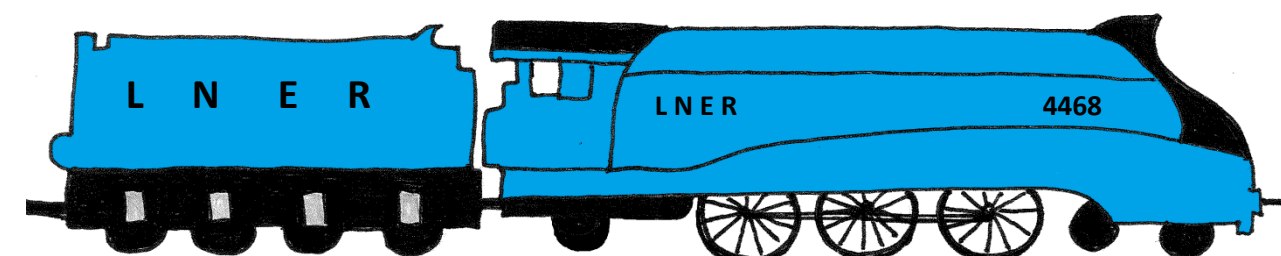
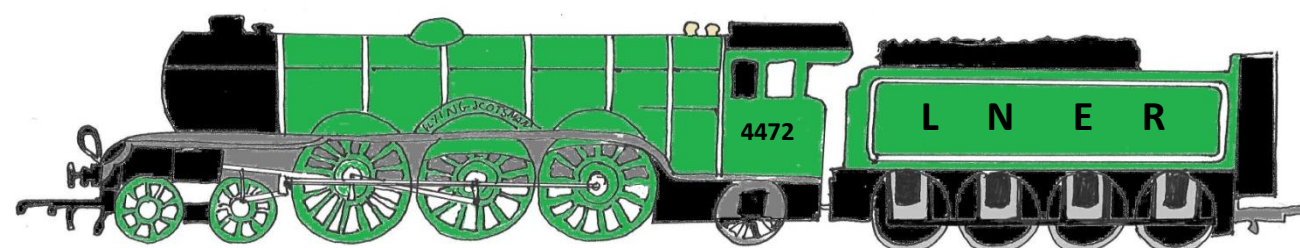


Data Centres: Engines of Growth



Abstract

*This brief paper explains that data centres are not just fancy sheds filled with servers: they underpin the digital economy, they are engines of growth and they improve productivity and generate employment across multiple business sectors. This is a result of their rather unique characteristics and happens in two ways. Firstly, building and operating a data centre is an advanced commercial engineering project; it depends on a complex and specialist supply chain and drives a demand for professional services and high value-add engineering and technical jobs. This is illustrated in **Engine of Growth No. 1**. Secondly (the unique bit), a single data centre is essentially a platform that enables a multitude of different business activities to function simultaneously, and can therefore support an astonishing range of different offerings from web-hosting to computer aided design. This is explained in **Engine of Growth No. 2**.*

Each Engine of Growth illustration is supported by a Key that very briefly explains the labels on each of the wagons and gives examples of some of the companies offering those services. The first Key provides short notes on the data centre supply chain and the second Key explains some of the business services that depend on data centres. These are not intended to be comprehensive; they are merely illustrative.

The paper includes a postscript on the two rather special locomotives that we have used for our illustration. It finishes with links to information on techUK's data centre activities and other explanatory material that we have produced on data centres.

Important note: The keys are indicative, not comprehensive. The organisations we have named just provide a sample of the thousands that comprise the wider industry. Their inclusion is not an indication that they are being singled out or endorsed. If your organisation is missing, let us know and we will add you provided we have space!

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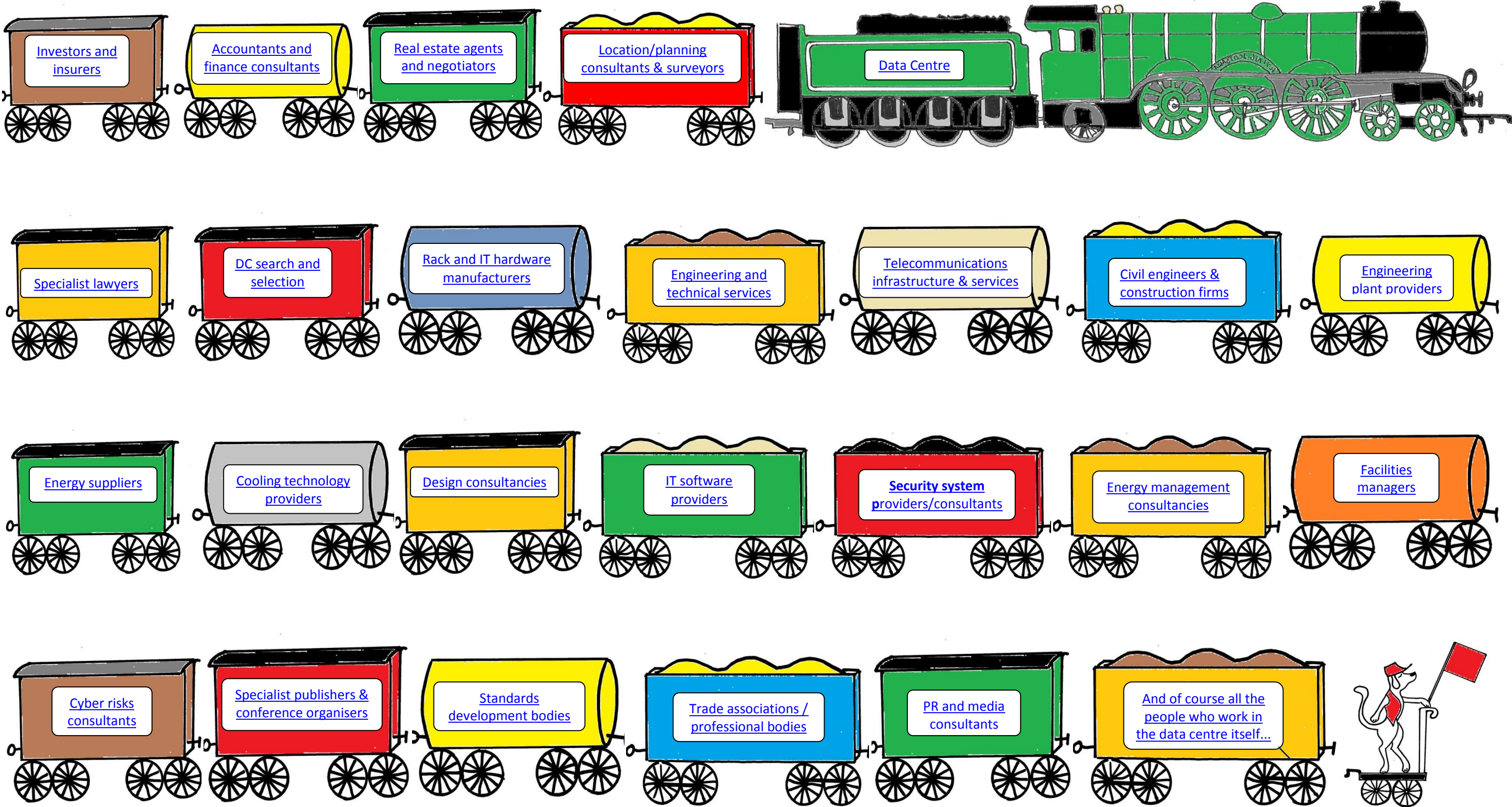
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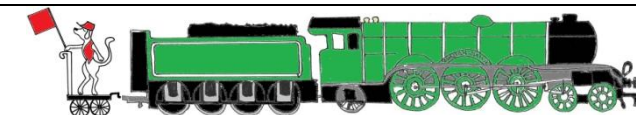
Acknowledgements: Mark Acton, Mark Bailey, Rob Coupland, Sir Nigel Gresley, Nicola Hayes, Andrew Jay, Billy McHallum, Steve Strutt

Data Centres: Engines of Growth No.1

Building or commissioning a data centre is eye-wateringly complex and expensive. Each element of financing, planning, design and construction needs specialist skills, and that is even before it is operational. As a result data centres generate a complex supply chain and rapidly growing demand for a wide range of specialist services. A single data centre therefore acts as an engine of growth in multiple economic sectors, from engineering to planning consultancy, from security fencing to publishing. This image shows just a few of the services that data centres need and some of the types of employment that data centres create – and this excludes employment, growth and productivity generated by the data centre for its customers. [That's another story](#). For more information on data centres and growth see our other papers: [Er, what is a data centre?](#), [Data Centres and Power: Fact or Fiction](#), [So What Have Data Centres Ever Done for Us?](#) and [Data Centres: A Day in YOUR Life](#) or contact emma.fryer@techuk.org. And if you want to know why we chose these particular trains, go to [the last page](#) of this paper!



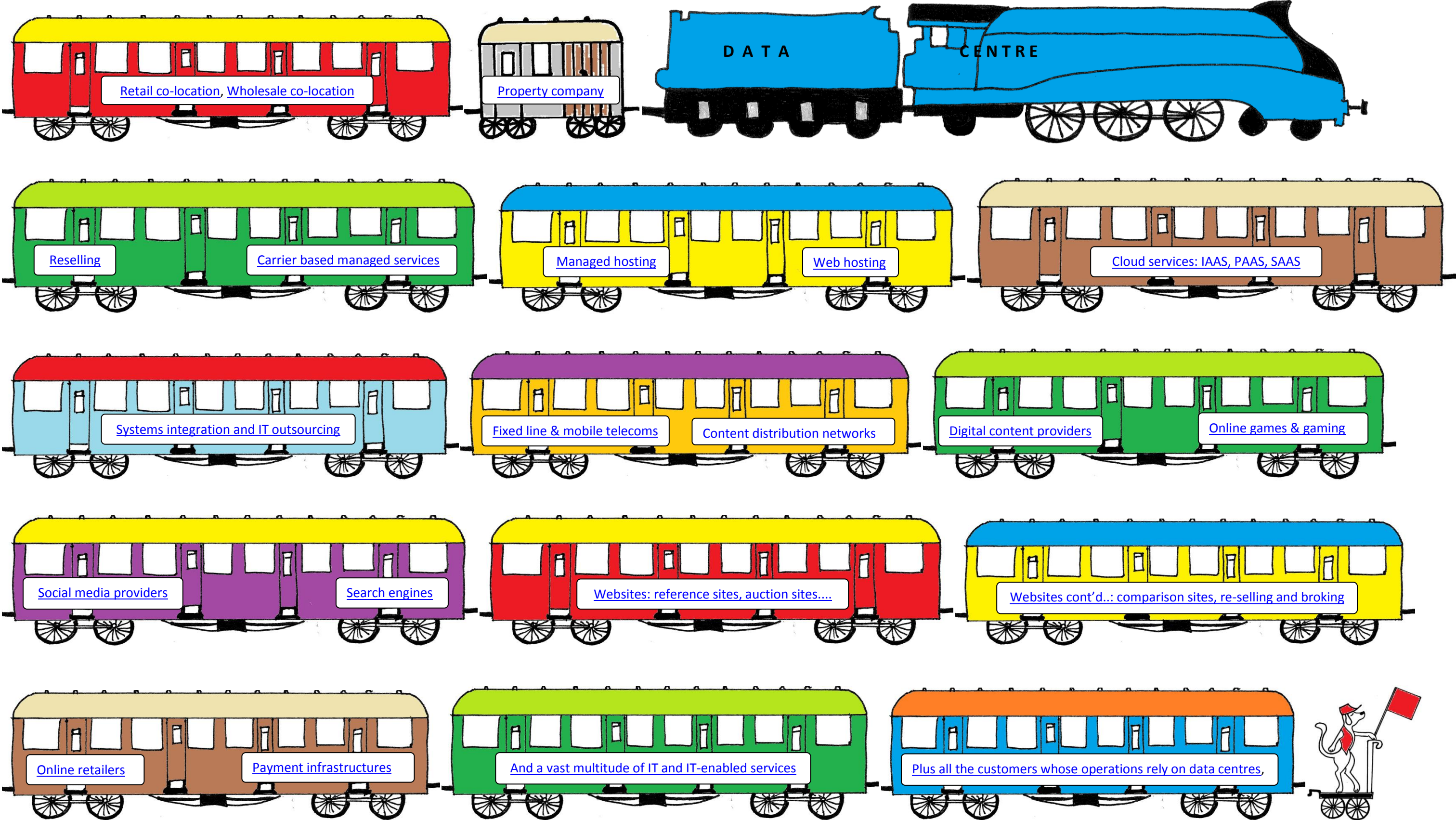
Key: Engine of growth No. 1: The data centre supply chain



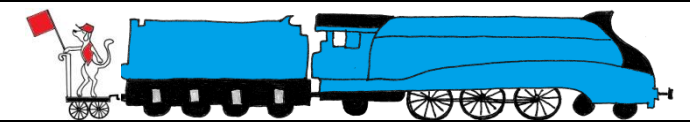
Data Centre operators: These organisations actually build and operate data centres. They include Ark, CenturyLink, City Lifeline, Colt, DataCentred, DRT, Equinix, Global Switch, Infinity, Level3, Next Generation Data, Pulsant, Rackspace, Sungard, Teleticity, The Bunker...and many others.
Location and planning consultants and surveyors: These organisations identify suitable sites for data centres and advise companies on where to build their facilities or locate their operations. They help companies navigate the planning process and prepare advocacy materials for planning applications and appeals. They include CBRE, Cushman and Wakefield, Deloitte, GVA, JLL...
Investers and insurers: These organisations provide the finance for those commissioning or expanding data centres, usually investing in the business activity rather than the property value. They include Barclays, Darwin and Lombard. Other companies provide specialist insurance and include Hiscox and Lloyds....
Real estate agents and negotiators: These organisations facilitate data centre transactions – these may be property transactions as companies lease, buy or sell facilities, or long term contracts for space and services within existing data centres. They include CBRE, GVA, Deloitte, JLL, Cushman & Wakefield...
Accountants and finance consultancies: These companies provide specialist accountancy services, for instance giving strategic advice that allows operators to compare business alternatives on the basis of total cost of ownership. They include Deloitte, Ernst & Young, KPMG, PWC....
Lawyers and contract negotiators: These companies provide specialist legal services, strategic and reactive, property based and technical. They include Bird & Bird, MayerBrown, Nabarro, Speechly Bircham, White & Case, Wragge & Co...
Data centre search and selection: These companies provide a link between data centres and people seeking data centre services, listing facilities by location and type. ColoXchange, Colo Research, , Colofinder, Data Centre Map...
Specialist architects and design consultancies: These companies advise operators on data centre design, from technical to aesthetic: Arup, CBRE, GVA, Nick Webb Associates...
Engineering and technical services: These companies maintain and manage the mechanical and engineering (M&E) functions and include CBRENorland, Cundall, Hurley Palmer Flatt, Norman Disney Young, Red Engineering, Waterman...
Telecommunications infrastructure and services: These companies provide connectivity – very high bandwidth - for data centres. They include BT, Colt, Geo Networks, Level3, Verizon, Virgin, Vodafone...
Civil engineers and construction firms: Data centres may look like big sheds but they rely on a vast range of engineering services and associated expertise. Some companies provide technical planning and design, other specialise in construction. They include Arup, Bouygues, Crownhouse, Galliard Try, ISG, Keysource, Mace, Mercury, Nova, Robert McAlpine, Skanska, Syska Hennessy, Waterman...
Engineering plant providers: These organisations provide things like generators, power supplies and the physical mechanical and engineering plant that the data centre depends on. They include Caterpillar, Cummins, Eaton, Emerson, Piller, Schneider, Socomec, Stulz, RC Group
Energy suppliers and brokers: These companies provide electricity. Data centres may contract for power with generators or via intermediaries. Centrica, EDF energy, EIC, E.ON, EnergyQuote, NPower, Scottish Power, SSE, Up Power Networks..
Cooling technology providers: Data centres require sophisticated cooling technologies. Suppliers include Airedales, Emerson, Excool, Leibert, Munters, Stultz, Trane, York...
Racks and cabling: Data centres house multiple racks of servers, connected by high bandwidth telecommunications. Suppliers include BellComm, Chatsworth, Comscope, CTI Group, Dataracks, ITM, Minkels, Panduit, Rittal...
IT hardware and software providers: These companies make the IT hardware and software that help run the data centre. This doesn't include the IT that is housed in the data centre. They include Cisco, Dell, Fujitsu, HP, IBM, Microsoft, Oracle, Salesforce.....
Security System providers/consultants: Data centres have to be very secure, with access restricted via both physical barriers and biometric controls. Specialist security providers include Beacon, G4S, Shield Group... Security can also include prevention and protection systems such as Fire Detection and Suppression. Companies include; Chubb, Kidde, Marioff, Tyco,,,,
Energy management consultancies: Operators need specialist advice on energy strategy, regulatory compliance and energy efficiency: Arup, CBRE, CGI, EnergyQuote, HPF, Pace, Pulse Business Energy, PWC, Schneider, Siemens...
Facilities managers: These companies deal with the technical management of the mechanical and engineering infrastructure that keeps the data centre running. They include Interserve, JCI, Johnson Controls, Mitie, NG Bailey, Norland...
Cyber risks consultants: Data centres handle sensitive data and need to ensure that they are not vulnerable to hacking or cyber attack. Specialists in providing these services include Kroll, Symantec, Trend...
Specialist publishers and conference/event organisers: A whole publishing and event industry has developed around data centres. Providers include Broadgroup, DataCenterDynamics (DCD), DataCentre World, Terrington Media, The Green Grid (TGG), Turret Group... Specialist publications include: Data Centre Journal, Data Centre Knowledge, Data Centre Management, Data Centre News, Data Centre Solutions, Focus, Mission Critical Magazine
Standards development bodies and other bodies creating standards: The complex, security conscious, energy intensive environment of data centres has driven the rapid development of industry standards for good practice. Bodies developing offerings relevant to data centres include ASHRAE, BCS, BIFM, BREEAM, BSI, CENELEC, CIBSE, ETSI, EUCoC, IEEE, ISO, ITU, The Green Grid, The Uptime Institute,
Trade associations, alliances, professional bodies: Trade associations provide a collective voice for the sector on a corporate basis and professional bodies act at the individual level. They include techUK, BCS, DCA, CIBSE, IET, IMechE, TGG..
PR and media consultants: Like other sectors, data centres need specialist advice on external perceptions and public policy matters. Providers include Brunswick, Nelson Bostock...
Training providers: Companies providing technical training and certification for people working in data centres include Capitoline, CNet, DC Professional. Organisations like BCS and IET provide professional qualifications.
And of course the people who work in the data centre: Data centre jobs range from security guards, engineers, energy and facilities managers to operations directors and other corporate roles like HR, sales, marketing and finance.

Data Centres: Engines of Growth No.2

Data centres are not just fancy sheds full of computing equipment. Data centres enable and power service economies in the way that heavy industry used to power manufacturing economies; they are the agents of growth for the knowledge economy. This is because a single data centre supports multiple layers of economic activity. Some organisations provide basic data centre services (security, resilience, power and connectivity, sometimes known as position, power and ping). Others re-sell this service to third parties, or add one or many of a vast range of IT enabled services from fleet logistics to web hosting. Other organisations use the data centre to provide a full range of IT services for their customers or to manage their own computing functions. In this way a single data centre can provide IT functions for hundreds or even thousands of businesses, it improves productivity and generates employment and growth within its customer base. And this excludes the build stage which generates its own supply chain of jobs and services. [That's another story](#). For more information on data centres see our other papers: [Er, what is a data centre?](#), [Data Centres and Power: Fact or Fiction](#), [So What Have Data Centres Ever Done for Us?](#) and [Data Centres: A Day in YOUR Life](#) or contact emma.fryer@techuk.org.



Key: Engine of Growth No. 2: The services sold out of the data centre



Property company: Not all data centre operators own the property. Instead they may lease the facility from landlords such as PMB and SEGRO.

Wholesale and retail colocation: Wholesale operators provide power, space and connectivity (broadband!) and build bespoke supporting infrastructure like cooling around customer needs. Customers tend to take large areas of space, even whole buildings. Providers include Digital Realty, Global Switch, Infinity, Next Generation Data, Virtus and Volta. Retail operators provide power, space and connectivity and the supporting infrastructure (cooling, etc) in place and ready to use. Customers share this by “co-locating” together and may lease large quantities of space right down to racks or partial racks. Retail operators include Ark, CenturyLink, Equinix, Pulsant, Sungard, Telecity and The Bunker. Some IT services providers also offer colocation space. There is quite a lot of cross-over between wholesale and retail colocation.

Reselling: These companies take space in data centres and then sub-let it. There are hundreds of such companies and they include Adapt, C4L, Control Circle...

Carrier based managed services: These companies are telecoms operators who provide data centre services. They include BT, Cable & Wireless (now Vodafone), Colt, Global Crossing, Interoute, Level3...

Managed hosting/dedicated hosting: These companies lease servers to customers on which they “host” applications. Dedicated hosting just means that servers are reserved for (dedicated to) one customer who doesn’t share servers with any other customers. Managed hosting providers tend to operate at large scale. They include CenturyLink, Rackspace and many others

Web hosting: These companies host websites and other applications for third parties. If you set yourself up as a plumber and wanted a website you would use a web-hosting service, probably via a web-developer or other third party. They tend to be at smaller scale and there are hundreds of different providers, including Fasthost, HostEurope, Netbenefit, Oneonone....

Systems integration / outsourced IT providers: These companies provide the whole IT services package to their customers, from software to laptops, including data centre services. They include Accenture, Atos, CapGemini, Captia, CSC, Deloitte, Fujitsu, HCL, HP, IBM, Logica, PTS Consulting.....

Mobile and fixed line telecoms providers: These companies provide telecommunications services. Some own the network infrastructure and others lease parts of it as wholesale customers. Services include broadband and voice telephony. Providers include BT, Colt, Level3, Vodafone...

Content distribution (or delivery) networks: These companies use large numbers of servers in different data centres. They optimise digital networks to maximise data flows over the internet from content providers to end users, streamlining data traffic and avoiding bottlenecks. They include Akamai, Gaikai, HCast, Soshonet...

Digital content providers: These companies create, licence and distribute digital material. They include BBC, Bloomberg, ITV, Reuters, Sky, YouTube....

Online games and gaming providers: These companies provide a specific form of digital content, online games, which can be played by many people at once or by individuals. They vary from serious games (where the primary intention is to educate rather than entertain) to online bingo. Providers include Gamesys, Mind Candy, Playfish. Gaming providers such as BetFair, Bet Fred and William Hill deliver interactive betting.

Cloud services: the cloud business model allows customers to buy their IT functions as pay-as-you-go services instead of being tied in to fixed contracts for space or hardware or software. Cloud services include infrastructure as a service (IAAS), platform as a service (PAAS), and software as a service (SAAS), among others. Providers include: Amazon AWS, CenturyLink, Google, Microsoft Azure, Rackspace, Salesforce...

Social media providers: These organisations provide peer to peer (one to one) and one to many communication and Facebook, Linked-in, Milkround, Twitter, What’s App...

Search engines: These organisations provide tools for searching the internet and helping end users filter and categorise information: Providers include Google, Microsoft Bing, Yahoo

Websites: Reference: These organisations provide information: Ask, BBC, Wikipedia...

Websites: Online auction sites: These companies provide an auction platform for peer-to-peer transactions and take a commission from the sale: Amazon, eBay

Websites: Comparison sites - These companies allow customers to compare different service providers and products, particularly financial services: Compare the Market, Gocompare, Money Supermarket

Websites: Resellers/brokers: These companies sell on behalf of third parties: Expedia.com, Lastminute.com

Online retailers: Companies that either started online or that have developed online offerings: Amazon, Argos, John Lewis, SportsDirect – in fact pretty much any retailer from DIY to groceries

Payment infrastructures: These companies use data centres to facilitate mobile or online financial transactions. They include LUUP, Monitise, PayPal, Worldpay...

IT or IT-enabled services: such as transport logistics, satellite navigation, building management systems, managed print services, weather forecasting, land use monitoring, in silico modelling, CAD, and a vast array of other things

Other data centre dependents: These are organisations that rely on data centres for their corporate IT function, such as banks, retailers, government departments, utilities, universities – pretty much any organisation you can think of.

Postscript: Why the *Mallard*? Why the *Flying Scotsman*?

The use of Sir Nigel Gresley's *Flying Scotsman* and *Mallard* as our locomotives in [Data Centres: Engines of Growth](#) is no coincidence. Even the most tepid rail enthusiast will recognise them instantly, especially the classic streamlined form, blue livery and characteristic 4-6-2 array of the *Mallard*, which set – and still holds - the all-time world record for steam traction. It achieved this on 3rd July 1938, on the East Coast main line between Grantham and Peterborough by reaching 126mph (pedants will say 125.88mph). The locomotive was driven by engineer John Duddington, the fireman was Tommy Bray and the inspector was Sid Jenkins.

But this isn't just about thrashing a big piece of kit along the fastest bit of track in the UK. The *Mallard*, the *Flying Scotsman*, and over a hundred sister locomotives in Gresley's iconic *Pacific* series, marked a high point in UK innovation and engineering. This was a time when Doncaster – yes, Doncaster – was a global centre of excellence and world leader in engineering skills and practice. So what went wrong? What happened to the UK's pre-eminence as the hothouse of engineering talent? What happened to the implementation of this talent in manufacturing? And what happened to the supply chain that fed it all? The sad truth is that a monumentally successful industry was catastrophically dissipated over a few decades and as a result we don't have a supply chain for the new breed of engineering hardware needed for infrastructure upgrades or next generation power supply – to be honest we don't even have a viable supply chain in the UK for knickers. So we import much of our rail rolling stock and other engineering hardware, along with our underwear.

But there is some good news. In fact we do have an engineering-based industry sector where the UK is a globally important market, where we have leading edge technology development and where the UK really is a centre of excellence for engineering and technical skills. The only problem is that nobody has ever heard of it. This is our data centre sector, collectively worth many billions of pounds, underpinning the digital economy, generating a complex supply chain of high value skills and supporting multiple levels of economic activity. There is another problem - that much current government policy, particularly the way that carbon is taxed in the UK, penalises UK operators and discourages investment and growth.

So the *Flying Scotsman* and the *Mallard* are poignant reminders of what we have lost. Only time will tell whether we can learn lessons from the past and prevent another UK success story drifting quietly offshore to join its predecessors. If you want to find out more about data centres, what they are, what they do and why they are important, have a look at our other publications (below) or contact emma.fryer@techuk.org or alec.broadhurst@techuk.org

techUK data centre programme

If you want to find out more about techUK's data centre programme or get involved, please visit:

<http://www.techuk.org/focus/programmes/cloud-infrastructure-data-centres>

Focus group overview: [techUK Data Centre interest groups](#)

Data Centres group overview: [techUK Data Centres Group Overview](#)

Data Centres Council overview: [techUK Data Centres Council information](#)

CCA web pages: [Information sources about the data centre CCA](#)

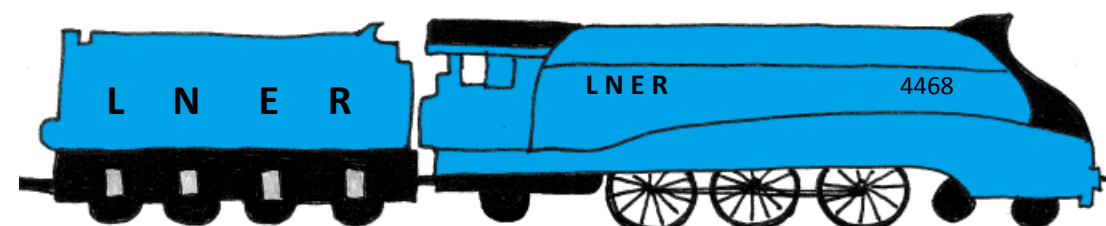
techUK papers: "Data Centres for Tiny Tots"

- [Er, what IS a data centre?](#)
- [Data Centres and Power: Fact or Fiction](#)
- [So What Have Data Centres Ever Done for Us?](#)
- [Data Centres: A Day in YOUR Life](#)

About techUK: www.techuk.org

techUK represents the companies and technologies that are defining today the world that we will live in tomorrow. More than 850 companies are members of techUK. Collectively they employ more than 500,000 people, about half of all tech sector jobs in the UK. These companies range from leading FTSE 100 companies to new innovative start-ups. The majority of our members are small and medium sized businesses. techUK is committed to helping the sector grow. It does this by helping members to:

- [Expand Market Opportunities](#): techUK works with its members to identify and advance innovation in the key markets representing the most significant opportunities for growth both domestically and internationally.
- [Improve Operating Performance](#): techUK works with our members to identify and help shape key public policy issues to optimise our industry's economic potential—both domestically and overseas.
- [Make Informed Decisions](#): techUK affords unique insights on key issues to help members make more informed decisions—and ensure a competitive edge in their markets.
- [Build Stronger Relationships](#): techUK helps companies broaden their network, build connections and deepen relationships with potential customers, partners and suppliers.



Mallard



Flying Scotsman