The Brunel Effect
The lessons that Isambard Kingdom Brunel offers today
Biography

Andrew Kelly has been Director of the Bristol Cultural Development Partnership (BCDP) since March 1993. He initiated and was project manager of Bristol’s successful £97m Millennium project At-Bristol which started the current transformation of the docks; he founded and led for five years Brief Encounters: the Bristol Short Film Festival and was founder and former chairman of DA2 (Digital Arts Development Agency). He founded the South West Arts Marketing Agency and Animated Encounters – the Bristol animation festival. He was director of Bristol 2008, the city’s bid to be European Capital of Culture which was shortlisted. He is currently director of Creative Bristol – the initiative established to deliver the Bristol 2008 bid – and Brunel 200. He is also the director of the annual Bristol Great Reading Adventure, now in its fifth year and is director of the Bristol Festival of Ideas which takes place every May. He is the author of 12 books including Filming All Quiet on the Western Front (2001), Building Legible Cities (Bristol, 2001), Managing Partnerships (Bristol, 2002), In Short: short film making in the digital age (2002), Queen Square Bristol: the biography of a place (2003) and Building Legible Cities 2: making the case (2003). His most recent book is Brunel: in love with the impossible (2006). His next book will be a biography of the great Hollywood film director, Lewis Milestone.
The lessons that Isambard Kingdom Brunel offers today
In December 1989, commenting on the frustration felt at the development of British road and rail systems, *The Economist* said that engineers needed to pick up where they left off a century ago. ‘Isambard Kingdom Brunel...probably spent more time talking to parliamentary committees than designing railways,’ it said. ‘Many of the great civil engineering projects of the nineteenth century were run by engineers who also had to be designers, managers and entrepreneurs all at the same time.’ It concluded that today’s engineering industry does not produce Brunels.
development in Bristol has been influenced, at least in part, by some of the inspiration that Brunel provides whether that be the creation of At-Bristol, work in the creative industries, the promotion, debate and celebration of ideas, Bristol Legible City or the renewal of the city generally.

This short essay looks at the lessons that Brunel offers for modern managers in the public, private or voluntary sectors, policy makers, educationalists and others involved in setting future strategies, and society generally. The focus is Bristol, as Brunel did his best work in the city and it is where most of the work of Brunel 200 has taken place, but the lessons are general. Attending to these issues may not create a new Brunel, but it could encourage Brunellian thinking, helping to transform the world again as he did in the nineteenth century, at a time when transformation is essential.

* Brunel was one of the most versatile, audacious and inspirational engineers of the nineteenth century. His astounding feats changed the world and continue to shape the way we live today. His list of achievements is long: the Clifton Suspension Bridge, Paddington Station, Temple Meads, ss Great Eastern, Box Tunnel, ss Great Britain, Maidenhead Bridge, the Great Western Railway and the Royal Albert Bridge, among many others. He was a pioneer of integrated transport, though his dream of a seamless trip from London to Bristol and on to New York was only fulfilled in May 2005 when Continental Airlines started their flights from Bristol International Airport.

Our aim was to learn from Brunel and his contemporaries, identify their spirit and vision and assess how these can be used to inspire new creative people and new creative projects: in short, to create the Brunels, and Brunel-type thinking, of the future. There is much to learn: Brunel had a portfolio career and was practising blue sky thinking outside of the box before the bookstalls became full of management tomes. He was part of the creative industries before the definition gained currency and a member of the creative class before it was invented. Today he would be a brand – perhaps one of the most respected of all.

Brunel has always been a personal inspiration. Although I saw myself early on as a social scientist, my interests have developed over time to embrace, first, city design and architecture and now engineering and science. The first time I saw the Clifton Suspension Bridge I knew that this was something special. I like to think that my work on cultural

Illustration by Robert Dudley of the Great Eastern during the laying of the Atlantic Cable, 1865 (Institution of Civil Engineers). This attempt to establish telegraphic communication between Britain and North America proved unsuccessful as the cable-end was lost overboard before the ship reached Newfoundland. A second attempt with an improved cable was made the following year and was completed on 27 July.
execution, bold in his plans but right’. His funeral route was lined with hundreds of railway men and members of the public. This was no Diana-type madness but a respect rare in industrial and business life. That affection continues today. He came second in the BBC Great Britons contest. His influence contributes to projects as wide-ranging as the Channel Tunnel rail link, Arup’s Chinese green cities and James Dyson’s uniting of art, design and technology in the creation of modern household appliances. In Bristol, the renewal of the Harbourside area, At-Bristol, the plans for the new University of Bristol buildings and Bristol Legible City have all been inspired by Brunel, with their linking of arts and sciences, the inclusion of world-class design, and their boldness.

This is not to hide the flaws and the problems. Health and safety was not an issue in Brunel’s day and people died on his projects; his devotion to the task, and his expectations of others, proved difficult to accept – for some he was, no doubt, a bit of a bastard at times; he was not a good delegator, though this is partly mitigated by his paying close attention to each aspect of his projects; his overspending was often impossible to accept, even though he invested his own money in projects and tales of his extravagance were sometimes exaggerated; his relationship with contractors was sometimes difficult, even to the extent of once hiring a private army to settle a debt. That aside, he created projects that lasted, changed the face of the world, continues to capture the public imagination and is an inspiration to innovators everywhere. He was, and remains, the Little Giant to many.

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Brunel was unquestionably a great man. What made him great? There are eight factors: timing, family, mentors and partners, education, vision, leadership, marketing, ideas and a commitment to quality and the best.

The time was right for a Brunel. The opportunities were present for his talent to be used fully (his father, an important engineer, was born too early to allow the full use of his talent). He contributed to and benefited from the industrial revolution, where the importance of engineering was paramount and science seen as essential.

The can-do zeitgeist of the nineteenth century provided the framework, but was he born or made? L T C Rolt said: ‘There are somePortrait of Marc Brunel, c 1802 (Institution of Civil Engineers). Brunel’s father is looking at the designs for the innovative block-making machinery he installed at Portsmouth.
Gateway of Clifton Suspension Bridge drawn according to Brunel’s design by Samuel Jackson, 1831 (University of Bristol). Jackson was a leading Bristol artist who produced a series of paintings based on Brunel’s proposed Egyptian design for the bridge which included decorative sphinxes at the top of the towers. Brunel had already produced a revised design before work on the bridge began in order to reduce costs.
Brunel’s training was essential. Marc gave his son a unique education. Schooling him early in geometry, helping him master Euclid and teaching him what he had himself learned in France in mathematics and engineering drawing, meant that Marc provided Brunel with an academic background unlike other British engineers. In the absence of opportunities for education, they tended to learn on the job and from contemporaries. Marc sent Brunel to France once the Napoleonic Wars were over to extend his education. There, he learned innovative drawing systems for tackling complex machine forms, a system of education which did not reach Britain until the 1840s. Most important of all he was apprenticed to Le Breguet, the great watch-maker whose firm is still operating today, where he learned the theory and practice of precision engineering.

Brunel’s artistic sensibility, nurtured by his father, provided a skill that was to manifest itself later in the elegance and beauty of his work. John Horsley, his brother-in-law, said that Brunel had a remarkably accurate eye for proportion as well as a taste for form. His beautiful architectural drawings, sketches of trees and shrubs for his garden, and decorative designs on the sides of railway carriages show his attention to detail, his understanding of geometry and his ability to observe. He used the best Bristol artists to show the grandeur of his proposals. This uniting of arts, sciences and business has rarely been repeated in such detail and with such success.

From an early age he wanted to change the world, to have an impact. His motto was *En Avant*: Forward. He wanted to do better than anyone else or create something new: ‘Let me try’ he said about all his projects. His impact on Bristol and the South West was fundamental. Bristol was once England’s second city, but at the time of Brunel’s birth it was facing increasing competition, particularly from Birmingham, Manchester and Liverpool. With the coming of the Great Western Railway (GWR) and Brunel’s innovative steamships, the ss *Great Western* and *Great Britain*, the city looked set to be at the forefront of a new world of design, transport and travel. But, as throughout Bristol’s history, isolated triumphs were offset by slow decline and the city’s influence was diminished. Brunel was proud to be a Bristol man, however, as the city gave him his first big chance with the designs for the Clifton Suspension Bridge, and the merchants and others helped him deliver the railway and his ships.
Brunel’s working practices and management style were also important. His vision, energy, devotion to the task, persistence, commitment to quality and ability to charm people to support his work are all important lessons for today. His extraordinary engineering vision was, and remains, unsurpassed – from the potential offered by mass passenger transit and transoceanic travel to the fine detail of designing lampposts on stations and liveries on train carriages. He was right about the broad gauge and was brave enough to try the atmospheric railway, despite opposition, as he aimed, always, to move technology forward. Even his failures were carried out with panache.

He had enormous energy and capacity for work. He expected the same from others, and often got it. He worked up to 20 hours a day surveying the GWR line. Challenging to work with, by the mid-1830s he was running concurrently several major projects with his loyal team. Not a positive lesson for today – a heavy workload, and smoking 40 cigars a day, would have done little for his health – but devotion, passion and leadership remain essential. He was articulate, able to inspire and charm his colleagues and partners. On the Thames Tunnel project, where Brunel nearly died, Richard Beamish said: ‘I saw that...’

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Section of the Great Britain’s engine room viewed from the fore-end, 1843 (Institution of Civil Engineers). The engine was designed by Brunel’s friend and colleague Thomas Guppy whose family home was at Arnos Vale. This drawing was made by John Weale.

Sketches of carriages for the Great Western Railway, 1836 (University of Bristol). Brunel’s brother-in-law, the distinguished artist John Callcott Horsley, commented that Brunel’s decorative work on the carriages provided just one small example of the engineer’s ‘rare artistic feeling’ and eye for colour.
Sketch of station lampposts for Bristol station (University of Bristol). Brunel’s attention to detail covered all aspects of the design of the Great Western Railway including decorative features on the lampposts used on the line.

Page of yew tree designs from Brunel’s gardening diary (University of Bristol). In 1847 Brunel purchased an estate at Watcombe near Torquay where he planned to build a house for his eventual retirement. Although the house was never built, initial work was carried out in landscaping the grounds. Brunel oversaw the planting and devised special tools for transplanting young trees to their chosen site.
each man, with his eyes upon Isambard Brunel, stood firmly prepared to execute the orders he should receive with resolution and intrepidity.’ At the age of 21 this was a remarkable achievement. He dealt with parliamentary commissioners successfully on many occasions.

He was a man of ideas, always researching, and quick to adapt any of those ideas that would be of advantage to his projects. He participated in discussions in learned societies on science and engineering. He recognised early on the potential of iron ships and screw propulsion. Even at the young age of 27, with no experience of designing, and only limited experience of travelling on railways, he realised before anyone else that a rail system should link major cities first, with slower branch lines coming second. He refused to patent any of his work, seeing this as an obstacle to free enterprise – an opinion not to be favoured today, when intellectual copyright is key to value in a knowledge economy, but refreshing nonetheless.

He was able to build partnerships through the force of his confident and enthusiastic personality. At the same time as developing his designs he was talking with landowners, negotiating with parliament to get his railway acts through, persuading directors and shareholders to invest in schemes. Partnerships were extended to his rivals. Bitter though the battles of the broad gauge were, the engineers of the time supported each other at launches and in project development.

Interior of Box Tunnel, illustrated by J C Bourne, published 1846. The tunnel was an amazing feat of engineering which took five years to complete and cost the lives of around 100 navvies.

Paddington plan and elevation from Brunel’s Great Western Railway sketchbook, 1836 (University of Bristol). The line between Bristol and London was opened in 1841. The original station at Paddington was a temporary structure with an uninviting entrance beneath the Bishop’s Road Bridge which led through to a wooden shed providing shelter for waiting passengers. The impressive new station with its iron and glass construction was completed in 1854.
He could be forceful and able to defeat what Jane Jacobs, the great urban theorist, in her book *The Death and Life of Great American Cities*, called squelchers – those who object to a project irrespective of its merits. Brunel fought against such squelchers. He was also a showman, demanding the best launches and celebrations for his projects, immensely proud of what he had achieved. The classic shot of Brunel in front of the chains of the *Great Eastern*, one of the great photographs of all time, could almost have been designed to have this impact, making Brunel, or Robert Howlett, his photographer, one of the earliest manipulators of public images. It is little wonder that the engineers were the cultural heroes of the nineteenth century.

Brunel always wanted the best and delivered this. As a young man he wanted to achieve excellence in engineering, to build castles in the sky, to dream dreams. His pitch for the creation of the Great Western Railway was about it being the best, not the cheapest. He had little interest in wealth except to accumulate it for his work. He may have been unsure of himself as a young man, even depressed sometimes at the slow rate of progress, but confidence and optimism saw him through. He was driven, he was sometimes ruthless, but he created great things. We need more people like him today.

**The Brunel Brand Characteristics:**

- Vision – for himself and for his country.
- Uniting arts and sciences.
- Risk taking and bravery.
- Can-do attitude.
- Inventiveness and creativity.
- Distinctiveness in all projects.
- Commitment and dedication.
- Determination.
- Quality in all work.
- Energy.
- Multi-tasking.
- Experimentation, inspiration and determination.

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*Isambard Kingdom Brunel and the launching chains of the Great Eastern, 1857 (Institution of Civil Engineers). The photographer, Robert Howlett, who captured this iconic image of Brunel died of a fever at the age of 27, partly as a result of his repeated exposure to the hazardous chemicals then used in making photographs.*
Brunel 200 – a celebration led by Bristol, the city where Brunel did much of his great work (but taking place throughout the South West – the region that is united by the GWR line) – has been both a heritage project and a step to the future. From Swindon to Penzance, and in Bristol, Bath, Weston-super-Mare, Stroud, Newton Abbot, Saltash, Plymouth, Devon and Cornwall, over one million people have been involved in Brunel projects. Major exhibitions in Bristol have been complemented by small exhibitions, education work, festivals, trails and guides, and books in the city and elsewhere in the region.

A lot can happen in a year, and much has taken place in 2006.

As the year progressed, Brunel’s legacy provided our inspiration. This is both a physical legacy with a renewed ss Great Britain and the Brunel Mile, and a spiritual legacy found in the debates that have taken place about the future of Bristol and the region, about engineering, and about ideas, which have encouraged new thinking that could transform the way we live, learn, work and play.

Over 550 ideas were submitted to the 200 Ideas for Bristol competition that was inspired by Brunel. Some were put forward for fun; many were quirky; some offered the potential for transformation. All of them were Brunellian in their approach: they broke the rules, looked beyond current policy and constraints and sought the new. Few will be delivered, sadly, but all deserve debate and consideration. A competition launched by the University of Bristol and New Civil Engineer magazine to redesign the Clifton Suspension Bridge brought in over 500 ideas from around the world. More competitions like these are essential.

2006 was a good start, but to make further progress we have to answer the question most often asked during this year: why isn’t there a Brunel today?

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Brunel is, more than ever, a mentor and an inspiration to artists, designers, project managers and scientists, among many other creative people. But there is no-one today, it seems, who unites arts and sciences in grand plans and who can think laterally, raise funds widely, accept risk and failure freely, be ready to work on a problem or an

Bath station, illustrated by J C Bourne, published 1846. Originally a roof in a Jacobean design spanned the broad-gauge tracks and the two platforms.
opportunity tirelessly until it is solved and, in the process of all this, capture the public imagination. In this, Brunel can serve as a mentor for people in all walks of life.

Do we need Brunels today? Brunel worked in a time of industrial revolution; today we live and work in the knowledge economy. We no longer need a Brunel to drive forward industrial activity, though he would have been fascinated by the new Airbus A380, space travel, the internet. But imagine a Brunel today bringing his energy, thinking, dogged persistence, problem-solving skills, commitment to quality and optimism to issues like education, city renewal, health and the ageing population, the new companies and businesses of the future and transport and travel. Imagine him or her charged with bringing their thinking to bear on solving the environmental crisis and addressing global warming and climate change. Imagine him or her charged with managing the railways. Imagine not one Brunel, but hundreds. Better still, consider the impact of Brunellian thinking seeping into all aspects of life and work.

Can this be achieved? There is much that stands in the way of a Brunel today. Setting aside the issue that few would wish to contemplate the punishing workload that Brunel accepted, there are five key reasons why we no longer have Brunel-type figures among us: the impact of legislation; increasing educational specialisation within education and in careers; the need to make quick returns to shareholders and electors; the split between arts and sciences; and limited vision.

The minimisation of risk through contemporary health and safety legislation is one problem. The modern health and safety regime, and its reliance on often risible hypotheticals, risk assessments (Brunel 200 had to do a risk assessment for the journey of the Lord Mayor’s coach and horses from the Mansion House to the Avon Gorge Hotel for the launch event) and the contravention, sometimes, of common sense, is creating a risk-averse society which starts in the nursery playground and goes through life. It is right to prevent personal harm, but wrong to stop all possibility of risk as this inhibits boldness.
This culture feeds through to the working environment, where failure is considered to be a badge of shame (though recent revision of bankruptcy arrangements have helped change this). Competent failure – that which results from experimentation and an attempt to keep moving forward – should be accepted as a fact of life. As Samuel Beckett said, failure should be greeted with ‘No matter. Try again. Fail again. Fail better’.

Education encourages specialisation and a split between arts and sciences; the modern education system will continuously fail to produce Brunels until there is change at the secondary-school level. There has been little difficulty in getting young children interested and involved in Brunel 200 work. At that age, there is a flexible curriculum, with more free time, allowing greater scope for exercising the imagination. This came through in project after project: seeing a group of ideas from schoolchildren brought together by Rolls-Royce showed how much the work of a 200-year-old man could inspire young minds; looking at the children’s entries for 200 Ideas for Bristol showed how imaginative their thinking can be. When it came to the secondary level, however, the shutters came down. The rigid nature of the national curriculum and the consistent need for results means there is no room for project work outside of things that can be reported eventually as an exam success.

Another problem is that modern business and government demands quick returns for shareholders and electors. This is one of the reasons why global warming is so difficult to address in a radical way within the framework of a five-year government and the need to provide value to shareholders (the problem is worse in Bristol due to annual elections which make any form of long-term planning virtually impossible). Partnerships between public and private sectors, and which bring in universities, the arts and voluntary sector organisations, have meant that initiatives can be developed over the long term. Similarly, the introduction of balanced scorecards and the triple bottom line means that businesses are able, sometimes, to look at environmental and social issues rather than purely at profit.

The split between arts and sciences is a recent occurrence (in Brunel’s day it was natural that writers and artists should engage with scientific thinking, just as scientists learned to draw and to write and communicate well). There has been some change: the growth in
View of the grand opening ceremony at the Clifton Suspension Bridge, 8 December 1864 (Bristol’s Museums, Galleries and Archives). Work on the bridge was abandoned during Brunel’s lifetime and was completed as a tribute to him by his fellow engineers after his death. The bridge was based on Brunel’s original winning entry for the competition to design a crossing at Clifton but much of the finished design was the work of the engineers John Hawkshaw and W H Barlow. Chains and ironwork from Brunel’s Hungerford Bridge, which had recently been demolished, were used in its construction.
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accessible science writing has bought often complex ideas to a mass audience (if only the arts could write so well), and the increasing interest by contemporary novelists like Ian McEwan in science subjects – especially global warming – provides some hope.

Bristol Cultural Development Partnership has long advocated the uniting of arts, nature and sciences in cultural development. The creation of At-Bristol was a start, though the major arts complex planned to accompany the work on nature and hands-on science did not materialise, at least in the Harbourside area. However, greater collaborative working is possible between the organisations present in Bristol. This could be part of Bristol’s work as a Science City where, in bringing together business, government and education, new creative approaches to a range of projects become possible.

Finally, we live in a time of modest vision – at a time when grand vision and big change is essential. If we are to transform, new ideas are needed. We need to raise aspiration and ambition levels to new heights in life and work. That may need champions able to articulate and promote aspiration. In 2006 we could not find a modern engineer to put in front of television cameras as a spokesperson for our project. What is needed is showpeople in engineering and other key professions who can explain complex ideas and promote imagination and inspiration. We also need people – and a city – that are bold and innovative, open to ideas, influences and cultures, and keen to embrace creativity in all areas of life and work. In developing new visions we need to develop the skills of the visionary: a determination to succeed against the odds; a collaborative approach – enrolling others to work together for a common goal; the ability to communicate; tenacity in dealing with challenges and the squelchers; and a willingness always to be bold.

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It can be done. Although no individual is likely to emulate the full range of Brunel’s expertise again, many Brunel-like characteristics can be seen in outstanding engineering work of today such as the Sage and the Millau Viaduct. He would have liked modern sports buildings and the Angel of the North. He may not have liked some of the new architecture on Harbourside, but he would have liked At-Bristol and the renewal of old buildings as arts and media centres. He would have seen early the potential of the digital revolution, admiring the World Wide Web for its transformative impact on research, knowledge and communications, seeing it as an equal to the way he transformed mass transport in the nineteenth century. Brunel would have admired their ambition, boldness and, in some cases, their beauty. He would have liked the fact that some of those involved saw him as an inspiration.

It is often felt that the progress that characterised the period since the Enlightenment came to an end in the twentieth century. Optimism, humanism and freedom from fear – the very essence of Brunel – are in short supply. No-one would dispute that visionaries are needed now. Some may doubt that the image of a man in a stovepipe hat, with mud-splattered boots, standing in front of oily chains, has a connection with the twenty-first century engineer, with business or indeed with society. But it is that spirit and achievement which has captured the imagination of over one million people in the South West in the bicentenary of his birth.

Daniel Gooch’s diary entry, on hearing of the death of his friend, was quoted earlier. What was not quoted was the end of that entry. Gooch wrote: ‘The commercial world thought him extravagant; but although he was so, great things are not done by those who sit down and count the cost of every thought and act.’ Brunel built the modern world in the nineteenth century. His inspiration can help to build the new world now, the new business, society, environment and prosperity. Our motto should remain: aim high, refuse to be deflected, let me try, En Avant – Forward.
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