FOLLOWING FUNCTION
CREATIVE REUSE OF INDUSTRIAL SITES
This book draws together the findings of a six-week travelling fellowship sponsored by the Winston Churchill Fellowship Trust. Sixty active and former industrial sites and their surroundings were visited across Germany and the USA. The study explored projects pioneering the creative reuse of industrial sites and considered the implications for heritage conservation and post-industrial communities.

Although industrial buildings may not carry the time-depth or cultural hallmarks typically associated with ‘heritage’, they contribute something important to our cultural understanding and identity. Industrial sites are also critical as the economic, social and physical centre of communities. As we move into a post-industrial age, the debate to decipher the cultural significance of our industrial heritage is only just beginning.

Difficulties securing investment and identifying sustainable new uses for redundant industrial sites often result in their loss. Sites are frequently located in areas of deprivation, usually linked to its closure, making investment and commercial reuse problematic but all the more important. Given the significant challenges surrounding industrial sites, open-minded, creative approaches to their reuse are essential in order to protect heritage and unlock regeneration opportunities.

The study explored the different philosophies, attitudes, commercial and technical challenges and spectrum of solutions for the reuse of industrial sites. The study seeks to broaden the debate and offer new perspectives for industrial regeneration in the UK.

Can we capture in the material evidence of post-industrial communities sufficient substance to reconcile our desire for a tangible link with the past with aspirations for an economically and socially vibrant future? This is the major conservation conundrum of the 21st century.

The Ruhrgebeit it is the largest urban agglomeration in Germany. Since the nineteenth century, separate districts have grown together to create a vast industrial landscape. The decline of heavy industry after the 1950s resulted in a series of structural crises and industrial diversification, shifting in recent years towards service industries and high technology. The closure of mines and steelworks resulted in widespread unemployment and communities reliant on state welfare.

As a result of the region-wide regeneration initiative of the IBA Emscher Park (1989-1999), the Ruhr Valley provides a unique overview of creative reuse typologies for redundant industrial sites. Fourteen years on, the regenerative impact of the IBA and its future challenges are becoming apparent.

In late May 2013, I cycled the 230km Emscher Park Cycle Path from Dortmund to Duisburg through the heart of the Ruhr’s coalfields. The cycle route reuses the infrastructure of the former coal rail and waterway networks, connecting the main industrial heritage sites and weaving through their surrounding communities. I spent the final weekend of my fortnight in Germany exploring industrial heritage projects in East Berlin.
During the first decades of the twentieth century, Europeans looked to American culture as a means of renewing and regenerating their own. America was seen as the agent of an age of mechanisation and modernity, unencumbered by the ancient traditions of Europe and free to generate a new aesthetic. American engineers derived form from functional and structural inevitability, creating a vernacular for industrial times. In Europe, American industrial buildings were iconicized through photographs set alongside seminal architectural texts by Wilhelm Worringer, Walter Gropius, Erich Mendelsohn, Bruno Taut and, most notably, Le Corbusier in Vers une Architecture. Images of grain elevators and daylight factories became staples of modern doctrine, forging the dialectical confrontation between sculptural form and gridded space.

As Europe preserves its modernist monuments, the American industrial buildings which inspired the international style face a much less certain future. Symbolic of a rapidly vanishing golden age, those buildings to survive the seismic shift to the post-industrial are increasingly anachronistic, economically intransigent and socially divisive. Nevertheless, practical responses to redundancy and an increasing cultural interest in industrial heritage are driving a number of pioneering approaches to the reuse of America’s industrial buildings.

During September 2013, I visited America’s north-eastern rust belt, tracing the industrial network from the Brooklyn Waterfront, along the Erie Canalway to Buffalo, and the southern bank of Lake Erie to Detroit. I visited sites featured in early modernist architectural manifestos, and projects with varied reuse models and different patterns of ownership; from private developers to philanthropists and government agencies. I wanted to understand factors affecting the commercial commodification of industrial sites, the role of communities in the redevelopment process and how decisions about industrial remains as ‘heritage’ are made.
INTERNATIONAL BUILDING EXHIBITION EMSCHER PARK (1989-99)

The Internationale Bau Ausstellung (IBA) was a ten-year urban restructuring programme to revitalise the abandoned industrial sites of the Ruhr Valley, address social housing needs and reverse the environmental damage caused by nearly two centuries of heavy industry. The IBA sought to develop a new social and spatial restructuring programme as an alternative to the traditional industrial development pattern that prioritised production over ecological, social and cultural issues. Through its communication strategy, the IBA also set out to reconstruct the fragmented, polluted and impoverished agglomeration of the Ruhr region towards a positive new identity.

Under the motto ‘workshop for the future of old industrial areas’, the IBA’s experimental approach to regional planning was through learning-by-doing, public involvement and an incremental strategy for regeneration. In collaboration with the regional government, the IBA provided strategic frameworks for regenerative change and called upon municipal governments, industry, civic associations and the general public to propose specific projects. The IBA was a flexible, self-regulating body without any governmental executive power, but wholly financed by the State.

During the ten years of the IBA’s activity, 400 individual projects were developed and 120 projects realised around six central working themes. Of all the programmes, those for industrial monuments have been the most impactful. Zollverein IX is now a UNESCO World Heritage Site and work is on-going to include a wider network of industrial sites as part of this designation.
IBA EMSCHER PARK WORKING THEMES

Emscher Landscape Park a patchwork of regenerated or protected green areas along the Emscher River and throughout the region including the 200-hectare Landscape Park Duisburg-Nord, greening of neighbourhoods and creating the Emscher hiking and cycle trails.

Emscher River System the long-term restoration of the canalised river from an open sewer go a naturalised waterway, with riverbank access and a system of non-polluting waste management.

Working in the Park conversion of former industrial sites into office space for new high-tech, media and design companies, forming a chain of technological centres.

Industrial Monuments reusing and transforming redundant mines and factories for civic, leisure and tourist use. The IBA aimed to serve as the region’s ‘monumental witness to industrial culture’.

Housing Construction and Urban Development aimed at persuading housing corporations to cooperate and invest in deteriorating housing stock, only a very small number of houses were refurbished through the IBA.

Social Initiatives, Employment and Training initiated as a result of unemployment and targeted at local projects where energy and commitment had been generated by citizens themselves.
Hansa began work in 1928 as one of seventeen large-scale coking plants built during the rationalisation of heavy industry in the Ruhr Valley at the end of the 1920s. The network of pipes and railway lines weaving through the site connected Hansa to the much larger industrial context of coal mines, steel plants and gas lines. The architect for Kokerei Hansa, Hellmuth von Stegmann und Stein, designed the site as a functional expression of the coking process. Arranged in two operational halves, the ‘black side’ of the site comprised the plant for coke production, while on the ‘white side’ by-products of the process were recovered.

Production at Kokerei Hansa ceased in December 1992 with the loss of 1,000 jobs. Threatened with demolition, the site was purchased in 1997 by the Foundation for the Preservation of Industrial Monuments and Historical Culture. Established by the Federal State in 1995, the Foundation was conceived as a new instrument for addressing fundamental structural transformation in the post-industrial region. It remains the only foundation in Germany committed to the preservation of industrial monuments, with the aim to conserve sites, research their history, provide public access and find new appropriate uses. The Foundation also campaigns to integrate industrial monuments into urban development and landscape planning. Their primary concern is to take over industrial monuments for which new uses are not yet obvious, giving valuable time for the right mix of investment to be found and future directions identified.

In 1998, Kokerei Hansa was given monument protection status. In cooperation with the City of Dortmund, a master plan was developed to put the site to cultural and commercial use, conceiving it as a giant sculptural focal point around which future landscaping developments in the north-west of the city could orientate. Today, the 1920s core of the site has been retained but a significant section including the gasometer, second coal tower and cooling plant has been demolished. A visit to Hansa gravitates around the great hall of the compressor house, which has been repaired and is entirely filled with an impressive regiment of original machinery. Outside the compressor house, a system of pathways and bridges weave around and through the elements of the industrial plant which are not conserved but are simply ‘made safe’. This light-touch retains the atmosphere of the site and enabled funds to be focused on maximising the extent of public access. The theme of Hansa is ‘industrial nature’ with the site abandoned to apparently unmanaged growth. The site is part of the European Garden Network and pioneers the Industrial Woodland Project.

Hansa’s future remains a puzzle. Sustaining the balance of nature versus rust requires careful choreography and significant funding. A controlled state of disrepair constitutes a continual process of dismantling, yielding a very special, temporal aesthetic. Hansa has probably never looked more beautiful, but visitor numbers are low and little engagement with the local community is evident. Perhaps Hansa can be best understood as an experiment in concepts for the conservation and reuse of large industrial sites – a valuable exploration facilitated by the flexible framework of the Foundation, which also affords a period of respite from commercial pressure. Over the coming years the squeeze on government funding will surely expose Kokerei Hansa to some degree of economic reality, and it will be very interesting to see how she responds.
The Ewald colliery began work in the 1870s and at its peak directly employed 3,800 men. Following its closure in 2000, parts of the site were sold to private companies and the historic core came under the ownership of the local town of Herten (population 50,000; partnered with Doncaster in the UK). By 2005, the areas in private ownership, including the former colliery workshops, had been converted for a software company and new warehouses were built for a logistics haulage business. Logistics haulage – which is swift to set up, low impact and income generating – has proved a useful intermediate use for a number of industrial sites after their closure and before other new uses can be found. Ewald is part of the Ruhr’s Science Park Valley, and the region has sought to attract new environmental technologies to former industrial sites, particularly in locations where collaborations with local universities can be fostered.

Over the last three years, Herten has sought to find new uses for Ewald’s historic colliery buildings and to turn its monumental spoil heap into an asset rather than an eyesore. The landscaping of the heap has created an inviting green parkland criss-crossed with pathways for cyclists and walkers, well-used by locals. Steel steps lead from the colliery courtyard to the ‘horizon observatory’ at the top of the heap, interspersed with platforms to catch your breath and admire the unfolding view. We made the ascent with a coach load of tourists, suggesting the biggest heapscape in Europe has succeeded in putting both Ewald and Herten on the map.

Twelve years after the colliery closed the future of Ewald’s historic buildings is less clear. The former administration houses have been repaired and are now used for offices and Herten’s tourist information centre. Large parts of these very fine late nineteenth century buildings are empty, although they can be hired for events. The local theatre has been established in a former engine building, and a machine house is in the process of being converted into a cookery school. The reuse of the enormous early/mid twentieth century shaft house is technically and economically difficult, and, although it is part of the listed monument, the most likely outcome is demolition. Perhaps most tricky is the first shaft tower, which is too important to lose and probably too complicated to save. A developer has tried to reuse it as a hotel, but the scale of the building and physical restrictions it imposes proved uneconomic. At present it stands empty and in poor repair.

Curiously, at the road junction into Ewald on the very edge of the site is a new build cafe, apparently styled on a motorway service station but encouragingly busy. Why this should be at the extremity of the site rather than bringing life into its heart and all those empty buildings suggests Ewald would benefit from a little more joined-up thinking.

Ewald is a largely successful example of public and private ownerships working towards the regeneration of a redundant industrial site to the benefit of the wider area. The feel of the site is utilitarian, with none of the IBA polish or grandiose lighting schemes of sites like Duisburg-Nord or Zollverein. It seems Ewald is more an initiative about dealing directly with the local context, putting leisure and tourism in second place in favour of the immediate issues of decontamination and creating new places for work.
The IBA project at Zollverein saved an internationally significant heritage site and rebranded Germany’s down-at-heel former industrial region as a confident and culturally ambitious post-industrialist society. At Zollverein the aspiration was regeneration on a regional scale, and the project has been of a corresponding complexity and cost. Mining began in 1847, one of the Ruhr’s first deep-mining pits. Since its closure in 1986, Zollverein’s emphasis has been on design and culture, serving as a business location, community venue, tourist destination and a central symbol and facilitator of progressive change in the Ruhr region.

The architecturally unified colliery buildings were designed by Fritz Schupp and Martin Kremmer between 1928 and 1932. Zollverein was considered the most modern colliery in the world and the architecture of ‘Neue Sachlichkeit’ (New Objectivity) was an expression of this. The buildings were designed for a lifespan of 60 years, coinciding with the anticipated end of the economic extraction of coal. Despite the different purposes of the colliery buildings, Schupp and Kremmer developed an austere system of steel cages, constructed as a series of simple boxes placed over the mechanism of each element of the colliery process. The steel frames were infilled with brick and armoured glass, fitted flush to the face of the steelwork and acting as rain screens to create simple, smooth cubes. Parapets concealed the slope of the roofs and rain pipes ran behind the facades.

The colliery was designed around two axes at right angles, crossing at the ‘court of honour’ in front of the shaft building and the pithead gear. On this ‘production axis’ was located the shaft house, wagon run, screening plant, sorting house and the conveyor belt bridges supplying materials to the coal washing plant. Along the ‘energy axis’ the boiler house, compressor house and workshops were arranged. Staggered building heights and fenestration patterns expressed either the horizontal or the vertical of the architectural massing. The focal point of the site was the massive twin strut frame gear towering about the shaft house. Somewhat eerily, the magnificent buildings of Zollverein were almost devoid of people. Because the several thousand miners employed at Zollverein worked underground, the architecture served only the machinery – and as a symbol of industrial might.

After Zollverein’s closure, the owner, Ruhrkohle AG, wanted to clear the site. In December 1986, Zollverein was listed as a protected monument and purchased by the state of North Rhine-Westphalia. Between 1989 and 1999 as part of the IBA programme, a specialist NRW state development company worked with Essen architects Boll and Krabel to develop the site for culture, tourism, arts and the creative industries. Rem Koolhaas and OMA developed a masterplan, including contributions from Norman Foster and SANAA. Zollverein was designated as a UNESCO World Heritage Site in 2001. The site is now a tourist and cultural destination, with the Ruhr Museum, the regional design centre, art school and the school of dance and choreography contributing to a mix of events and attractions. A number of businesses have established in the smaller buildings.

Zollverein’s parkland links the different architectural elements of the site with railway line pathways and a network of overhead walkways. Birch trees cluster where railway lines converge, and a new layer of pale concrete benches and planters help frame the landscape. The gigantic coking plant, which was active until 1993, awaits full conservation, but the playful creation of an open air swimming pool, skating lake and a ferris wheel anchored in the middle of the oven battery encapsulate the sense of ambition and imaginative delight which underpins Zollverein’s reuse.
Operational from 1847, Carolinenglück is one of the oldest collieries in the Ruhr. At its peak in 1929, the colliery and coking plant employed nearly 3,000 people, many of whom were housed around the mine in settlement housing constructed in the first years of the nineteenth century. Badly damaged during World War II, Carolinenglück was repaired and briefly resumed production until finally closing in 1964. The coking plant was decommissioned and demolished in 1968.

Carolinenglück is a successful example of reappropriation by the local community for new commercial uses. Since 1970, the site has remained operational as the central water pumping station for RAG (formerly Ruhrkohle AG) and the historic headframe remains in use regulating water levels in the mine shafts below ground. This continued activity has ensured the maintenance of the core of the site and has probably contributed to the use of associated buildings for local business. The mine’s social and administrative buildings have been modestly refurbished and are in use as offices. The larger shed structures are repaired and added to, and now house haulage, scrap and motor repair companies.

Finding a future after mining for Carolinenglück and her community has been organic and locally generated. The former colliery has the air of quietly getting on with business, and its buildings and open space are well-utilised as valuable assets to small-scale light industry and local enterprise. The surrounding mine settlement housing is busy and well looked after. The former oil railway of 1850 bisects the site and is now part of the network of walking and cycle trails in the region.

The big unanswered question for Carolinenglück is what to do with its significant historic buildings. The Malakoff Tower of 1856 is one of the earliest and most impressive in the region. Ideally, this important building would be repaired and adapted to a new use that complements the commercial activities of the wider site. However, this is costly, complex and unattractive to local business in an area where brownfield sites are plentiful. At the very least, the building should be recorded as part of a mitigation process for its decay and potential loss, recognising that the balance of value at Carolinenglück has, through necessity, prioritised commercial reality over industrial heritage.
Europe’s largest gasometer was built in 1929 to store gas for the Oberhausen ironworks. Following the closure of the ironworks in the late 1980s, the gasometer was purchased by the city of Oberhausen and converted into an exhibition hall.

Christo’s extraordinary sculpture, the first realised since Jeanne-Claude’s death, wraps the void of the gasometer in twenty thousand square metres of translucent fabric. Ballooning fatly against its tethers, this giant invertebrate hovers with the expectant secrecy of a gestating larva.

Pressed between the gasometer wall and undulating gossamer, there is a ninety metre climb to the top of the sculpture. Inside the sculpture, an ethereal, overwhelming white. Soft light, devoid of echo - the experience of snow.
The last plane took off from Tempelhof in 2008 and since then the airport has shrugged off the constraints of aviation law to embrace its new role as a public park on a spectacular scale. A roasting hot day in June saw the former runways humming with cyclists. Vast grasslands shrill with skylarks unfolded into the distance. Heat haze on the tarmac shimmered like a river and, against it all, the lazy arc of Sagebiel’s epic terminal building dozed in the sun.

Over a kilometre long and one of the largest buildings in the world, Hitler’s 1934 gateway to Europe is now in search of a new purpose. But a building of this scale requires an ambitious mix of reuse typologies, combining public and private enterprise, and engagement with audiences on local, regional and national levels. Happold Consulting have been appointed by the Berlin Senate to develop ideas for an approach to secure a sustainable future for this sleeping giant. Their innovative study tests and blends components of other large-scale regeneration initiatives world-wide to develop a palette of potential new uses, underpinned by sustainability benchmarks.

The regeneration of the building becomes particularly exciting in the context of the public park which is being shaped around it. The city is investing €60m into the project between 2010 and 2017, carefully focusing new interventions around the edges in order to leave the majority as open grassland. The interventions feel enjoyably ad hoc and temporary – with the expectant atmosphere of a music festival before the crowds arrive. Tents and containers are sparsely dotted and a chain of community and arts projects link around the perimeter. Of these, the Edible Landscape garden has created a peaceful haven amongst fruit trees, while the Mini Art Golf’s deployment of 18 artists in the creation of an ecologically-themed crazy golf course succeeds in thoroughly bamboozling the punters. After the clutter of the city, the expansive green of Tempelhof is a delight. But watch out for the crazy golf – we were there for hours…
The area of Oberschöneweide along the River Spree in south-east Berlin, was developed into an industrial waterfront by AEG during the 1890s. A storage battery factory, power station and cable works with its own copper rolling mill, rubber plant and wire-drawing shop employed more than 18,000 workers by 1898. Within a few years, this new plant gave rise to numerous firms that were destined to become famous in engineering, radio and television, contributing to Oberschöneweide’s rapid transition from ‘pretty meadow’ to Electropolis.

Work on what was to become one of the largest industrial sites in Berlin began in 1896. It was planned as a manufacturing complex largely independent of external suppliers, processing rubber, synthetics and metal through to the finished product. The expansion of the works after 1913 was supervised by the architect Peter Behrens. The surviving cable works buildings chart the transition from 19th century ornamentation to the functionalism of modernism. Although the building styles differ, they were all built in the same yellow brick that typified AEG’s presence.

After World War II the site came under the control of the East German state and in 1967 became part of an industrial conglomerate which brought together the entire East German cable industry. After the reunification of Germany in 1989, the site passed into the ownership of a government agency charged with privatising the former nationalised industries and easing their transitions into the market economy. Significant redundancies in the early 1990s were followed in 1997 by the closure of the cable manufacture operations, and, after a century of industrial production, works ceased at Oberschöneweide.

The industrial buildings at Oberschöneweide came under monument protection and the huge task of remediating ground contamination and making the buildings safe was carried out by the state property agency, BLEG. In search of a new use for the site, the borough, university and local community lobbied to consolidate the dispersed faculties of the University of Applied Sciences on the former cable works site. Works to convert the site for university use commenced in 2005, with the planning of the 68,000m² project undertaken by Nalbach & Nalbach, with landscaping by Cornelia Müller and Jan Wehberg. The Wilhelminenhof Campus opened in 2009.
HENRICHSHÜTTE IRONWORKS
Hattingen

The extraction of coal since the early eighteen century established Hattingen as one of the first industrial cities of the Ruhr region. Steel production started in 1853, when the Henrichshütte was founded. The blast furnaces and kilns across the large site produced coke and worked iron and steel. Operational until 1987 and employing 10,000 people, the Henrichshütte became one of the most important employers of the region and dominated the town. Following its closure, the majority of the site was demolished and redeveloped as a business park.

Following a lengthy and technically difficult period of conservation, part of the ironworks has been opened as a public museum by LWL-Industriemuseum. As one of the major Ruhr tourist sites and an anchor point on the Route of Industrial Heritage, the museum houses a restaurant, shop and events space. The blowing house contains a collection of machinery and is used for music recitals and the display of art.

The highlight of a visit to Henrichshütte is the series of walkways weaving through the partially conserved structures into the heart of the ironworks. Simple, unobtrusive interpretation enables visitors to learn about the different iron processes and brings to life the tough conditions for the thousands of local people who once worked there. A ride up through the 55m high blast furnace structure in a glass elevator is an extraordinary experience. At the top, one is struck by the sheer scale of the original works - and how quiet it is today.
The Thyssen blast furnace and ironworks at Duisburg-Meiderich covered an area of 200 hectares and employed more than 10,000 people. Operational for 82 years, it closed down in 1985. At the suggestion of the city of Duisburg and supported by a purchase via the property fund of the state of North Rhine-Westphalia, the site was developed in 1989 as a key component in the IBA Emscher Park.

The site was transformed into a landscape park by landscape architects Peter and Anna-Liese Latz. The binary pairs of park:waste, process:product and art:nature were inverted so that waste becomes park, product becomes process and nature becomes art. The recycling of buildings, soil and water underlie the park design. Blast furnaces become accessible ‘follies’ and concrete tanks walled gardens. Contaminated soil is contained, planted with species that can tolerate specific soil conditions and organically remediated over time. Water is recycled through a series of new waterways activated by windpower. An important sub-project of the park is the modification of the Alten Emscher river, which was made accessible via steps and footbridges. The modification of the watercourse is one of the first reference projects for the environmental reconstruction of the waterways of the Emscher system.

A mixture of designed and wild areas were created, with space also being left for the vegetation to spread. Self-contained gardens, sports facilities and playgrounds are created in the old industrial structures. The metre-thick concrete walls of the former iron ore bins are intensively used as a climbing garden, the gasometer – filled with 20,000m³ of water – is now a scuba diving school. The blast furnace run-off level is used as an open-air theatre, opera and film stage and the former gas turbine and machine halls are used as theatre and event venues. A youth hostel and training centre have been established in the smelting work’s former administration building. At night a light installation by the British engineer, Jonathan Park, immerses the blast furnace backdrop with multicolored illuminations. The former iron railway station on the site is used for tourist rail traffic – the Emscher Park Railway. The park is open to the public year-round at no charge, attracting around 700,000 visitors annually.
Le Corbusier chose an aerial photograph of the Brooklyn Army Terminal to illustrate his chapter on Surface; the second of his Three Reminders to Architects published in Vers une Architecture in 1923. Given his dismissive ‘fear’ of American architects, Le Corbusier was presumably unaware that the two 980ft-long terminal buildings were designed by Cass Gilbert, architect of the Woolworth Building! The Brooklyn Army Terminal was a vital link in the long chain of shipping along the southern Brooklyn waterfront during the first half of the twentieth century. Constructed at the very end of World War I, it was one of the earliest intermodal ports, straddling a dense network of freight train lines which ran alongside and through the two enormous storage buildings. Rail lines and sky bridges connected the buildings to giant sheds along each of the four harbour piers, allowing rapid transfer of supplies and people to ships moored alongside. Throughout World War II, the Army Terminal was a vital point of dispatch, employing 56,000 people around the clock, and processing over three million troops and nearly forty million tons of supplies.

Decommissioned in 1966, the Army Terminal lay fallow for nearly two decades. During the 1980s it was transferred from federal to city control and is now operated by the New York City Economic Development Cooperation, tasked with supporting business and employment. The Army Terminal buildings have been put back to work, filling four million square feet with a diverse but complementary mix of business from balloon makers, to chocolatiers and HIV vaccination researchers. After many years of decline and the transfer of commercial shipping across the river to New Jersey, the Army Terminal has been the key driver of regeneration along the Brooklyn waterfront. Establishing a critical mass of light manufacturing and business activities, the focus is on encouraging operations well-suited to the robust warehouses - buildings which could so easily have been prioritised for exclusive apartments. The pragmatic reuse of the Brooklyn Army Terminal has, above all, ensured its survival and the retention of many former industrial buildings around it. However, its extraordinary significance in the narrative of industrial development and the emergence of modernism is a rich resource which has yet to be celebrated.
WILLIAMSBURG WATERFRONT
Brooklyn, New York

North of the Brooklyn Navy Yard, the Hasidic Jews of South Williamsburg are celebrating Rosh Hashanah. Walking west to the waterfront, under the bridge and along Kent Avenue, the broken chain of Brooklyn’s industrial past unfolds. From the slaughterhouses, breweries and rope makers of the late seventeenth century, Brooklyn grew into one of the largest industrial centres in the country. The north waterfront through Williamsburg and Greenpoint saw the concentration of heavy industry, their chimneys a counterpoint to the skyline of Manhattan on opposite bank. It was here the ‘five black arts’ of glass, iron, ceramics, printing and refining were developed.

As New York’s waterfront became overcrowded, so manufacturers and entrepreneurs found space and affordability across the East River – a pattern repeated today as gaps left by declining industry are filled with workshops, studios and emerging residential communities.

Although many of the larger buildings have been lost, the character along the waterfront remains industrial and low rise. Fingers of new green public space extend down to the river across the footprints of old buildings and railway yards. The many trucks along Kent Avenue have been joined by cyclists. In 2005, the Department of City Planning rezoned the Greenpoint and Williamsburg waterfront from industrial/commercial to residential, and the march of the high rise is underway. After a lengthy battle, the Austin Nichols warehouse by Cass Gilbert was retained and converted, and now squatly holds its own next to tower blocks.

The enormous Domino Sugar plant fills the view from the Williamsburg Bridge. Closed in 2004, only the central buildings have been given landmark status and the demolition of the wider refinery, including the oldest buildings, is imminent. The developer has chosen to keep the cranes but demolish everything around them – cashing-in on the fashion for edgy industrial relics, but unfortunately not the rich history to which they bear witness.
Until the early nineteenth century, Gowanus Creek was a low-lying tidal estuary settled first by Lenape Native Americans before being gradually purchased by Dutch settlers in the 1630s and then by English colonists. By the mid seventeenth century there were three tide mills on the creek, the boggy marshland was used for salt hay and farmers used the waterway to transport produce from Brooklyn to the busy markets of Manhattan.

In 1840 the Gowanus Creek was canalised to give barge access from New York Harbour to the centre of Brooklyn. This led to the canal becoming a major centre of industrial growth, attracting industries such as lumber, coal, hay, grain and building materials – especially Brownstone for the construction of Brooklyn's rapidly expanding residential neighbourhoods. In turn, industrial development spurred the construction of worker housing around the canal in low-rise terraces.

Activity on the canal peaked in the 1920s but declined after World War 2, and significantly reduced after the construction of the expressway in the 1960s. The Gowanus Canal remains an important piece of commercial infrastructure and an intact survival of nineteenth century engineering and construction. Due to its declining importance in Brooklyn's commercial life, significant investment in the canal and surrounding neighbourhood has not been made since the 1920s and much of the original timber canal structures, industrial buildings and the worker housing survive. Although the waterway is no longer regularly trafficked, light industry remains active and the residential areas are busy. One block away from the canal the streets are becoming increasingly gentrified.
As the industrial Brooklyn cityscape evolves, new development plans have been debated for Gowanus. The adjacent neighborhood was rezoned for high density residential use with a strong commercial component. Brownfield redevelopment incentives are offered by the State of New York. Recent development plans have conflicted with the existing character of the neighbourhood and some significant industrial structures have already been demolished for out-of-scale speculative development. Community action groups have sprung up, keen to protect existing small businesses and to lobby for development on a scale which complements the rich nineteenth century character of the area.

A key factor in this process is the canal’s dubious fame as one of the most polluted waterways in the US, which led to its designation as a Superfund Site by the Federal Government in 2010. The clean-up process is likely to last until at least 2016. The problems of pollution have halted significant development and offer an important opportunity for the shape of future development to be debated. Several groups are advocating for the preservation of the industrial character of the area and retention of significant structures associated with this history. In 2011 the importance of historic Gowanus was publicised by the Historic Districts Council as part of its Six to Celebrate programme, and the nomination of the Gowanus Canal Corridor to the National Register of Historic Places as an Urban Industrial District is now moving forward.

Gowanus is full of potential. The urban waterway is an extraordinary resource almost completely cut-off from its community – hardly surprising given it regularly fills up with raw sewage during heavy rain. The mix of residential and light industrial seems to rub along and gives a sense of an unpretentious, active community. A number of magnificent industrial buildings are empty and decaying and there are obvious questions as to what to do with structures like the long-redundant coal pockets. With thoughtful, community-led regeneration which respects long-established businesses and a range of household incomes, the rehabilitation of Gowanus could and should be a blue print for other urban industrial areas with a rich history to share.
From the 1820s until around 1950, the city of Buffalo prospered from the transfer of grain between the ships of the Great Lakes and the smaller vessels of the Erie Canal. When Anthony Trollope visited Buffalo in the 1860s it was already 'the great gate of Ceres' and was soon to become the world’s largest grain port. In 1842, Buffalo entrepreneur Joseph Dart devised a system of bucket elevators to scoop grain from boats into vertical bins, triggering a revolution in grain storage and the rapid development of silo structures made first from timber, then steel, and eventually concrete.

Photographs of American grain elevators, including examples from Buffalo, where hugely influential among the European avant-garde when they were first published by Walter Gropius in Jahrbuch des Deutschen Werkbundes in 1913. Reproducing them in Vers une Architecture (First Reminder to Architects: Volume), Le Corbusier heralded the grain elevators as ‘the magnificent fruits of the new age’. Further photographs in Bruno Taut’s Modern Architecture (1929) added Buffalo’s Concrete Central elevator to the visual lexicon.

Having sketched Gropius’ 1913 photographs, Erich Mendelsohn visited Buffalo in 1924 specifically to photograph and draw the grain elevators. He was the only European early modernist to see the buildings first hand.

‘...Mountainous silos, incredibly space-conscious, but creating space. A random confusion amidst the chaos of loading and unloading corn ships, of railways and bridges, crane monsters with live gestures, hordes of silo cells in concrete, stone and glazed brick. Then suddenly a silo with administrative buildings, closed horizontal fronts against the stupendous verticals of fifty to a hundred cylinders, and all this in the sharp evening light... Everything else so far now seemed to have been shaped interim to my silo dreams...’
Today, the grain elevators of Buffalo comprise the most outstanding collection of extant grain elevators in the United States and collectively represent the variety of construction materials, building forms, and technological innovations that revolutionised the handling of grain. Although a small number of sites have been demolished (including the 1901 steel Dakota Elevator published by Gropius), nearly twenty elevators dating from 1897 to 1954 have survived the collapse of the Great Lakes grain trade. Most are abandoned, and only a few are still being used in the grain industry. Together, they form an extraordinary landscape of dense, sculptural verticality clustered along the Buffalo River.

Recognising that the Buffalo grain elevators are at risk of large scale loss, a local businessman bought the group of four at the back of his metalwork factory in 2006. Crowded together in the loop of the river, one has been repaired and returned to use as a commercial grain store while the other three are now part of an extraordinary experiment in slow-burn regeneration. Having prevented their demolition, substantially removed commercial pressure and spent six years clearing rubble, the initiative gives the grain elevators of ‘Silo City’ both time and public access to see if they can find their own way forwards. New uses are evolving organically and intuitively through the interest of local people, underpinned by a strong sense of shared custodianship. University of Buffalo students are regular visitors and are encouraged to think of this architectural playground as their own. Silo City is already becoming a laboratory for the arts and industry, with cavernous spaces transformed through music and sculpture, urban sport, and heritage tourism. Interpretations and collaborations are emerging because the owner is open-minded enough to welcome them. Countering the modernist insistence on form following function, Silo City speaks more to Aldo Rossi’s understanding of grain elevators as ‘the cathedrals of our time’, admiring them, not just for purity of volume, but for their marking ‘the passage of time, the slow evolution of collective work’.
When Le Corbusier put forward utopian plans for a linear industrial city, he was influenced by Detroit. The Motor City of the 1930s functioned as an interconnected locus of production within which individual industrial plants were organised around linear production lines. Le Corbusier’s 1935 tour of the Ford Motor Company convinced him to adapt automobile assembly line production methods to the building industry. In warning against suburbanisation, perhaps Le Corbusier anticipated that Detroit’s decentralisation would facilitate the rise of the industrial city, but also sow the seeds for its post-industrial demise.

Detroit invented the automobile and mass production, but was ultimately undermined by its own consumerism. The history of racial division, abandonment of the city’s historic core and radical suburbanisation burdens Detroit with a metropolitan landscape poorly adapted to the innovation it desperately needs. As Detroit tackles population loss, disinvestment, unemployment and dereliction, attempts to consider a better future for the city are coming forwards. With twenty square miles of vacant plots and one third of buildings abandoned, land is Detroit’s greatest liability and its greatest asset.

The Detroit Future City plan published in January provides a twenty-year framework for consolidating the redundant land of Motor City into a ‘canvas of green’ . The formalisation of a new connective landscape is an affordable response to rationalising the city’s infrastructure, redefining neighbourhoods, remediating industrial contamination and producing food. Although very different in character to the industrial linear systems of the 1930s metropolis, Detroit is already growing a new productive network for sustainable transformation.

The Detroit Future City plan approaches the whole city as a redundant industrial network to be regenerated for a post-industrial age. However, within the urban system there are a number of distinct sites which are particularly important to the identity of Detroit and the history of industry in America. Detroit’s architecture is recognised as being among the finest in the US, with the National Trust for Historic Preservation listing many of Detroit’s skyscrapers and buildings as America’s most endangered landmarks. The people of Detroit are rightly proud of their industrial buildings and of Albert Kahn, the foremost industrial architect of his day. An important aspect of Detroit’s social and economic rehabilitation will be recognising the cultural value of the material evidence of its industrial past. As the Detroit Future City plan gains momentum, it is essential to incorporate and underscore sustainable strategies for protecting, repurposing and celebrating Detroit’s exceptional industrial heritage.
In 1776, central Philadelphia become home to the first naval shipyard in the US. After 1871, the navy yard relocated to a larger yard 3 miles away on League Island, at the confluence of the Delaware and Schuykill Rivers. During World War II the yard employed more than 40,000, dropping to 12,000 during the 1950s. The last new ship was built in 1970 and the site closed in 1995 with the loss of 7,000 jobs. In 2000, the federal government sold the 490 hectare site and its 187 abandoned buildings to the Philadelphia Authority for Industrial Development.

The site is roughly the same size as the whole of downtown Philadelphia, and well-connected to major highways, waterways and the airport. In 2004, a masterplan was proposed to redevelop the Navy Yard as a business campus, incorporating 120 companies, 10,000 employees, a 194 acre historic core and areas retained by the United States Navy for its Reserve fleet and engineering activities. In 2003, the developer Liberty Property Trust began working in partnership with the city and took control of 260 acres. A series of high-end, LEED accredited office accommodation is being constructed targeted at bio-tech and pharmaceutical companies, including Glaxo Smith Klein. Tax credits and abatements for research, development and innovation are important in helping to attract pioneer companies to colonise the new business park. The Navy Yard is a nationally certified historic district on the National Register of Historic Places, yielding investment tax credits of up to 20% of renovation costs for building restorations.

Urban Outfitters, a clothing and housewares retailer, was the first major non-ship building corporation to move to the Navy Yard, repurposing five buildings dating between 1880 and 1939. Using the Federal Historic Preservation Tax Incentive Program, the client invested over $100 million in the 285,000 square-foot project. The buildings have been repaired and refurbished to provide distinctive design studio and office space while celebrating the factory characteristics of volume, light and ‘found’ features. The synthesis of art, culture, economy, and environment results in the transformation from a public, production-based yard to a private, creativity-based campus.
Dortmund | Cycle Tour of Dortund Docks  
Zeche Zollern  
Dortmund "U" Shape Centre for Creative Arts  
Kokerei Hansa

Castrop-Rauxel | Halde Schwerin (Slag Heap Sundial)  
Erin Park  
Rüters Tar Works & Worker Housing

Herten | Zeche Ewald

Bochum-Hamme | Zeche Carolinenglück

Bochum | Jahrhunderthalle

Hattingen | Henrichshütte

Witten | Zeche Nachtigall

Essen | Cycle Tour of Essen  
Zeche Zollverein  
Zeche Zollverein Worker Housing  
Margarethenhöhe 1900s worker housing  
Villa Huegel

Oberhausen | LVR Industriemuseum Zentrale  
Eisenheim Miners' Housing  
St Anthony Ironworks  
Peter Behrens LVR Archives  
Oberhausen Gasometer

Duisburg | Landschaftspark Duisburg Nord  
Duisburg Docks & Harbour

Berlin | Campus Wilhelminenhof  
Industriestadt Schöneweide  
Happold Consulting
<table>
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| New York    | Brooklyn Navy Yard  
Brooklyn Bridge Park  
DUMBO, Brooklyn  
High Line & Meat Packing District, Manhattan  
Industrial Williamsburg & Greenpoint  
Austin Nichols Warehouse  
Domino Sugar Refinery  
Historic Districts Council  
Society for Industrial Archaeology Roebling Chapter Meeting  
Gowanus Canal & District, Brooklyn  
Friends & Residents of Greater Gowanus Meeting  
Governor’s Island  
New York Economic Development Corporation  
DIA Beacon  
Brooklyn Army Terminal  
Industrial Red Hook  
Coney Island |
| Philadelphia| Philadelphia Navy Yard |
| Albany      | New York State Historic Preservation Office  
Erie Canalway |
| Buffalo     | Central Terminal Railway Station  
Silo City |
| Detroit     | Detroit Future City Plan  
Eastern Market  
Russell Centre  
Michigan Central Station  
Packard Plant  
East Canal District  
Belle Isle Park  
Detroit Industrial Architecture Tour  
Detroit Industrial Photography  
Salt & Cedar Letterpress |
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Liz Leber        Partner, Beyer Blinder Belle Architects & Planners
IBA Emscher Park was outward-looking, shaping a new image for the Ruhr around its post-industrial legacy and inviting the world to consider the region from a fresh perspective. It introduced a new architectural quality, demonstrating that industrial redundancy could transform into something desirable, modern and memorable. Flagship projects by famous designers delivered visual impact and were widely showcased. While the IBA created a positive, future-oriented new identity for the region, it can be argued that the IBA’s focus on image also sentimentalised the reality of heavy industry and its aftermath, partially masking the complex socio-economic problems that continue to affect the region.

The IBA was successful in attracting trade and tourism to the Ruhr. However, in privileging a network of sites over other areas, it contributed to a highly uneven geography. There is a tangible disconnect between the heritage sites re-presented through the IBA and the communities immediately around them. Heritage-focused projects such as Duisburg Harbour have created ‘gentrification bubbles’ which are limited in their capacity to positively benefit surrounding neighbourhoods. Projects remediating industrial pollution and creating green spaces demonstrate the most wide-reaching and tangible benefit to communities. The major Emscher River System project is frequently cited by residents as directly improving the quality of their environment. It has attracted specialist engineering skills to the region, generated positive links to universities and continues to provide employment.

The IBA’s dissociation of politics from regeneration was both a strength and a weakness. A small planning unit called the Emscher Park Planning Company was set up to administer the projects, and the relative structural autonomy of the organisation from government allowed for greater flexibility. The outcome was a product of negotiated interests, informal and open engagement, cooperation among diverse participants and the influence of powerful stakeholders. Dependent on project-based consensus, internal conflicts were handled through innovative governance methods. However, operating outside of politics enabled some of the more challenging social and economic issues to be side-stepped. The IBA was unable to support effective political debate, arrive at solutions to strategic contradictions or manage efforts to address the complicated social situation of a region still in decline.

In contrast to the top-down, region-wide and publicly funded model of the IBA, the reuse of industrial buildings in America is much more commercial with less emphasis on heritage. State historic preservation orders are only triggered if a project receives federal funding, although influential city landmarking bodies can be effective at a local level. Tax incentives play a key role in making former industrial sites commercially attractive to investors. Decision making around zonation has a fundamental impact on development patterns, but the recognition of the heritage value of industrial buildings is rarely a factor in re-zonation decisions.

While the cultural attitude and conservation approach to the great modernist buildings of Europe is well-established, the debate to decipher the significance of American industrial buildings has far to go. In conjunction with an increased cultural appreciation of industrial buildings as ‘heritage’, progress is being made to protect industrial sites through the National Register of Historic Places and designation of landmarks. However, many important structures remain at risk, without proper recognition of their importance either in global architectural development or as extraordinary buildings in their own right. Many endure because of the sheer effort required to dismantle them, and it is often this inherent robustness, rather than any cultural impetus, which leads to their reuse.

Many of the sixty industrial reuse and regeneration projects visited over the course of the Fellowship demonstrate how new functions can re-activate redundant sites towards a culturally relevant and sustainable future. In the seismic shift to post-industrialism, the insistence on new function and recognition of heritage value is essential if these culturally important buildings are to endure and be of continued service to their communities.
LESSONS FOR THE UK

- Industrial buildings are inherently robust, flexible and adaptable to new use.
- The range of creative possibilities for the reuse of redundant industrial sites is excitingly broad and imaginative.
- Industrial regeneration has the power to frame history and shape new identities.
- The time scale for regeneration is measured in generations.
- Pioneer colonisers, intermediate users, and temporary activity all play a role as stepping-stones towards a more stable future for redundant industrial sites.
- Socio-economic regeneration of redundant industrial sites is strongest when the leadership is local.
- Industrial sites were once the heart of communities and the involvement of local people is essential.
- Adaptive reuse must be designed for long-term sustainability from the outset.
- Balancing pragmatic adaptive reuse and heritage value is difficult and needs a joined-up approach and the right mix of political and economic support.
- Heritage tourism can only be a part of the regenerative mix and must be balanced with a wider economic ecology.
- Universities can play a critical role in post-industrial regeneration.
- Intelligent public/private finance mixes and tax incentives can make or break sustainable regeneration.
- The economic and heritage value of regeneration is most impactful when sites are understood as components in a wider, interconnected industrial system.
- Putting redundant industrial sites back to work is essential if we are to look forward to a culturally, socially and economically vibrant post-industrial future.
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