

# Game on

## Mega-event infrastructure opportunities

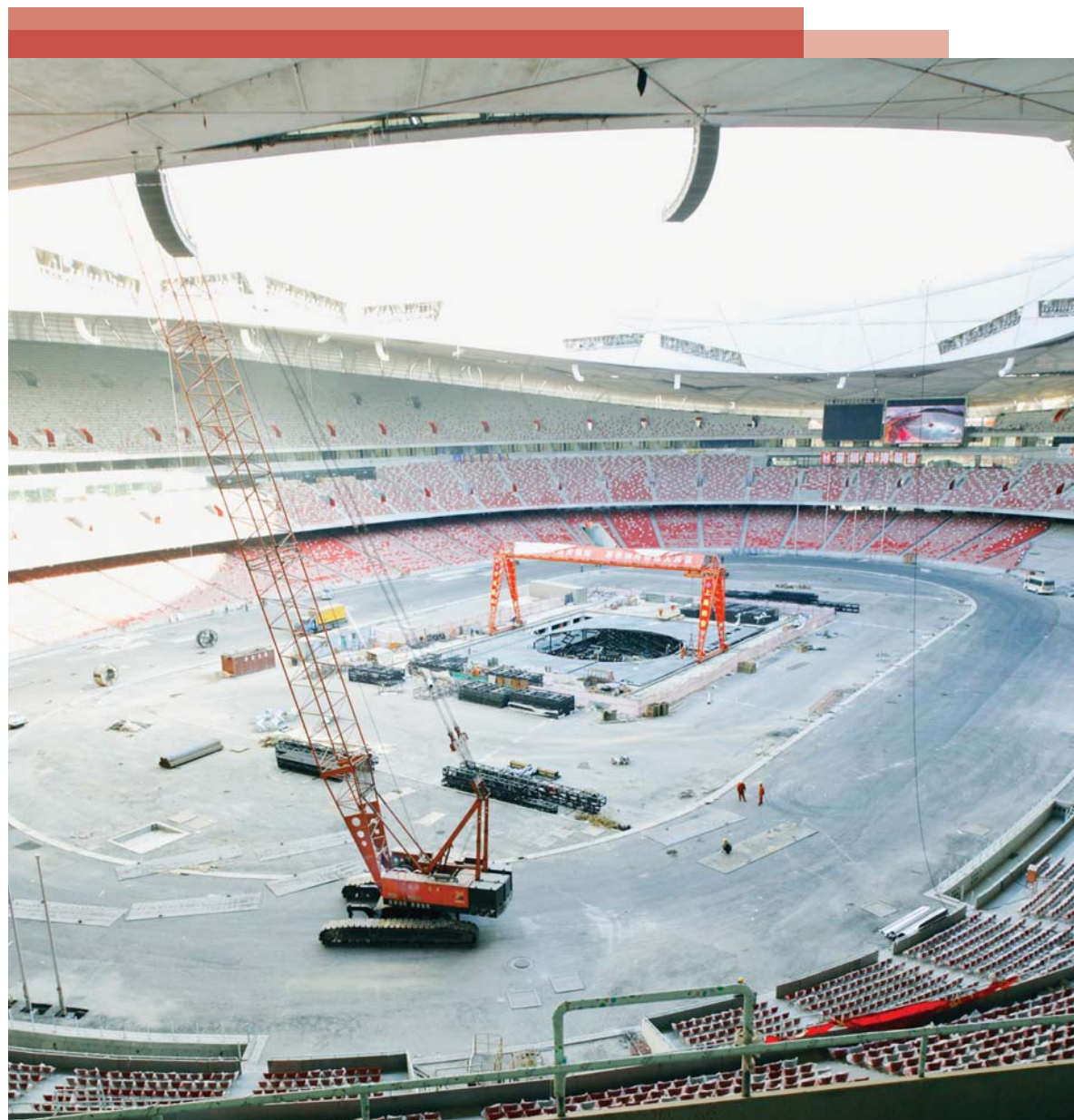
April 2011

### **At a glance**

The quality of a region's infrastructure denotes its potential for growth well into the future.

Investment in mega-event-related infrastructure can accelerate economic development by as much as three decades.

Cities and regions turn to public-private partnerships for access to capital and risk mitigation.



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*The transformative effect of well-thought-out supporting infrastructure for a mega-event like the Olympics or World Cup football has long-lasting economic, demographic, and social implications for the entire region. How a government body—national, regional, or municipal—plans for the legacy of supporting infrastructure can have a ripple effect on the development of a region for decades to come.*

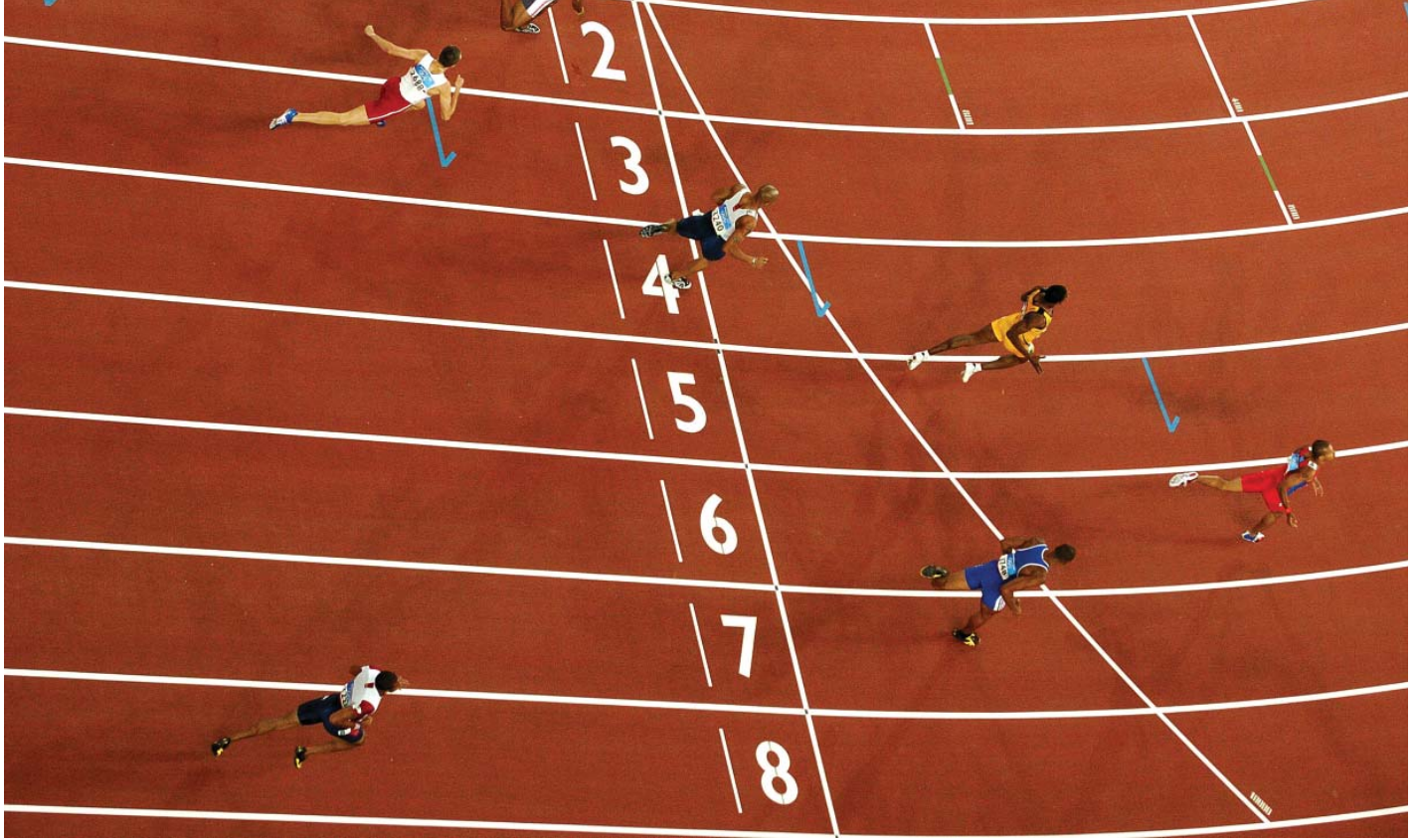
More than 4 billion people worldwide tuned in to the Beijing Olympics in August 2008, the largest global television audience on record. A lavish extravaganza that cost billions of dollars, the Beijing Games were the most expensive to date. And while the world watched, China took center stage. The global audience tuned in to watch athletes compete, but they also saw contemporary China in a whole new light. This opportunity to capture the world's attention for a few weeks—and the ensuing lasting legacy—exemplifies both the intangible and the tangible essence of mega-events.

Indeed, the legacy of a mega-event is very tangible: An October 2009 report by two economists, Mark Spiegel from the Federal Reserve Bank of San Francisco and Andrew Rose from the University of California, Berkeley, found that hosting a mega-event like the Olympics or the FIFA World Cup™ permanently boosts trade by 30 percent. Their study of 196 countries' economic performance between 1950 and 2006 found that the “Olympic effect” derives from host countries signaling their intention of moving toward a more open trade policy.<sup>1</sup>

Today, winners of mega-event bids should begin planning far ahead of the actual event, often a decade or longer in advance, recognizing that success in hosting a mega-event must include the supporting infrastructure required for participation, by both athletes and spectators. In fact, inadequate infrastructure planning or follow-through might well upend the perception of impressive achievement: Reports documenting the potential lack of adequate infrastructure have sometimes dominated the news in the weeks and months leading up to a mega-event. Those reports have the potential to jeopardize the positive image a city or country is aiming to build. To avoid such a scenario, advance planning is essential. So is the importance of demonstrating the lasting benefit of that infrastructure investment, a true legacy for the community.

In the excitement that grips a host city immediately after a selection announcement, ideas and vision abound. Translating those ideas and that vision into reality, however, is more elusive. To maintain clarity of vision, city leaders are well advised to test the long-term viability of each





anticipated project. How does the vision for mega-event investment correspond with the region's long-term needs and objectives? Which financing models best apply in each case? What role does sustainability play? What are the projected maintenance costs? How will procurement occur? What kind of oversight should govern the process? PwC understands each of these critical success factors and barriers. In the following pages, we will analyze the infrastructure investments that a sample of host cities has made. We will also examine the long-term implications for each region where those investments occurred. Our experience advising organizing committees, contractors, and host countries allows us to discern—from the perspective of an infrastructure investment—the factors that create a lasting legacy for a host city or country.

### ***Taking the long view***

Providing adequate transportation, utilities, clean water, and sanitation for thousands of athletes and millions of spectators at a mega-event like the Olympics or the World Cup, governed by the Fédération Internationale de Football Association (FIFA), is no mean task. But what becomes of that supporting infrastructure after the athletes and spectators have gone home? While the eyes of the world are on the events, athletes, and facilities for a few weeks during a mega-event, the transformative effect of well-thought-out supporting infrastructure has long-lasting economic, demographic, and social implications for the entire region. How a government body—national, regional, or municipal—

plans for the legacy of supporting infrastructure can have a ripple effect on the development of a region for decades to come.

In Spain, Barcelona used the 1992 Olympics as a catalyst to speed up previously established goals for urban regeneration. The city constructed ring roads that eased long-term traffic congestion, renovated its airport, restructured public transportation, improved public parks and the lakefront, upgraded its telecommunications system, and modernized its sanitation system. With every intention of benefiting the residents and businesses of Barcelona over the long term, local planners undertook a massive effort to transform the city.<sup>2</sup>

But the Games weren't the sole catalyst for this evolution, according to Stephen Essex, associate professor at the UK's University of Plymouth, who researches infrastructure implications of the Olympic Games. He says the Olympics "simply speeded up the renewal that had already been planned to take place over 50 years" in keeping with the region's 1976 General Metropolitan Plan of Barcelona. According to Essex, organizers had already "mobilized public support through neighborhood projects that had established a consensus for change." Meanwhile, existing facilities with planned upgrades served as many of the main Olympic venues. And public sector support was substantial, Essex says, impelled by the end of the Franco period as well as an upsurge in regional identity.<sup>3</sup>

In fact, Barcelona spent six times as much on infrastructure (both Games infrastructure and supporting infrastructure) as it did on organizing the event itself. And four previously neglected urban areas were a part of the plan for citywide Olympic facilities, which allowed city planners to allocate resources for comprehensive redevelopment.<sup>4</sup> As a result, the 1992 Games thrust Barcelona into the top tier of Europe's tourist and business destinations; the mayor of Barcelona said the city experienced a metamorphosis within five years that would otherwise have taken three decades.<sup>5</sup> In fact, thanks to infrastructure investment and brand equity in the wake of the Olympics, tourism revenues more than doubled in Barcelona.

However, public support—and resources—are not always enough. Private funding, expertise, and oversight are often required to bridge the gap between what the public sector can realistically achieve and what the mega-event actually requires. In addition to almost \$5 billion committed by the public sector, the Barcelona Olympics attracted some \$7 billion

# 250%

*In anticipation of increased consumption during the 2014 Winter Olympics in Sochi, 200 new facilities will power up incrementally, increasing the energy capacity of the Sochi power grid by 250 percent.*

in private-sector financing.<sup>6</sup> Today, municipalities hosting the Olympics and other major events like the World Cup increasingly explore private-sector options as a way to better manage financing concerns for supporting infrastructure. More recently, some cities and regions have turned to public-private partnerships (PPPs) as a viable solution. Best suited to large-scale infrastructure assets with ongoing maintenance requirements, PPPs are increasingly used to secure additional financing, better manage risk, and increase transparency and accountability. (For more on PPPs, see page 15.)

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*A 2010 World Economic Forum report found that underinvestment in infrastructure is a top 10 economic risk for the entire global landscape because infrastructure is the foundation of a region's prosperity and resilience.*

### ***Investing for optimum return***

While the total amount invested in a mega-event is always high, it can vary widely, based on how much infrastructure already exists. China invested approximately \$40 billion in infrastructure alone between 2002 and 2006 to prepare for the Olympics, building some 40 new stadia and athletic facilities, doubling the capacity of Beijing's subway system, completing the light-rail system, building and improving roads, and constructing a new airport.<sup>7</sup> Olympic-related investment accounted for up to 15 percent of overall economic investment between 2002 and 2008.<sup>8</sup> What the city gained was an enormous—and enormously overdue—investment in its basic infrastructure and in its public spaces, according to William Kirby, director of the Fairbank Center for Chinese Studies at Harvard University. Kirby describes the new airport as “stunning, larger than all of Heathrow, and perhaps the most beautiful on earth.”<sup>9</sup> And by easing air traffic congestion as a result of fewer flight delays, the airport also provides

long-term economic benefit.<sup>10</sup> Post-Games, Beijing is a top performer in the infrastructure category, according to a 2010 PwC report on global cities. Despite lingering urban mobility challenges, it has the lowest user cost of public transportation of the 21 cities evaluated.<sup>11</sup>

London, meanwhile, expects to spend some \$15 billion for the Olympic Park under construction in East London and the regeneration of the entire region, including transportation, bridges, utilities, and walkways. Olympic Village, which will house the athletes during the Games, will provide private as well as government-supported housing for London residents after the Games. A report from the UK's National Audit Office says that “Olympic Park will be a blueprint for sustainable living and help to transform the heart of East London,” historically a less developed part of the city.<sup>12</sup> Meanwhile, several long-term transportation projects estimated at about \$8 billion, while not being delivered specifically for the Olympics are nevertheless essential for the success of the Games, according

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to the National Audit Office report. These projects include widening of the M25 motorway around London and upgrading rail links to Olympic venues, such as the West Coast mainline and the Channel Tunnel Rail Link. The M25—the second longest ring road in Europe at 117 miles—was procured as a PPP and financed entirely with private funding.<sup>13, 14</sup>

### ***New opportunities for investors***

Investing in infrastructure offers a multitude of economic and social benefits to the region itself. It also offers a wealth of opportunity to international investors seeking new markets. Brazil, for example, is expected to invest some \$83 billion in infrastructure from 2009 to 2016 to prepare for World Cup football in 2014 and the Olympics in 2016. More than 1,200 projects have already been identified for the World Cup, which is expected to draw 3 million Brazilians and 600,000 international visitors.<sup>15, 16</sup> New infrastructure projects will include airports, roads, public transportation, and sanitation. A public-private partnership is likely among the best options to finance a high-speed train line—estimated

to cost \$20 billion—that would serve both the Olympics and the World Cup.<sup>17</sup> Private investors from the Middle East, Europe, and the US have expressed interest in these infrastructure projects. Even more pressing is the need to upgrade Brazil's airports. Increased capacity is essential for handling the volume of foreign visitors expected to attend both mega-events; public-private partnerships offer an ideal option for airport development.

Meanwhile, in Sochi, Russia, site of the 2014 Winter Olympics, the Russian government is actively soliciting participation in public-private partnerships. City and regional planners expect the Games to transform both Sochi and the Krasnodar region in southern Russia, 1,000 miles south of Moscow, into a state-of-the-art year-round resort—with more than 220 miles of roads and bridges, some 125 miles of railroad track, 22 tunnels, telecommunications upgrades, almost 300 miles of gas pipeline, and a modern international airport.<sup>18</sup>

The Sochi Olympic bid calls for approximately 50 infrastructure projects in all. A new high-speed





railroad will be able to transport 8,500 passengers per hour, moving passengers between the coast and the mountains in less than 40 minutes. Some 200 new power plants are slated to increase the energy capacity of the Sochi power grid by 2.5 times its existing capacity. They will power up incrementally, in anticipation of increased energy consumption. And \$500 million worth of new telecommunications infrastructure will allow digital transmission and mobile communication. City and regional officials have thus planned for transportation, energy, and telecommunications infrastructure that will benefit residents and local

businesses long after the 2014 Winter Games.<sup>19</sup> Already a regional tourist destination, Sochi is poised to evolve into an international tourist destination after the Olympics.

Russia is also planning ahead for 16 stadia across 13 cities in anticipation of World Cup football in 2018. Much of the massive infrastructure investment required for this event—4,800 miles of roadway and 1,200 miles of railroad—will occur outside Russia's main cities of Moscow and St. Petersburg, where almost none of the infrastructure currently exists.

## Infrastructure investment: What works best?

Some mega-event host cities have done a far better job of investing prudently in infrastructure than others. Below are some of the priorities that ensure a lasting legacy:

1. Supporting infrastructure works best when it is part of the region's long-term plan for growth. Barcelona already had a 50-year development plan in place; Vancouver's transit project, Canada Line, had been part of the region's long-term plan for decades.
2. Urban regeneration offers long-term payoffs. Sydney's Wentworth Point, formerly known as Homebush Bay, used to be a 3-square-mile area of unusable swampland with meat-packing facilities, some industrial facilities, and a munitions dump before the 2000 Olympics transformed it into a thriving residential neighborhood.<sup>a</sup>
3. A holistic approach translates vision into reality: Well-thought-out project definition objectives, transparent control and accountability, structured project oversight, a clearly defined time line, and robust communication and reporting help ensure successful completion of these large-scale infrastructure projects.
4. Legacy planning for stadia, especially large venues, is crucial. Qatar, for example, plans to build modular venues for World Cup 2022, then dismantle them post-event and ship them to developing nations.
5. Public-private partnerships offer additional financing options, specialized expertise, and risk transfer, as in the case of the Canada Line rapid transport system and Whistler Highway expansion in Vancouver as well as the M25 motorway expansion in London.
6. Public-sector commitment to long-term partnerships is essential. In the case of the M25 expansion, for example, when private financing became less certain, the UK's Department of Transport committed up to \$790 million to save the project. In the end, private funds financed the entire endeavor; however, public-sector commitment was essential to success.<sup>b</sup>
7. Collaboration among various levels of government—federal, state, and local—is essential to mega-event infrastructure planning and investment. Rio de Janeiro won the bid to host the 2016 Olympics only after all three levels of government collectively committed the necessary resources. Having learned from two unsuccessful attempts, they worked together the third time to meet the International Olympic Committee's infrastructure requirements for a successful bid.



As with all mega-events, the challenges in Russia include securing funding, attracting private investors, completing construction on time, and ensuring proper planning for legacy use.

Like the Russian government, the South African government actively solicited private participation in infrastructure, specifically foreign direct investment. The government provided incentives for foreign

new airport with a longer runway for larger airplanes is the country's first new airfield in almost 100 years. The World Cup also accelerated initial completion of the country's first high-speed rail system. The 50-mile rail line linking Johannesburg to Pretoria is one of the country's largest infrastructure projects, according to South Africa's Department of Transport.<sup>20</sup>

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*To prepare for the 2010 World Cup, the South African government committed a first tranche of \$52 billion toward energy generation and distribution, rail transportation, and ports.*

companies to partner with local businesses. While wider infrastructure development has long been a goal of the South African government, the 2010 World Cup—the first sports mega-event held on the African continent—accelerated much of the planning and development. In fact, the government embarked on an ambitious infrastructure development undertaking in 2008, committing a first tranche of \$52 billion toward energy generation and distribution, rail transportation, and ports. In preparation for the World Cup, the government invested more than \$4 billion on infrastructure, implementing extensive road, rail, and airport upgrades. And a brand

### ***Infrastructure investment offers competitive advantage***

A lasting mega-event legacy, infrastructure provides the economic and social foundation of a region's prosperity: Workers spend less time getting to and from work, businesses move products and supplies more quickly, and transportation costs decrease. A 2010 PwC report found that infrastructure correlates directly with a region's "livability," which is an economic asset.<sup>21</sup> In fact, the quality of a region's infrastructure indicates its potential for growth well into the future. In the context of a mega-event, selection committees

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*The monorail project in Manaus, in anticipation of World Cup 2014, is one of Brazil's most ambitious urban mobility projects to date, an excellent example of how a mega-event can impel regional long-term infrastructure investment.*

look carefully at infrastructure from a more practical perspective. They want to be sure that the city can accommodate the athletes and spectators during the actual event—house and transport them—while the mega-event itself functions smoothly.

The task of looking beyond the actual event becomes the responsibility of the host city, region, and country. Legacy planning has become a major component of hosting a mega-event, not least because of the long-term competitive advantage that infrastructure offers. And global demand for infrastructure will continue to expand significantly in the decades ahead, according to the Organization for Economic Cooperation and Development (OECD), driven by global economic growth, technological progress,

climate change, urbanization, and growing congestion.<sup>22</sup>

Legacy planning was certainly a consideration in the Sydney Olympics, as evidenced by analysis from the New South Wales Treasury's Office of Financial Management, which identified the development of major facilities and infrastructure as a driver of business benefit well in advance of the 2000 Sydney Olympics.<sup>23</sup> In the post-Games assessment, PwC reported that the public and private sectors in Sydney invested some \$2 billion on the construction of venues and infrastructure built specifically for the Games. In addition, regional infrastructure construction completed in time for the Olympics but not undertaken specifically for the Games amounted to another \$2 billion or so. New construction and upgrades included refurbishing



the Sydney airport, building new expressways, upgrading several railway stations, and improving the sanitation system.

The upgrade of the Sydney airport, which cost approximately \$1.5 billion, almost doubled its capacity to handle international passengers and added a new rail link. The local telecommunications operator upgraded its capacity at a cost of several billion dollars, which allowed for more than 500,000 mobile telephone calls in Olympic Park during the opening ceremony, a record-setting number in the year 2000 at one event.<sup>24</sup> Today, Sydney ranks as a top performer in PwC's 2010 report on global cities. The city leads in business, political, and quality-of-life variables ranging from urban livability to housing, green space, air quality, congestion management, and carbon footprint.<sup>25</sup>





A mega-event can advance that sometimes elusive economic asset of livability, often by a decade or more, as proven by Barcelona. And Munich's acceleration of transportation and infrastructure projects in preparation for the 1972 Games allowed the city to hasten urban development by as much as

an entire decade.<sup>26</sup> In Atlanta, dormitories built to house athletes at the 1996 Olympics now house 10,000 university students. Meanwhile, the conversion of commercial space to residential has attracted more than 100,000 new residents to the downtown area since the year 2000. These newer residents

represent a reversal of the 1970s and 1980s population trend, when some 100,000 residents moved to the suburbs.<sup>27, 28</sup> And a 21-acre section on the edge of downtown Atlanta, previously a blighted industrial district, is now among the largest urban green spaces in the US.<sup>29</sup>

### ***Poised for transformation***

PwC research has found that a city or region needs to excel in four essential dimensions to capture attention on the world stage: quality services to residents and businesses, sustainable development, visionary leadership, and consistency of image. Cities and regions already poised to achieve transformation in these dimensions are best suited to use the mega-event to accelerate that transformation, as did Barcelona with

Russia, South Africa, and Brazil. In 2007, when Brazil was selected to host the 2014 World Cup, the federal government, cities, and business leaders recognized that they needed to engage in smart planning to make the event a success and bequeath a legacy of improved infrastructure to the host cities. The Brazilian Association of Infrastructure and Basic Industry, the Brazilian Federal Ministry of Sports, and the Brazilian Football Association

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the 1992 Olympics. Similarly, the World Cup football successes of Germany and South Africa also changed perceptions of those countries globally. That might explain the fierce competition among bidders for mega-events—Beijing, for example, edged out 10 contender cities in its bid for the 2008 Olympic Games. It then embarked on a flurry of investment in new infrastructure.

According to the OECD, new construction will drive the bulk of investment in most developing countries as governments strive to expand their networks.<sup>30</sup> Mega-events can certainly provide the incentive for that investment, as they did in China,

sought an accurate picture of the cities vying to host the World Cup events. Once they were able to identify gaps, they could prioritize transformational new investments across the various dimensions of infrastructure, such as energy, healthcare, security, sanitation, transportation, seaports, airports, and telecommunications. Local governments meanwhile are planning transportation enhancements to better allow spectators to reach the events in host cities. In Manaus, for example, officials have embarked on one of Brazil's most ambitious urban mobility projects to date: a new monorail system that will benefit residents and businesses long after football fans have come and gone.

The monorail project in Manaus represents an excellent example of how a major event can impel long-term infrastructure investment in a region that is already poised for transformation. As does Rio de Janeiro's Porto Maravilha urban regeneration project being undertaken for the 2016 Olympics.

Also poised for transformation is Qatar, a rapidly modernizing peninsula nation in the Middle East that is fast becoming an economic, cultural, and sports hub. Winner of the 2022 World Cup football bid, Qatar is slated to spend close to \$70 billion on infrastructure. The country has committed to building a new airport, a new rail system including rapid transit, a new network of roadways, and a bridge to neighboring Bahrain.<sup>31</sup> Much of this construction is part of Qatar's long-term vision for transformation by 2030. Renovation and stadium construction, of modular facilities that can be dismantled, are expected to cost another \$4 billion. All the stadia will be equipped with high-technology, outdoor air-conditioning systems to combat daytime summer temperatures in excess of 100 degrees Fahrenheit, not uncommon in the Middle East. To accommodate legacy planning,

# \$70B

*Qatar expects to spend \$70 billion on infrastructure upgrades.*

government officials announced that the upper tier of several of the stadia will be dismantled and shipped to countries that currently lack football venues. The lower tiers will remain as smaller facilities to host local sporting events.<sup>32,33</sup> As with other successful mega-events, Qatar's ambitious undertaking will require collaboration with the private sector.

### **Public-private collaboration reduces risk**

The most successful Olympics derive from close collaboration between the public and private sectors, according to Michael Payne, who served on the International Olympic Committee for 21 years.<sup>34</sup> The Games represent an opportunity not just for the host city but also for the private participants to make their mark—or strengthen their position—on the world stage. The 1984 Los Angeles Games offer a high-profile example of private participation. After severe financial setbacks a few decades ago—such as the Montreal Games in 1976, originally estimated at \$310 million, but with a final tab of \$2 billion that took almost 30 years to pay off—many cities shied away from hosting the Olympics. In fact, Los Angeles was the only bidder for the 1984 Games. With almost no public financing, the Los Angeles Games relied on private funding to bridge the gap for hosting the Games. The first Olympics Games to pay for itself, the Los Angeles Games turned a profit of \$223 million for its host committee, the Los Angeles Organizing Committee of the Olympic Games.<sup>35</sup>



The success of the Los Angeles Games has been replicated—and improved upon—in the Games that followed. Private partners have complemented public-sector know-how with additional funding, expertise, and oversight. Take the example of Canada Line, a 12-mile regional rapid-transit line connecting downtown Vancouver, the Vancouver International Airport,

Similarly, Vancouver’s Sea to Sky Highway project, also procured as a PPP, was completed in time for the 2010 Winter Olympics. That upgrade, also part of the region’s long-term plan, will most certainly pay for itself, according to Norm O’Reilly, who served on the board of the Canadian Olympic Committee (COC) from 1998 to 2002 and worked on operations with the COC for the 2010

*Best suited to large-scale infrastructure assets with ongoing maintenance requirements, public-private partnerships can help secure additional financing, offer specialized expertise, and better manage risk.*

and central Richmond in British Columbia. Although this new light-rail system wasn’t part of the 2010 Winter Olympic bid, the Games did serve as a catalyst for the project, which was completed several months ahead of schedule as a PPP. Canada Line is the first transit project in North America to be developed as a PPP; it had been part of the region’s long-term plan since the late 1960s. Innovative tunnel design and a service plan to generate more revenue from higher midday ridership resulted in proposed construction cost savings equal to \$85 million in net present value. Ridership began tracking ahead of anticipated levels almost immediately after Canada Line opened in August 2009.<sup>36, 37</sup>

Vancouver Winter Olympics. O’Reilly, a professor of sport management at the University of Ottawa, explains that the upgrade saves time as well as improves road safety on a highway that leads to one of the most popular ski destinations in North America. While the Games accelerated completion, O’Reilly says the upgrade itself was “a no-brainer.”<sup>38</sup>

In fact, various levels of public-private partnerships have evolved over the course of several decades of collaboration for the Olympics. Already widely used in countries such as the UK and Australia, they offer new opportunities for Brazil, Russia, and Qatar to attract private sector participation in infrastructure.

In fact, the costs and benefits associated with mega-events present ideal opportunities for public-private investment partnerships that serve wider urban development goals. Deals that are structured to be mutually beneficial to both the public and private partners are most likely to succeed because each partner becomes an active stakeholder. Depending on the particular deal or type of infrastructure investment, private partners sometimes become long-term stakeholders. As cities encourage more private-sector participation, they can realize the twin benefits of improved access to capital and greater budgetary certainty; well-structured contracts can allocate risks—related to cost overrun, delay, and quality—to the private sector.

### ***Infrastructure girds long-term prosperity***

The impact of hosting major sporting events varies according to the level of development in the host city and country, according to Andrew Zimbalist, an economics professor at Smith College in Massachusetts who has authored several books on sports economics. Zimbalist says with proper planning, hosting a large event can serve as a catalyst for infrastructure development, thus benefiting less developed areas more than those with a well-developed infrastructure already in place.<sup>39</sup>

In Europe and Asia, for example, hosting events like the Olympics, the Commonwealth Games, and

the World Cup are considered part of the process of local and regional long-term development.<sup>40</sup> Ultimately, residents and local businesses in cities hosting mega-events benefit over the long term when city planners and regional leaders create and upgrade supporting infrastructure in keeping with long-range plans already in place for the region. The mega-event serves as a catalyst for accelerated socioeconomic development, including securing sometimes elusive funding. “The Olympic legacy is most effective and pronounced where it goes with the grain of wider urban policies and developments,” says Essex, the associate professor at the University of Plymouth.<sup>41</sup>

That legacy of wider urban development, complete with supporting infrastructure, indicates not only its energy in the present but also its momentum for the future, as reinforced by a 2010 PwC report on global cities.<sup>42</sup> In fact, a 2010 World Economic Forum report found that underinvestment in infrastructure is a top 10 economic risk for the entire global landscape because infrastructure is the foundation of a region’s prosperity and resilience.<sup>43</sup> A mega-event can accelerate infrastructure development by a decade or more; when done in keeping with previously established local, regional, and national plans, it can also afford a region improved quality of life, competitiveness on the world stage, and long-term economic gain.

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## Endnotes

- <sup>1</sup> Andrew K. Rose and Mark M. Spiegel, *The Olympic Effect*. National Bureau of Economic Research, October 2009.
- <sup>2</sup> Peter Kindel, Scott Watkins, and Andrew Hasdal, *Land Use and Infrastructure Investments by Olympic Host Cities: Legacy Projects for Long-Term Economic Benefits*, Topografis & Anderson Economic Group, LLC, October 1, 2009.
- <sup>3</sup> E-mail communication with Stephen Essex, associate professor at the University of Plymouth, December 10, 2010.
- <sup>4</sup> Greg Clark, *Local Development Benefits from Staging Global Events*, Organization for Economic Cooperation and Development, 2008.
- <sup>5</sup> Michael Payne, "A Gold-Medal Partnership," *Strategy+Business*, Spring 2007.
- <sup>6</sup> Greg Clark, *Local Development Benefits from Staging Global Events*. Organization for Economic Cooperation and Development, 2008.
- <sup>7</sup> Lee M. Sands, "The 2008 Olympics' Impact on China," *The China Business Review*, July-August 2008.
- <sup>8</sup> Sunil Jagtiani, "Track Record: Temporary Hurdle," *Fund Strategy*, September 1, 2008.
- <sup>9</sup> William C. Kirby, "Do Olympic Host Cities Ever Win? A Huge Improvement for Beijing." *The New York Times*, October 2, 2009.
- <sup>10</sup> Partnership for New York City, *Grounded: The High Cost of Air Traffic Congestion*, February 2009.
- <sup>11</sup> PwC, *Cities of Opportunity*, 2010.
- <sup>12</sup> National Audit Office (UK), *Preparations for the London 2012 Olympic and Paralympic Games: Progress Report February 2010*, February 26, 2010.
- <sup>13</sup> Ibid.
- <sup>14</sup> PwC, *Gridlines*, June 2010.
- <sup>15</sup> Interview with Mauricio Girardello, partner, PwC Brazil, May 26, 2010.
- <sup>16</sup> Mimi Whitefield, "For Next World Cup, Brazil Gets the Ball Rolling" *The Miami Herald*, July 27, 2010.
- <sup>17</sup> "Do Brazil's Infrastructure Plans Have a Sporting Chance?" *Project Finance*, December 2009.
- <sup>18</sup> Sochi Organizing Committee, Position Statements, accessed April 1, 2011.
- <sup>19</sup> *Sochi 2014 Bid*, <http://Sochi2014.com/en/legacy/>.
- <sup>20</sup> Department of Transport, Republic of South Africa, *Transport Action Plan for 2010*, 2006.
- <sup>21</sup> PwC, *Cities of Opportunity*, 2010.
- <sup>22</sup> Organization for Economic Cooperation and Development, *Policy Brief: Infrastructure to 2030*, January 2008.
- <sup>23</sup> New South Wales Treasury: Office of Financial Management, *The Economic Impact of the Sydney Olympic Games*, November 1997.
- <sup>24</sup> PwC, *Business and Economic Benefits of the Sydney 2000 Games: A Collation of Evidence*, 2001.
- <sup>25</sup> PwC, *Cities of Opportunity*, 2010.
- <sup>26</sup> Holger Preuss, *The Economics of Staging the Olympics: A Comparison of the Games 1972-2008*, Edward Elgar Publishing Limited, 2004.
- <sup>27</sup> Metro Atlanta Chamber of Commerce, "Atlanta's Olympic Legacy," <http://www.metroatlantachamber.com/files/file/communications/oly/finalolympiclegacy.pdf>, accessed February 10, 2010.
- <sup>28</sup> Dahshi Marshall, "Do Olympic Host Cities Ever Win? A Renaissance for Atlanta," *The New York Times*, October, 2, 2009.
- <sup>29</sup> Metro Atlanta Chamber of Commerce, "Atlanta's Olympic Legacy," <http://www.metroatlantachamber.com/files/file/communications/oly/finalolympiclegacy.pdf>, accessed February 10, 2010.
- <sup>30</sup> Organization for Economic Cooperation and Development, *Policy Brief: Infrastructure to 2030*, January 2008.



- <sup>31</sup> Paul Kelso, "Hourglass Starts Running for Qatar to Vindicate FIFA's 2022 Gamble," *The Daily Telegraph*, January 10, 2011.
- <sup>32</sup> *Qatar 2022 Bid*, <http://www.qatar2022bid.com/qatars-bid/legacy>.
- <sup>33</sup> Matthew Futterman and Jonathan Clegg, "World Cup Headed to Russia and Qatar," *The Wall Street Journal*, December 3, 2010.
- <sup>34</sup> Michael Payne, *Olympic Turnaround: How the Olympic Games Stepped Back from the Brink of Extinction to Become the World's Best Known Brand*, Praeger, 2006.
- <sup>35</sup> Michael Payne, "A Gold-Medal Partnership," *Strategy+Business*, Spring 2007.
- <sup>36</sup> Simon Kent, "Passing the Torch," *PM Network*, December 2008.
- <sup>37</sup> PwC, *Public-Private Partnerships: The US Perspective*, June 2010.
- <sup>38</sup> Interview with Norm O'Reilly, professor of sport management at the University of Ottawa, September 25, 2010.
- <sup>39</sup> Andrew Zimbalist, "Is it Worth It?" *Finance & Development*, March 2010.
- <sup>40</sup> Greg Clark, *Local Development Benefits from Staging Global Events*. Organization for Economic Cooperation and Development, 2008.
- <sup>41</sup> E-mail communication with Stephen Essex, associate professor at the University of Plymouth, December 10, 2010.
- <sup>42</sup> PwC, *Cities of Opportunity*, 2010.
- <sup>43</sup> World Economic Forum, *Global Risks 2020: A Global Risk Network Report*, January 2010.

#### **Infrastructure investment: What works best?**

- <sup>a</sup> PwC, *Business and Economic Benefits of the Sydney 2000 Games: A Collation of Evidence*, 2001.
- <sup>b</sup> PwC, *Gridlines*, June 2010.

**For a deeper discussion about mega-event infrastructure, please contact our partners who have advised on global sporting events, including:**

World Cup, Germany 2006  
World Cup, South Africa 2010  
World Cup, Brazil 2014  
World Cup, Russia 2018  
World Cup, Qatar 2022  
Olympics, Sydney 2000  
Olympics, Beijing 2008  
Olympics, Vancouver 2010  
Olympics, London 2012  
Olympics, Sochi 2014  
Olympics, Rio de Janeiro 2016

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