Rising of Super City Clusters

Envision an Urban Future for All

Yvonne Zhou, Yipei Liu, Xiaobai Chen, Ming Xu, and Shane Sun

March 2018
# Contents

1. **The Formation and Development of a New Generation of City Clusters**  
   1.1 Sustained Urbanization and Increase in Population Concentration  
   1.2 A New Generation of City Clusters that Emerges Around Megacities  

2. **Development Challenges of the City Clusters**  
   2.1 Spatial Imbalance: Improvement of Transportation as a Double-edged Sword  
   2.2 Opportunity Imbalance: Income Inequality Within Cities  
   2.3 Resources Imbalance: Depletion and Insufficient Supply of Public Services  

3. **Towards a Sustainable Urban Future**  
   3.1 Coordinated Development  
   3.2 Inclusive Growth  
   3.3 Circular Economy  
   3.4 Emerging Technical Solutions  
   3.5 New Approach to Governance  

**Conclusion**
Rising of Super City Clusters

Envision an Urban Future for All

1. The Formation and Development of a New Generation of City Clusters

1.1 Sustained Urbanization and Increase in Population Concentration

Economic and social development has been driving the global population to concentrate around urban. By 2030, it is expected that two-thirds of the global population, i.e. 5.1 billion people, will be living in cities. At the same time, the urban development will demonstrate polarizing characteristics. By 2030, the number of megacities with a population size of more than 10 million will increase from 29 as of today to 41; the number of cities with a population size of 5 to 10 million will increase from 44 to 63; the proportion of urban population in mid-and-above-sized cities will increase from 50% to 55%. (See Exhibit 1 & 2.)

The aggregation of urban population can be attributed to multiple factors including industrial development, enhancement of public services, improvement of spatial connectivity, and expansion of population within the sphere of influence of the urban center. (See Exhibit 3.) There is a large population base in the developing countries of Asia, Africa, and South America. Advancement of industrialization and the improvement of transportation infrastructure lead to rapid aggregation of people into large cities. It is estimated that all 12 of the upcoming megacities will locate in developing countries. In contrast, the industrialization of most western developed countries took place in an age when transport links were rudimentary, and population growth is dampened by poor public health. As a result, polarization is not a prominent feature in many Western industrialized nations, and the lack of both endogenous and exogenous population growth leads to stabilization of existing spatial structure. Nevertheless, for major metropolises in the English-speaking countries (such as London and New York), the benefit of English as the “global language” and the relatively open immigration policy has expanded the sphere of influence for these cities. Further aggregation of population could, hence, be expected in these “global cities”. In short, the fate of megacities in future context will be relevant to both advanced and developing economies.
Exhibit 1. Increasing Concentration of Global Population

Sources: UN World Urbanization prospects 2014; BCG analysis.

Exhibit 2. Distribution of Megacities

It is estimated that by 2030, 5% of the world’s top 20 megacities will contribute 21% of global GDP

Sources: Martin Prosperity Institute; The Mega-Regions of North America; Oxford University; BCG analysis.
Note: The Chinese government has restricted the expansion of urban population. For example, by 2030, the population of Beijing should not exceed 23 million, and Shanghai should not exceed 25 million. The data is based on urban natural population growth (without adopting population intervention method).
1.2 A New Generation of City Clusters that Emerges Around Megacities

As international experience demonstrates, the process of urbanization usually involves the evolution of independent city to expansive metropolitan areas, and eventually to poly-centric city clusters. Currently, large and mega-sized cities in the developing world are mostly in the state of mono-centric urban sprawl. Even in developed countries, coordinated development among cities within a cluster is still far from mature. In the United Kingdom, for instance, fast-paced growth in London is coupled with a myriad of issues ranging from underutilization of land within the greenbelt and the uneven development among satellite cities, to the inefficient transport links and the expanding North-South divide. As the next generation of city clusters emerge around new megacities, three differentiating features could be observed:

- **Larger**: centered around one megacity, and accompanied by 2-3 large cities, the new generation of city clusters will likely feature population well above 25 million

- **Faster**: with higher level of basic public services, there is greater capacity for endogenous growth. At the same time, modern transportation links and information flow rate will boost the cluster’s ability to attract external population. In the meantime,
development of future industries requires high quality of space for interaction. City clusters, through providing a comprehensive collection of factor conditions required by emerging industries, will exhibit even stronger attraction to talent and population in general.

- **Broader:** High-speed transportation expands the sphere of influence of the city cluster; emerging technologies, such as networked autonomous vehicles, will further enhance the connectivity between localities within a cluster.

Such new features bring new challenges to future city clusters.
2. Development Challenges of the City Clusters

As mentioned above, employment opportunities brought about by industrial growth, superior provision of public services, and the improved connectivity enabled by new transportation and communication technology, combined with rapid population growth within the sphere of influence of an urban center give rise to expedited formation of megacities and mega clusters. At the same time, however, the innate conflict among these aggregating factors lead to a series of imbalances in the process of urban development. (See Exhibit 4.) These imbalances are mainly manifested in three forms: Spatial imbalance, opportunities imbalance and resource imbalance. The interplay among the three imbalances may create a vicious circle of urban degradation: Polarizing and sprawling development in core cities lead to environment deterioration in surrounding areas and shortage of public resources within, together with rising income inequality and resulting social confrontation, forces for positive changes are paralyzed, while the city continue to swell. The key to balanced and sustainable urban development lies in effective spatial coordination, innovative policy design that alleviates the conflicts arise from rapid urban expansion and population growth, and cluster based solutions that addresses prevalent “megacity diseases” through optimized resource allocation and utilization.

Exhibit 4. Three Imbalances Emerging Megacities Need to Address

Source: BCG analysis.
2.1 Spatial Imbalance: Improvement of Transportation as a Double-edged Sword

The improvement of transportation infrastructure will facilitate the flow of production factors and the optimization of resources allocation. The impact of transportation on economic development, however, is not distributed evenly in space. While core cities are able to extract resources through improved transportation links, areas with poor industrial foundation and factor endowment often fall victim of siphoning effects. The construction of rail transport facilities is often welcomed, in spite of challenges that may arise with land acquisition and project financing. What is often under reported is the significant difference in the level of benefit different areas along the route could expect to derive. Take the Wuhan-Guangzhou High-speed Railway as an example. Since its completion in 2009, the two large metropolises at terminal ends of the rail link have maintained rapid growth and population inflow. Other cities along the route, on the other hand, have shown varied performance: cities with sound industrial foundation or tourism resourced gained saw gains in population growth, while areas with poor factor endowment suffered from accelerated outflow. (See Exhibit 5.) The development of megacities is often a polarizing process, with Beijing being a classic example. The next generation of city clusters will exhibit faster pace of growth and a wider sphere of influence. It is crucial to take a

Exhibit 5. Impact of High-speed Rail Development

Spatial Conflict: Is High Speed Rail a Boon or a Curse
Completion of the Wuhan-Guangzhou HSR cut the transport time between the two cities from 11hrs to 3hrs
Population flow along the Wuhan-Guangzhou HSR link between 2008 and 2016

- Accelerating Inflow
- Accelerating Outflow
- Revert to Inflow
- Reduced Outflow
- Accelerated Outflow

85km 130km 147km 52km 125km 153km 150km 87km 140km

Guangzhou, Wuhan, Changshang

- Guangzhou: Core of the Pearl River Delta City Cluster
- Wuhan: Core of the Middle Yangtze River City Cluster
- Changsha: Core of the Chang-Zhu-tan City Cluster

Yueyang, Zhuzhou

- Yueyang: Second largest city in Hunan
- Zhuzhou: One of the Three Cores of the Chang-Zhu-tan City Cluster

Hengyang, Zhuzhou, Shaoguan, Qingyuan, Xianning

- Fourth-tier cities and below, lack of industrial infrastructure and cultural resources

Sources: 12306, Yearbook of Guangdong Province, Hubei Province and Hunan Province; Expert Interview; BCG analysis.
*Floating population= Permanent population of the year - Household population of the year. The positive value indicates the inflow of foreign population, otherwise it indicates the outflow of local population.
holistic view towards the development of all cities and districts within a cluster, so as to avoid exacerbating spatial imbalance.

Another form of spatial imbalance concerns new and existing urban space. Improved transportation links bring large expanses of undeveloped land within the reach of the core city. Tendency for city administrators to avoid complexity involved in land acquisition and to leave lasting legacy in the form of iconic landmarks leads to a positive bias towards green field development. A balanced view towards new development and regeneration is key to ensuring that in creating new and much needed living space for expanding urban population, efforts are made to avoid the decline of inner cities, the neglect of underprivileged urban poor, and the loss of cultural identity associated with the city’s past.

2.2 Opportunity Imbalance: Income Inequality Within Cities

As global population continues to agglomerate towards major cities, technological advancement, and rapid shifts in industrial structure and production methods have led to fundamental changes in the dynamics of urban economic development. The traditional path of gradual evolution from labor-intensive industries to capital-intensive and eventually to innovation-driven ones may no longer be available. Compared with the rise of coastal city clusters in China, the emerging mega cities will face the challenges from new ways of production in much early stages of their development. Automation, artificial intelligence and flexible manufacturing blur the boundaries of global value chain and division of labor among nations. The declining contribution of basic labor to total factor productivity and the “Matthew effect” brought about by the interplay between technology and capital are working to intensify inequality, and may even challenge the ability of emerging megacities and city clusters to provide employment to low-skilled labor altogether.

Even in developed countries, strong correlation can be observed between level of economic development and social inequality, while “jobless” growth has become a major point of concern in public discourse. Taking the United States as an example, the severity of income inequality is observably strong in major international metropolises such as New York and Los Angeles; and despite continued increase in total level of employment, job participation rate has never recovered to pre-crisis level. The risk of long-term structural employment and disengagement from labor market poses serious risk to development and stability.(See Exhibit 6.)

Similar pattern is seen at city cluster level. (See Exhibit 7.) Among the ten metropolitan areas in the four largest city clusters in the United States, only Boston and Dallas has
Exhibit 6. Economic Development and Inequality

Opportunity Conflict: Income gap widens as cities develop
Income gap in major US cities, 2016

Sources: ESRI incomes mapping; BCG analysis.

1The ratio between 5th and 80th percentile of household income.

Exhibit 7. Income Inequality in Four Major U.S. City Clusters, 2014-2016

<table>
<thead>
<tr>
<th>City Cluster</th>
<th>2014 Ratio</th>
<th>2016 Ratio</th>
<th>Change value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boston-Washington City Cluster</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New York</td>
<td>14.1</td>
<td>14.7</td>
<td>0.6</td>
</tr>
<tr>
<td>Washington</td>
<td>15.1</td>
<td>17.5</td>
<td>2.4</td>
</tr>
<tr>
<td>Boston</td>
<td>17.8</td>
<td>14.8</td>
<td>-3.0</td>
</tr>
<tr>
<td>Philadelphia</td>
<td>11.8</td>
<td>12.3</td>
<td>0.5</td>
</tr>
<tr>
<td>Great Lakes City Cluster</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chicago</td>
<td>11.9</td>
<td>12.1</td>
<td>0.2</td>
</tr>
<tr>
<td>Detroit</td>
<td>10.9</td>
<td>11.8</td>
<td>0.9</td>
</tr>
<tr>
<td>Texas Triangle City Cluster</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Houston</td>
<td>9.7</td>
<td>10.2</td>
<td>0.5</td>
</tr>
<tr>
<td>Dallas</td>
<td>12.2</td>
<td>11.0</td>
<td>-1.2</td>
</tr>
<tr>
<td>West Coast City Cluster</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Los Angeles</td>
<td>12.5</td>
<td>12.8</td>
<td>0.3</td>
</tr>
<tr>
<td>San Francisco</td>
<td>14.5</td>
<td>15.9</td>
<td>1.4</td>
</tr>
</tbody>
</table>

Sources: ESRI incomes mapping; BCG analysis.

1The ratio between 5th and 80th percentile of household income analysis of 2016 American Community Survey.
exhibited narrowing income inequalities. Compared to their peers, Boston and Dallas have launched targeted initiatives to promote inclusive growth. The city of Boston launched the “Inclusive Initiative” to reduce income inequality through community building and eradication of discrimination; Dallas on the other hand introduced Communities United for a Greater Dallas (CUGD) initiative to systemically improve living conditions and employability of low-income groups.

Evolution of technology and business will not lead naturally to improvement in social equity. Positive interference that encourages participating, engagement and mutual understanding is key to creating amiable context for the alleviation of inequality.

2.3 Resources Imbalance: Depletion and Insufficient Supply of Public Services

As cities grow in size, demand for resources such as water, electricity and fuel, as well as for transportation, education, healthcare and other public services increase simultaneously. Emerging megacities — with faster pace of development and larger population base — will face even more pressing challenges. In 2014, only 10% of the world’s urban population lived in cities with up-to-standard air quality; Among the ten most congested cities, six are emerging megacities (Mexico, Bangkok, Jakarta, Istanbul, Rio de Janeiro, and Beijing). In China, average concentration of PM2.5 in the Beijing-Tianjin-Hebei (Jing-Jin-Ji) Region in the first half of 2017 reached 72 μg / m³ (second-degree pollution), with an increase of 14.3% from previous year; in the meantime, the measurement of same indicator for Pearl River Delta is 35 μg / m³, with an increase of 16.7%. Pollution has become a top public concern in recent years. As for transportation, compared with 2016, ten cities exhibited spillover of congestion suburban areas, include the core cities of five “national-level city clusters” (Beijing, Shanghai, Tianjin, Wuhan, Xi’an). Effectively reduction of environment footprint, and more efficient mobilization, utilization, and distribution of resources, are key to creating a positive connection between the expansion of urban capacity and the improvement of urban experience, and are thus important items of the agenda for future city cluster development.
3. Towards a Sustainable Urban Future

A new generation of city clusters evolved around emerging megacities will be key to human development in the future, the timing and characteristics of their rise, as discussed, will likely create more pressing challenges that more established peers faced. The ultimate purpose for city cluster development is to satisfy the pursuit of people for a better life. To satisfy such pursuit requires a sustainable and self-adjusting system that foster coordination, inclusion, and preservation through open collaboration and multi-dimensional innovation, while the enhanced urban livability, in turn, attracts high quality of factors of production that enables more productive collaboration and innovation. (See Exhibit 8.) Coordinated development, inclusive growth, and circular economic model are core to this system. While application of advanced technology solutions allows a myriad of possibilities for cities to better understand and serve the demand of its residents, the running of future city clusters will incur much greater complexity, and will require weighing of ever more demands and options. To command such task has raised the bar significantly on what is required of bodies and individuals governing the city cluster. A renewed approach to governance will be the cornerstone for achieving the vision for a promising urban future for all.

Exhibit 8. A Vision for the Future City Cluster

Source: BCG analysis.
3.1 Coordinated Development

Coordinated development among different cities within a region requires coordination in multiple dimensions, from organization, space, to the underlying data infrastructure. Effective resource integration, role allocation, and best practice sharing is achieved through synchronized effort in data gathering and process, strategic planning and design, as well as task execution and implementation.

- **Coordinated Organization.** This involves creating trans-regional/cross-functional management platforms to stimulate the flow of factors of production through centralized resource integration and coordination, creating and exploring industrial, cultural and human capital synergies. Taking the Lille-Kortrijk-Tournai city cluster as an example, economic revitalization and social transformation are achieved through the establishment and functioning of an administrative organization structure that encourages and enables effective communication within and between multiple levels of government concerned with the development of the cluster — from local communities all the way through to the European Commission. (See Exhibit 9.)

- **Coordinated Space.** The key to ensuring spatial coordination is to ensure the plan-
ning and development of transportation infrastructure and the designation of land use that corresponds to a shared vision and strategy for the development of the cluster. On one hand, planning guidelines need to be established at cluster level to provide general direction, while tools and support are provided to individual cities/districts/communities to devise strategies that reflect local idiosyncrasy and differentiated functional positioning. On the other hand, incentive structure and evaluation criteria on local officials need to be redesigned to encourage collaboration rather than zero-sum resource-grabbing. (See Exhibit 10.)

- **Coordinated Data.** Data form the foundation for regional planning and administration. The key to the coordinated development of future city clusters is the coordination in data. A compatible platform needs to be established to allow effective collection, analysis and application of data. In the meantime, opening a compatible data acquisition, analysis, application platform between cities while using open data repository and application programing interface (API) is required for the sharing of data — to the extent that data security can be adequately safeguarded — and enabling of participation from a multitude of players in agile urban innovation. (See Exhibit 11.)

**Exhibit 10. Tokyo: Transit Oriented Development Enabling Spatial Coordination**

<table>
<thead>
<tr>
<th>Background and challenges</th>
<th>High-density development around increased number of stations, improved coordination through redefining the form and boundary of urban space</th>
</tr>
</thead>
<tbody>
<tr>
<td>- In recent years, Japan’s aging population resulted in a transition from radial expansion of major cities toward a “compact” development model amid increasing migration of people to the capital and other major urban agglomerations.</td>
<td>- Increase the number of lines: Based on the inter-city radial railway transportation line, build a fiber city system to promote regional development.</td>
</tr>
<tr>
<td>- A continuous decline in suburban population and the number of train commuters made public transport and infrastructure facilities unsustainable in these areas.</td>
<td>- Increase site density: Based on existing lines, increase the number of stations and shorten the walking time of suburban residences to the station, and thus promote the development of public transportation.</td>
</tr>
<tr>
<td>- The “fiber city system” was proposed on the basis of “compact” urban development, with the aim of maximizing land efficiency against contracting urban spaces.</td>
<td>- Creating a livable environment: Converting free areas with less accessibility to stations to green spaces, thus to create a livable green urban environment.</td>
</tr>
</tbody>
</table>

**Sources:** FiberCity 2050; BCG analysis.
3.2 Inclusive Growth

Shared prosperity will occur naturally. The development and adoption of smart technologies will lead to further concentration of wealth towards knowledge and capital. While the net impact of technological development on employment is a subject of debate, the dichotomy between economic growth and employment/wage growth is indicative of the persistant structural conflict brought about by “industry upgrade” that cannot be easily resolved by market forces. Reducing social stratification requires systematic policy design that supports skill upgrade and entrepreneurship. It is key to direct incremental public resources accrued from technological advancement towards fostering a social environment and institutional construct that encourages and facilitates participation in innovation, creativity, and continuous self-improvement, thus achieving progressive as well as dignifying redistribution of wealth.

Mobility is a central element of inclusive growth. Through elimination of barriers to spatial inclusion, knowledge inclusion and social inclusion, improvement in mobility could be attained as a result of reduced biases and enhanced mutual understanding. (See Exhibit 12 & 13.)
Medellin is the second largest city in Colombia, and Santo Domingo was synonymous with slum in the city. The local transportation network and education system were underdeveloped, with a limited number of public amenities available, making it impossible for most residents in the area to work in downtown Medellin, as if they were isolated from the society.

A cable railway and “mountain elevators” were constructed in 2004, and the travel time from Santo Domingo to the downtown area was cut from several hours to just 20 minutes. Tens of thousands of local residents went to the city for work.

Modern style amenities including a library and a stadium were built in Santo Domingo. They improved the image of the area and raised residents’ acceptance.

A wide variety of interactive activities were held at the local stadium and botanic garden. The arrival of tourists broadened the leisure and social life in Santo Domingo.

Sources: Documents retrieved; BCG analysis.

Exhibit 12. Pittsburgh: Lifting Knowledge and Social Barriers Through Supporting Entrepreneurship and Community Education

-maker movement

STEAM Programs

Popular Science Infrastructure

Sources: Documents retrieved; BCG analysis.
• **Spatial Inclusiveness.** Strengthen the physical links between communities, promote integration through public events, social programs, open exhibitions, partial regeneration, etc., that will increase touch points between communities in familiar environment.

• **Knowledge Inclusiveness.** Leverage physical as well as virtual resources to provide infrastructure for continuous learning. In the meantime, sponsor creativity and innovation, direct public funding towards transformational skill acquisition.

• **Social Inclusiveness.** Encourage place-making that addresses shared social needs. Create mixed-use, open, diverse, and dynamic public spaces. Discourage gentrification in planning and development process. Promote diversity and communication, reduce stratification in the field of education, and nurture empathy through cross-community immersion.

### 3.3 Circular Economy

Circular economy aims to achieving energy conservation, emission reduction, and optimized utilization of resources through forming a closed-loop in the production and consumption process. Development of circular economy is a systematic endeavor involving a multitude of stakeholders, and relies upon synchronization between supply system, production process, emission standard, municipal services and individual behavior. Currently, the extensive application of circular economic concepts and practices is largely observed in developed regions, most notably Northern Europe. As digital technologies become increasingly mature, the cost of monitoring, recovering, and utilizing waste, and optimizing the use of energy will likely fall significantly. For emerging city clusters, circular economy is no longer an unaffordable luxury, and the scale in which circular economy initiatives can be applied will expand from single city to multi-centric ecosystem that cover both urban and rural areas.

In establishing a circular economy system, two interconnected factors are crucial to its success.

1) **Design of business model**

Build close-loop system for the utilization of resources along the production value chain and consumer journey. Ensure that the system — in part as well as in whole — is supported by sound business model that can withstand the test of market and time. (See Exhibit 14.)
2) Establishment of social awareness

Lacking participation from the consumption end, the closed-loop that is central to the functioning of circular economy will break down. It is thus essential to internalize the concept and methods of socially responsible and environmentally conscious consumption and civil behavior into civic culture. (See Exhibit 15.)

3.4 Emerging Technical Solutions

The ultimate purpose for city cluster development is to satisfy the pursuit of people for a better life. Reliable energy supply, convenient transportation, enjoyable natural space, adequate public services, and pleasant built environment are the basis of quality life. Development of smart technologies has provided a diverse range of options to address needs that may arise in the context of future city clusters. (See Exhibit 16.)

Adoption of smart technology solutions, however, is not without issues. Often smart city...
solution falls victim of the “technology-for-technology” trap. Lacking understanding about competing priorities and varied demands from stakeholders, overlooking interoperability that leads to fragmented systems and inability to deliver promised value, underestimating the accompanying organizational and capability transformation required to manage and continuous upgrade the system, and the bias in favor of new technology with limited applicability and scalability all potentially contribute towards waste of public resources are already under pressure in most part around the world.

Reflection on past failures has led some to rethink the approach to smart technology adoption. Take the city of Boston as an example. In contemplating the development of a smart transportation system, it partnered with BCG to conduct simulated testing on multiple technological options against a series of different scenarios. The exercise generated unique and systematic insight into the impact of smart mobility adoption — not only the technology in itself, but also the ways in which it is adopted — to the livability and sustainability of the city. The result and analysis enables the city to develop programs that bring desired value to the public, and provide valuable input to other cities looking to adopt the technology. (See Exhibit 17.)
Exhibit 16. Smart Technologies Improve Quality of Living

Market demand diversified as technology innovation accelerates

Exhibit 17. Systematic Design and Testing

Smart technology based solutions should be carefully designed and tested

Workflow

1. Environment Modeling
2. Experiment Design
3. Scenario Simulation
4. Analysis and Evaluation

Key measures

1. Data are collected to construct models to simulate the area selected for testing
2. Different technological options are designed and experiment plans developed
3. Experiments are conducted for different scenarios that reflect states of reality
4. Results of the simulated experiments are analyzed to assess impact and applicability

Case study

BCG supported Boston in simulated self-driving vehicle testing

The downtown area is selected for the tests. Spatial, participant and real-time behavior data were collected

The test plan was designed for four models with autonomous driving functionality

Different scenarios were developed according to differences in driving automation and timeshare technology penetration between the models

The impact of different models on car ownership, CO₂ emissions, etc. is analyzed under different scenarios

Source: BCG analysis.
In addition to taking a systematic approach towards the understanding and development of tech-enabled solutions, it is also important to take a full view of the technological options available to the city, evaluate their cost and impact, and decide on a path to take that truly reflects the desire of the people. (See Exhibit 18 & 19.) The city of Stockholm, Sweden, plans to become the smartest city in the world by 2050. There are multitude of options in each area of smart technology. Through a structured analytical progress — which involved establishing a set of evaluation criteria that reflect the city’s development priorities and assess the overall impact of each technological solution — the City, with the help of BCG, has set on the course to seek a route to success that balances vision with practicality.

The application of new technology is crucial to the development of future cities and city clusters. Faced with diverse choices, cities need to be smart about “Smart Cities”.

3.5 New Approach to Governance

New realities in a new era have brought about new and more pressing challenges to the development of emerging city clusters. Addressing such challenges requires the ability to design complex and comprehensive solutions, while making effective use of new technological tools. This requires the next generation of government command greater ability to
exert top-down leadership in shaping future development agenda and mobilize essential resources, as well as to establish agile institutional arrangements that foster bottom-up innovation.

The British government has been making active efforts to innovate the way in which urban development is governed. On the “top-down” side, Innovate UK, the innovation promotion arm of the Department for Business, Energy, and Industrial Strategy, has been working with city governments to facilitate urban innovation. (See Exhibit 20.) Under this cross-level and cross-department arrangement, Innovate UK has organized Future Cities competition, mobilizing central government resources to support local governments in developing and implementing innovative digital city initiatives. In the meantime, it established a number of urban innovation accelerators, called “Urban Catapult”, throughout the country in order to encourage small-to-medium companies to participate in urban digital innovation. Results from city-level innovation initiatives are shared among participants through the Knowledge Transfer Network (KTN) initiative.

On the “bottom-up” side, Urban Catapult provides equipment, network, funding, and managerial support to companies and individuals looking to develop innovative solutions to urban challenges. (See Exhibit 21.)

- Functions
  - The department is an administrative decision-making body under the British cabinet.
  - It is designated to facilitate development in business and industry, scientific research and development, energy and climate sectors. Its responsibilities include drafting development strategies and policy incentives and making administrative decisions.
  - As a public organization affiliated to the Department of Commercial Energy and Industrial Strategy, Innovate UK supports scientific research activities; helping technology professionals and organizations to find business partners and other institutions for technology development and commercialization; stimulating economic growth in the UK.
  - Innovate UK have several Key non-profit projects, which facilitates technology commercialization by matching innovative product developers with suitable enterprises and facilitates participation in the Future Cities contest.

Sources: Literature search; BCG analysis.

Exhibit 21. Bottom-Up: Encourage and Facilitate Participation Through Catapult Centers

Catapult Centers successfully attract various institutions to participate in urban construction and innovation efforts by rolling out four measures:

- Use advanced equipment to do theoretical verifications with the help of experts.
- Use social networks to conduct academic collaborations with businesses.
- Search for industrial funds.
- Search for preferential policies and removal of management restrictions.
- Use advanced equipment to conduct tests with the help of experts.
- Use social networks to conduct collaborations with academic institutions and investment companies.
- Search for industrial funds and relevant policies.
- Use advanced equipment to get skill training needed for innovative industries and find jobs with the help of experts.

Advantages of the bottom-up mechanism:

- Lower the threshold for participating in innovative industries and the development of future cities to attract more companies and institutions.
- Promote communications between various institutions to form a virtuous dynamic cycle linking industries, universities and research communities.

Sources: Literature search; BCG analysis.
Data infrastructure is crucial to supporting innovative approaches to governance. Government in leading global cities are launching open data platforms, allowing access to a wide range of data, and encouraging experimentation of new digital products and services using the data available. As part of the OrganiCity initiative, London has introduced the EaaS (Experimentation as a Service) platform, which in addition to data access, provides a comprehensive set of support, including co-creation, testing and IP protection. (See Exhibit 22.)
Conclusion

As the world continues to urbanize, population is becoming more concentrated. Megacities with more than 10m people will become important centers of human development. New entrants to the megacity club will come exclusively from developing countries, while some will continue to sprawl around a single urban center, many will grow to become clusters of core and ancillary cities as transportation links improve. The new generation of city clusters that evolves around emerging megacities will feature larger population, faster expansion and broader reach compared to their counterparts in developed nations during the same stage of economic development. Such characteristics will likely magnify the conflicts and imbalances that arise as byproduct of urban development. Resolving such conflicts and imbalances requires a comprehensive solution that encompasses coordinated development, inclusive growth and circular economy.

Advancement in emerging technologies provides new possibilities for addressing challenges faced by the new generation of city clusters, and meeting demands from citizens for enhanced quality of life. Technology, however, is merely a means to end. Systematic approach towards solution design, careful evaluation of cost and benefit, and a holistic and dialectic view over tech and non-tech elements are key to devising successful strategy for future city clusters. Diversified options and increased administrative complexity have raised new challenges to governments in their capacity to govern. The ability to command top-down strategic leadership is matched in importance by that to empower bottom-up participatory innovation. Supporting the new model of governance requires open data infrastructure and accompanying service offerings that enable agile experimentation.

The city cluster of future is a complex and open living organism, in the face of technological progress and institutional innovation, the management of urban agglomerations is evolving from an administrative function to a creative process. Breakthrough achieved in this incremental process may lead to creation of “super city clusters” that defies traditional patterns and constraints, and will bring about a prosperous, resilient, and sustainable future for all.
About the Authors

**Yvonne Zhou** is a partner and managing director in the Beijing office of The Boston Consulting Group. She is a global topic leader of Urbanization & Real Estate, and also leads BCG’s Industrial Goods practice and Public Sector practice in Greater China. You may contact her by email at zhou.yvonne@bcg.com.

**Yipei Liu** is a principal in the Hong Kong office of The Boston Consulting Group. You may contact him by email at liu.yipei@bcg.com.

**Xiaobai Chen** is an associate in the Beijing office of The Boston Consulting Group. You may contact her by email at chen.xiaobai@bcg.com.

**Ming Xu** is an associate in the Beijing office of The Boston Consulting Group. You may contact her by email at xu.ming@bcg.com.

**Shane Sun** is a senior associate in the Beijing office of The Boston Consulting Group. You can contact him by email at sun.shane@bcg.com.
The Boston Consulting Group (BCG) is a global management consulting firm and the world’s leading advisor on business strategy. We partner with clients from the private, public, and not-for-profit sectors in all regions to identify their highest-value opportunities, address their most critical challenges, and transform their enterprises. Our customized approach combines deep insight into the dynamics of companies and markets with close collaboration at all levels of the client organization. This ensures that our clients achieve sustainable competitive advantage, build more capable organizations, and secure lasting results. Founded in 1963, BCG is a private company with offices in more than 90 cities in 50 countries. For more information, please visit: www.bcg.com

For more information about BCG, please email greaterchina.mkt@bcg.com.

For more insights from BCG, pls follow us on WeChat, account name: BCG波士顿咨询; ID: BCG_Greater_China; QR code:

©The Boston Consulting Group, Inc. 2017. All rights reserved.
3/18