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LIVING GALLERY

London's delivery of the Olympic and Paralympic Games was a monumental triumph. But now the dust has settled, what legacy will the Games leave – and what, if anything, can Rio 2016 learn from London 2012?

IOC president Jacques Rogge summed up the London 2012 Olympic Games as simply "happy and glorious". After a decade in the making, LOCOG and Olympic stakeholders delivered the greatest show on earth with barely a glitch, setting a new benchmark for the Olympic movement and ensuring the Games will be a tough act to follow at Rio 2016.

The 80,000-capacity Olympic Stadium – blessed with great sightlines and an electric atmosphere for every track and field session – went down a storm with spectators and athletes. The entire Olympic Park, a 2.5km² patch of industrial land in East London transformed into a sporting hub for the Games, was a hive of activity throughout the 17-day extravaganza as well as the Paralympics that followed. Many of the days attracted crowds in excess of 200,000 people. London 2012's success story was also enhanced by Team GB's record medal haul – 65 medals, including 29 golds – which was Great Britain's best tally since 1908.

If much of the seven years of preparation from winning the bid were characterised by concerns over a budget that rocketed to £9.3 billion – nearly four times the bid book estimate – the final weeks before the Games were dominated by worries about security and transport issues, always the IOC's biggest headache.

When private security contractor G4S failed to deliver on promises to supply enough trained staff to protect venues, London 2012 organisers and the government were forced to recruit military troops to plug the shortfall. The swift action averted any potential crisis and to their great credit, the 3,500 uniformed soldiers drafted into venue security operations were a big hit with the public and – along with the volunteers – were the friendly face of the London Games that many visitors will remember. G4S has said it won't be bidding for the Rio contract.

Fireworks over the Olympic Stadium and Orbit at the closing ceremony at the Olympic Park

(Clockwise from right top) The London 2012 beach volleyball stadium at Horse Guards Parade; the Velodrome in the Olympic Park; the highly popular 'Games Makers'; and army personnel stepping in to assist security operations after the G4S fiasco

Despite the critics, London mayor Boris Johnson defiantly defended the city's already creaking transport network, insisting it would cope with the influx of thousands of visitors. In the build-up to the Games, around £6.5 billion was invested in upgrading and extending transport links. However, due to a drop-off in tourism during the Olympics amid fears of transport chaos, the anticipated congestion on the London Underground and rail networks never actually materialised. Even Heathrow, the official host airport of the Games, dealt well with the thousands of athletes, officials, VIPs and sports fans who touched down.

The legacy beings

Now the 2012 Games have left town, the site of a series of memorable sporting achievements that was built by the Olympic Delivery Authority on time and to budget is undergoing an 18-month makeover to become the Queen Elizabeth Olympic Park. The London Legacy Development

"The 3,500 uniformed soldiers drafted into venue security operations – along with the volunteers – were the friendly face of the London Games"

Corporation claims it will provide "an exciting new visitor destination and community park". The phased reopening of the park starts from July 2013, exactly a year after *Slumdog Millionaire* film director Danny Boyle's stunning opening ceremony.

From Olympic constructions through to delivery and legacy plans, there's plenty Rio 2016 chiefs can learn from the London Games. As the Olympic flag was passed to Rio 2016 Games organisers at the 12 August closing ceremony, the enormity of the task facing Brazil hit home. According to the IOC evaluation commission, Rio has its work cut out across many areas of Olympic preparations. But similarly to London and Beijing before it, the second largest city in Brazil – famed for its annual Carnival celebrations, Copacabana Beach and the Maracanã Stadium – will doubtless be a fantastic setting for South America's first-ever Olympics.

The week-long 2012 Olympics debrief that takes place in Rio this November, part of the IOC's transfer-of-knowledge process, is a crucial milestone

in preparations. Admitting he had few complaints with LOCOG's staging of the Olympics, Rogge emphasised the point in his final press conference of an Olympics under his watch as IOC chief. He steps down in September 2013. "Here and there things can be improved; no-one will pretend that there is perfection in this world," he says. "I think the Games were absolutely fabulous. But there are issues so we can tell the Brazilians 'Be careful about this, be careful about that'. Nothing fundamental."

Ticketing improvements

One of the big agenda items of the 2012 debrief is ticketing – both sales and distribution. LOCOG drew criticism from angry British sports fans over the official ticketing website, run by Ticketmaster, which crashed under the weight of high demand on several occasions through the phased ticket sales process. Meanwhile, the IOC Ethics Commission is investigating allegations that appeared in the *Sunday Times* earlier this year claiming that a handful of National Olympic Committees and authorised ticket resellers sold 2012 tickets on the black market.

LOCOG also received widespread criticism in the first few days of the Olympics after swathes of empty seats were seen at various venues in the accredited Olympic Family areas. London 2012 chairman Sebastian Coe defended the no-shows – which were also an issue in the opening days of the Beijing 2008 Olympics – saying they were a familiar pattern during the preliminary rounds of competition as representatives of international federations and National Olympic Committees had to divide their time between sports and meetings. LOCOG remedied the problem by reselling batches of tickets released on a daily basis by Olympic Family members such as federations and by offering some seats to military personnel. Rio 2016's ticketing strategy requires extensive planning to ensure organisers don't suffer the embarrassing problems that appeared to plague London 2012.

Innovations in sustainability

Once the government budget was locked down, London's 'big build' for the Games – spearheaded by Olympic Delivery Authority chairman John Armitt and chief executive David Higgins – was a major success. Most of the construction work was wrapped up in 2011, leaving time for test events to iron out any wrinkles in operations. Zaha Hadid's Aquatics Centre was the final Olympic Park venue to be finished on 27 July 2011, a whole year before the



The Copper Box was the venue for handball, goalball and the fencing discipline of the modern pentathlon during the 2012 Games



COMMUNITY MATTERS

"It is important to remember the London 2012 Olympics was just one small part of a much larger vision," says Stuart Fraser of Make Architects, which designed London 2012's 'Copper Box' (above). "The Olympic Park and the venues created for the Games must be catalysts for the ongoing regeneration of the local and wider area, and provide extensive facilities to be used by the local community long after the Olympics have finished.

"To realise this vision, all of the permanent Olympic venues in London were primarily designed for legacy, with the ability to be overlaid for the Games. Instead of creating white elephants, this has resulted in sustainable, flexible, multi-purpose buildings that can be used for high-capacity spectator events as well as a wide range of day-to-day community sports and activities.

"Engagement with local residents helps to anchor the Olympic venues within the local communities," Fraser continues. "Good community consultation results in facilities that really benefit local people and London as a whole. The venues need to be fully integrated with the post-Games masterplan and infrastructure development to maximise use by communities."

opening ceremony. The meticulous timetable of preparations has raised the bar for Rio 2016.

Sustainability and legacy were the buzzwords in the Games' design and construction. London's mix of existing (ExCeL, Earl's Court, Wimbledon, Wembley, Lord's Cricket Ground for archery), permanent (Olympic Stadium, Velodrome and Aquatics Centre among them) and temporary venues (Basketball Arena, Horse Guards Parade for beach volleyball, equestrian and modern pentathlon at Greenwich Park, triathlon at Hyde Park) fit well with the IOC's drive to reduce the costs and complexity of staging an Olympics. But can Rio match that?

"London has absolutely refreshed the Games in many aspects – especially when it comes to sustainability and legacy," continues the IOC's Rogge, claiming it set a new blueprint for Rio 2016 and future hosts. He insists London 2012 had offered a "better care for sustainability and legacy than many other cities in the past," adding that the Barcelona 1992 Games were the benchmark. "London had the intelligence to start very early in the preparation cycle by creating a legacy company, which is something that we are definitely going to recommend to future cities," he notes.

The Basketball Arena – one of the largest temporary venues built for an Olympics – represents a good example of London's push to ensure there were no white elephants blotting the landscape. Costing around £40 million, the venue's

frame comprised of about 1,000 tonnes of steel covered in 20,000m² of a recyclable white PVC fabric that provided the backdrop for lighting displays during the Games. The venue is being dismantled and recycled elsewhere.

The 15,000-capacity Riverbank Arena – a temporary build for hockey on the Olympic Park – showcases a very different legacy that is subject to close examination by Rio 2016. The venue occupied a prominent location during the Olympics and was filled for every game. Post-Games, it's being broken down and relocated to the north of the Olympic Park at Eton Manor, at which it will become the Lee Valley Hockey Centre. With 3,000 permanent seats, it could in future be expanded to 15,000 spectators with temporary structures.

In marked contrast, Rio 2016's hockey plans were still in limbo in September. Organisers upset International Hockey Federation leaders by threatening to break bid book pledges by relocating the hockey facility from the Olympic Park to a site up to 40 minutes from the hub of Games action. With a big fanbase in Brazil, there are question marks over putting hockey 40 minutes away from the Olympic Park located in the Barra Zone. A final decision as to the venue location is due before the end of the year.

Elsewhere in London's Olympic Park, the Copper Box – the venue for handball and modern pentathlon – is flagged as a model of sustainability. Retractable seating provided a flexible Olympic venue. LOCOG highlights the use of 88 light pipes in the roof that allow natural light into the venue, reducing the demand for electric lights and meant to achieve annual energy savings of up to 40%. Rainwater collected from the venue's roof



RETAIL VALUE

Advanced technology at the Games continued into the in-venue retail outlets. An innovative Bleep EPOS system served the official merchandise stores and kiosks in many of the London 2012 locations – from the Olympic Park to Hampden Park. Touchscreen terminals incorporating a built-in laser scanner, Ingenico EFT devices and thermal receipt printers made transactions quick, easy and secure. The compact design made the terminals space-saving and adaptable to a variety of POS setups, while the terminals also reported back to Bleep's cloud-based Web Back Office, enabling sales trends to be analysed. Furthermore, a VAT refund barcode printed on every receipt enabled visitors from abroad to preload the purchase details at the refund booths when leaving the UK by scanning their receipts.

The system proved highly effective in serving large volumes of sports fans quickly and securely. The contactless payment system enabled Visa contactless and mobile phone payments, with transactions processed in about three seconds. This helped retailers to maximise sales and the average spend per head, as well as reduce queue and transaction times.

was used to flush toilets and reduce water use at the venue by up to 40%. In legacy mode, it becomes a multi-use sports centre for community use, athlete training and events.

Securing the legacy of Olympic Park venues was a priority from the outset. The failure to find a tenant for the Olympic Stadium before London 2012 led to much criticism of the legacy company. LOCOG's pledge to the IOC was to keep the athletics track in any post-Games stadium configuration but that made a marriage with football a difficult proposition due to fans being so far away from the pitch. Winning the bid for the IAAF World Athletics Championships in 2017 was a significant boost for the legacy goals of Lord Coe and Olympic organisers.

At the time of going to press, Premier League club West Ham is the favourite of four bidders seeking to take over the stadium, which will remain under public ownership. Retractable seating is one answer to the football-athletics conundrum.

The London Legacy Development Corporation, now chaired by Mayor Boris Johnson, is taking the transformation of the park very seriously, having embarked on a £300 million construction project to turn it into the Queen Elizabeth Olympic Park. Under this scheme, temporary venues are coming down, including the rather unsightly wings on the Aquatics Centre, to prepare the park for community and elite sports use in the future. The Olympic Village is to be repurposed to provide more than 2,800 new homes, while the broadcast and press centres are earmarked to become hubs for technology, design and research businesses. New roads and bridges, meanwhile, are being created and five new neighbourhoods will be developed over the next 20 years.

Spectator experience

There were few grumbles from visitors to the London Olympic site, aside from some kiosks running out at food in the park. Transport links from the city worked well, crowd management was handled efficiently and the necessary security checks at park entrances operated smoothly. Jacques Rogge and Lord Coe heaped praise on London

2012's band of 70,000 volunteers. "We will never forget the smiles, the kindness and the support of the wonderful volunteers, the much-needed heroes of these Games," the IOC president said in his closing ceremony speech.

Lord Coe also paid them a huge tribute and applauded the support and passion of the British people, who generated a huge buzz on the park and in the venues to give Team GB some home advantage throughout the Olympics and Paralympics. "Britain is at the top of its game in terms of event management. Capitalising on everything that we have witnessed in the past fortnight and the past seven years is going to be important," he cautioned, indicating his ongoing commitment to London 2012's legacy promises.

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IOC warning for Rio 2016

According to a frank assessment of Rio 2016's preparations by IOC Coordination Commission chair Nawal El Moutawakel, Brazil has no time to waste in delivering on its commitments.

Fears over "extremely tight" deadlines are prompting the concerns of the Moroccan, who regularly visits Brazil for check-ups on progress across the Olympic project. In her report to the IOC Session in London, she stressed the "overall work that has to be done is substantial" and called for "very vigorous coordination" between the Brazilian government and Rio 2016 stakeholders to keep preparations on track. FIFA secretary general Jerome Valcke has been equally frustrated with



(Above) The famous Maracanã football stadium, the venue for FIFA's 1950 World Cup, is being redeveloped for the 2014 finals (which Brazil is also hosting) and the 2016 Olympic opening and closing ceremonies (Below) The Royal Mint struck a £2 coin to commemorate London's handover to Rio, featuring an evocative design by Jonathan Olliffe



construction of stadia and transport infrastructure for the 2013 Confederations Cup and World Cup.

El Moutawakel identified accommodations and integration between the organising committee and public authorities to deliver transport and security. Work has started on the foundations of the Olympic Village – slated for completion in December 2015 – and the Olympic Park masterplan is finalised with work starting in the western neighbourhood of Barra da Tijuca in July.

Now Rio must do the hard part, the 'big build' to emulate London's achievement and deliver the complex construction jigsaw piece by piece. The winner of the public-private partnership, Rio Mais Consortium (construction companies Norberto Odebrecht, Andrade Gutierrez and Carvalho Hosken) is charged with doing much of the building work on the site of the former Formula 1 Jacarepaguá racetrack. The Olympic Park will cover an area of 1,180,000m² and stage 14 Olympic and nine Paralympic disciplines.

El Moutawakel claims the 2012 debriefing in Rio will be a critical milestone, "a unique opportunity for Rio 2016 to learn. It will help them tremendously as they move into operation mode", she says. Rio 2016 president Carlos Nuzman, meanwhile, has accepted London's Olympic model would take some matching. But he believes Brazilian organisers are up to the task. "LOCOC has set a new level of collaboration with Rio, which has been to our great benefit."

New era for digital technology

During the London Games, the biggest buzz about technological innovations for sports venues concerned Crystal CG's dazzling digital displays at the Olympics and Paralympics opening and closing ceremonies. The entire Olympic Stadium bowl became a giant video screen, an effect created by small paddle-shaped pixel tablets designed by Tait Technologies, each attached to a seat in the stadium and bearing nine full-colour pixels arranged in a square, delivering a total of 634,500 pixels. The 70,500 tablets created a stunning display of unprecedented size on which Crystal's spectacular digital animations were shown.

"The audience literally became part of the action," says Will Case, creative director at Crystal. "No longer limited by large flat screens, we were presented with the challenge of creating

animations to bring the stage and the spectators together. We delivered. The live audience and those watching at home were drawn into the action. We are witnessing the death of the traditional video screen – this will transform the way event content is presented in future."

Opening ceremony director Danny Boyle saw the potential of the visual concept that ended up making such an impact. The project was delivered in just 14 weeks with a team of 50 designers from Crystal London with support from Crystal Group.

Michael Payne, the former IOC marketing director and a non-executive chairman of Crystal CG International, believes London 2012 raised the bar in staging the ceremonies as a television spectacle and to the stadium audience. "They made quite an impact around the world," he says, "and in the USA, several of the large stadia and leagues have said 'What is all that about?'" Payne believes the pixel tablets have transformed the nature of ceremonies and concerts, describing it as a "true entertainment game changer".

He adds LOCOC's close attention to entertainment, music and in-venue presentations across the array of competition venues was also a first for the Olympic Movement, crediting the organising committee for treating spectators as a client group. He claims LOCOC "brought a new dimension" to deliver a magical atmosphere and experience for visitors "from the way music was used to the way sport was explained in venues and other aspects of entertainment". As official digital imaging services supplier for London 2012, Crystal provided a significant portion of the digital content used for in-venue sports presentations.

With video screens becoming an increasingly important part of the entertainment package at mega sporting events, Payne believes the challenge for Rio 2016 will be to assess what's gone on in Beijing and London and try to deliver ceremonies and sports presentations that are different and unique. The IOC has high expectations. Advances in digital displays should see something special. "But it's difficult to know where technology and the creative process will be four years," he says. ■

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