more than just an economic commodity. It expresses life's aspirations and the experiences of a home, and thus it plays a significant role in the creation and reinforcement of relationships among people. If cities can offer them substantial reasons to keep coming back, such as jobs, entertainment, and amenities, cities also should be able to support the most basic need – a socially sustainable habitat. To a large extent, the solution to this objective lies with the three players – the regulator, the developer, and the designer, who need to work together to create solutions for the occupants. Socially sustainable high-rise housing needs a smart and sensitive approach associated with the ideals and expectations of its users. If the high-rise residential market is to ameliorate further, it must work harder to deliver the same desirable elements as those found in low-rise neighborhoods. ∎

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Figure 7. Commerzbank Headquarters, Frankfurt. © Foster+Partners / Nigel Young