King's Cross Station Redevelopment

Human Systems Demands and Impacts

Andrew Harding

An exploration and commentary on a contemporary civil engineering project in the United Kingdom.

Contents

Introduction

King's Cross station was designed by Lewis Cubitt in 1852 and was the largest single span structure in Europe. The roof span is 105ft wide by 800ft long and was originally supported by laminated timber. However, this was replaced by steel at a later date. (Durant, 2010)

Nowadays almost 40 million passengers use King's Cross every year and this number is only ever going to increase given both the rising population of London and the increasing size of the city. Society now regards quick and easy travel as a fundamental need, therefore modern and adequate infrastructure is essential.

Redevelopment of the station was announced in 2005 and carried a budget of £400m. Plans included restoration of the existing grade I listed building, incorporation of the King's Cross St Pancreas London underground station and a brand new station concourse. The new concourse is designed to provide an awe inspiring entrance to the city. (Arup, 2012)

In 2006, planning permission was acquired to redevelop the surrounding areas as well as the station. This area totalled 8m sq. ft. and would be used for a variety of purposes including a new University and a large amount of public space that straddles the Regent's Canal. This regeneration will create the biggest change in London in 300 years. (Littlefield, 2012) (King's Cross Central Limited Partnership, 2012) This part of the project is expected to last beyond 2020 and a large amount of the project is still unknown. The purpose of this report is going to be the redevelopment of King's Cross station itself and the challenges that come along with that.

Project Aims

The core challenge of the project is to bring the station into the 21st century and provide a future proof transport hub suitable for an ever growing busy city, whilst retaining the original features of the grade I listed building. This will provide much better access to transport for the unprecedented number of people that use King's Cross on a daily basis.

It was decided that an essential aim of the project is to have the vast majority of infrastructure in place for the London Olympics in 2012. During the Olympics there would be a greater number of people in the city, meaning that there would be increased pressure on the transport network. As well as this, it provided an ideal opportunity to showcase the development to the world.

This factor meant the project had a definitive deadline with very little room for error. The core aim of the project had to be completed within a five year timescale, whilst conforming to other social and legal demands that apply to any project in the current economic and environmental climate. As well as this, the project was required to minimise disruption to the existing station and transport network.

The project can be broken down into aims;

- Provide a future proof transport hub
- Retain the historical features of the existing building
- Comply with social and legal demands
- Adhere to a definitive timescale
- Minimise disruption to existing transport links

The main aim may become distorted. For example, to a member of the public it may be unclear what the driving force behind the project is. They may think that the main aim is to enhance London's image during the Olympics and wonder whether technological advancement drives global competition or whether it is global competition driving our advancement. To somebody involved with the project, the main aim is a combination of both.

Governance

As with any project, the redevelopment of King's Cross has many fundamental responsibilities it must adhere to.

In today's world there is a massive amount of emphasis on the environmental impacts of a project. This includes any water pollution, air pollution, waste and any consideration of wildlife habitats. However, as King's Cross is located in a heavily developed city, it is unlikely that wildlife will be affected in this case. The main causes for concern during this project are air pollution and waste.

There are a number of key targets and legislation with regards to air pollution and climate change. In 1990 the Intergovernmental Panel on Climate Change (IPCC) was set up and since then a number of summits have been held to set out key targets for combatting climate change. These targets include the reduction of greenhouse gasses. This can be achieved by creating energy efficiency, generally reducing energy consumption and the increased use of renewable energy sources.

Also, there are a number of key targets that the project must adhere to when it comes to the control of waste. The Environmental Protection Act 1990 part II introduces the concept that every company who deals with waste has a 'duty of care'. This means that all those dealing with waste must take appropriate steps to dispose of it in a safe and environmentally friendly manner.

These legislations are enforceable by law and the Environment Agency can impose penalties such as monetary fines and prosecution. (Rostron, 2001)

As well as these legislations, King's Cross is a grade I listed building, meaning that it cannot be unjustly altered or demolished and that features of the building must be retained for heritage purposes.

The economy also has a large impact on projects. In the current uncertain economic climate spending is always under scrutiny and it is important to have a realistic, achievable budget. During the recession the UK Government announced many plans to reduce public spending. However, they also have a responsibility to reduce unemployment and boost the economy. This can be achieved through large construction projects such as this one in a variety of ways. The project itself will provide employment and the improved transport links that the project will provide may encourage

new businesses to set up in the area and create globalisation. This is only enhanced with the project being a big part of the London Olympics.

There are also a number of social responsibilities the project must face. Given the nature of the project, it is important to keep the disruption of existing services to a minimum. The project must take into account the public's thoughts and opinions as well as keeping them updated on plans and developments.

Furthermore, the project has many responsibilities in terms of health and safety including the workforce and general public.

It is clear that the governance of the project is extremely important. Proper governance is achieved through democracy, transparency and accountability, which are all inherently interlinked. This promotes best practice and fairness in terms of planning, public involvement and enforcement.

Corruption and mismanagement can lead to unsuitable, unsustainable, defective and dangerous infrastructure which not only raises the costs of maintenance, repair and replacement but can also result in civil and criminal liability for damages. Democracy and transparency lead to accountability, which is proven to reduce mismanagement and increase sustainability within projects. This can be achieved through multi stakeholder approaches, meaning that not one person has control over the project. This promotes best practice and in turn increases sustainability. (Hawkins & McKittrick, 2012)

Also, the provision of publically available information increases the transparency of the project. This is achievable by letter drops, news articles and exhibitions. As King's Cross is already such a public area the provision of information is both easy and vital.

In order to ensure that the obligations of the redevelopment of King's Cross were met, Network Rail appointed Turner & Townsend to provide an overarching commercial management service. Turner & Townsend set up an experienced management team which took charge of procurement and cash flow. As well as this, Turner & Townsend supported Network Rails own project management team when dealing with other aspects of the project such as the environment. (Turner& Townsend plc , 2011) The appointment of this third party company to provide project management is an example of a multi stake holder approach which promotes democracy, transparency and accountability.

Parties and Disciplines Involved

John McAslan + Partners are the architects involved in the project (Arup, 2012) and Network Rail Ltd is the client in terms of the redevelopment of King's Cross station. During the project there were a number of different stake holders involved. King's Cross is being developed by the King's Cross Central Limited Partnership which brings together three groups; Argent King's Cross Limited Partnership, London & Continental Railways Limited (LCR) and DHL Supply Chain. (King's Cross Central Limited Partnership, 2012)

Arup was the lead consultant on the project. They provided transport planning, multi-disciplinary engineering services, security, IT, lighting design, acoustics, visualisation and pedestrian modelling. (Arup, 2012)

Furthermore, a number of contractors were used during the construction phase of the project; Companies included Carillion, BAM Nuttall, BAM Construct and Kier group. (King's Cross Central Limited Partnership, 2012)

The redevelopment of King's Cross was a huge project and incorporated many aspects of civil engineering including project planning, transport planning and pedestrian modelling as provided by Arup. As well as this, geotechnical engineering is involved when incorporating the underground aspects of the existing transport network in London. Lighting design and acoustics are also vital when creating an awe inspiring concourse. Mechanical and electrical engineering were needed to provide services such as energy, information and connectivity. The construction sector is also vital in providing the physical structure of the redevelopment which includes an ambitious Diagrid Cell structure, forming the main concourse.

Analysis of the Project

As a system the project can be broken down into many different elements and sub elements; many parts form the whole. The concourse is an element of the King's Cross redevelopment project. However, this element can be broken down further into sub elements including lighting and power.

This can be illustrated in system diagrams:

Figure 1; overall system

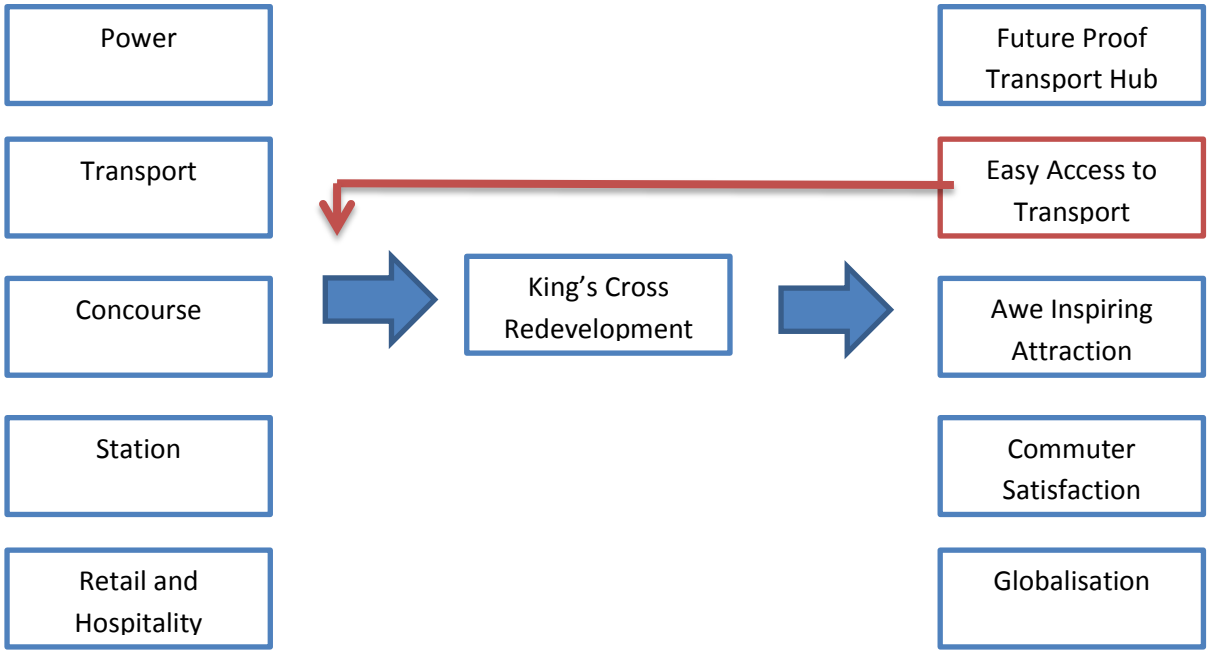
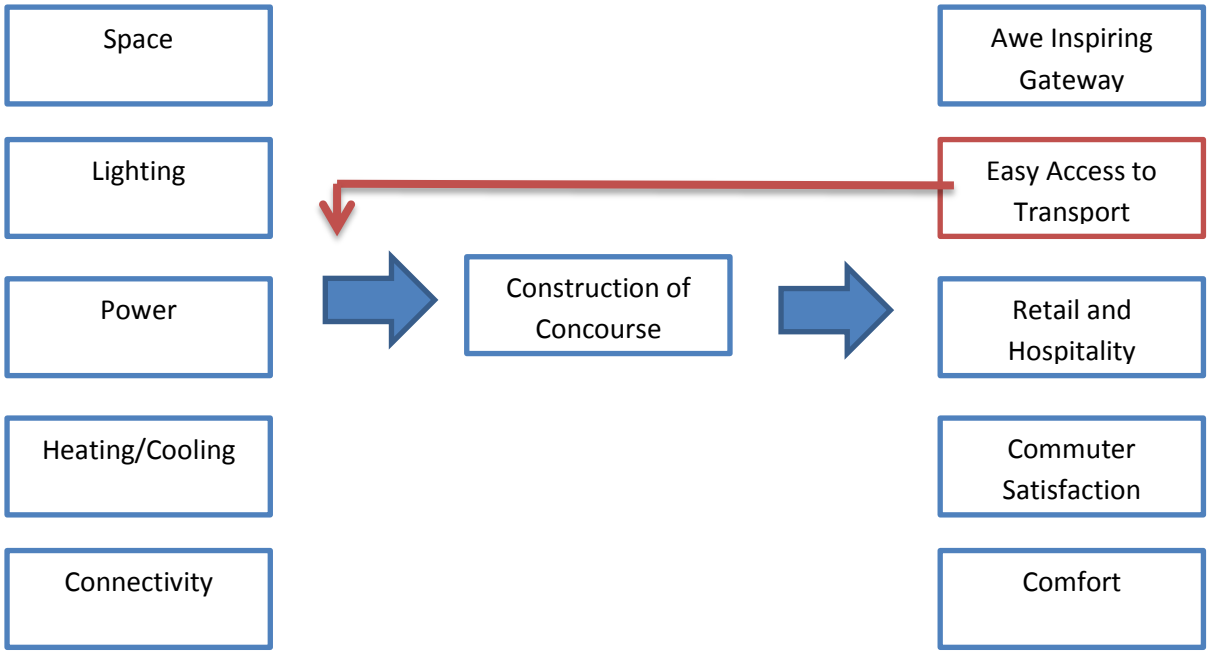


Figure 2; concourse sub-element



These figures show different elements of the same project. In both cases easy access to transport can be considered as a feedback loop because a key responsibility of the project is to reduce any disruption to existing transport and to provide a future proof transport hub. Easy access to transport is the foundation of this goal.

Conclusion – Should it have gone ahead?

The project had many social and legal demands to contend with in terms of the environment and economy. As the project is still essentially on-going and in its infancy, it is difficult to gauge how well it has achieved these targets. However, it is fair to say that at large it will have. Construction is well known as the largest socio-economic driver and after 5 years of steady employment it will have boosted the UK economy massively. As for the environmental side of the project, the station now incorporates solar panels and rainwater recycling. This massively improves the stations sustainability. (Network Rail, 2012)

The core challenge of the project was to bring an ageing station into the 21st century and to provide a future proof transport hub, whilst retaining the original features of the building. The project was also required to be largely complete for the London Olympics and to be completed whilst limiting disruption to existing services. These goals have been achieved with monumental success. The new station and concourse was open months in advance of the Olympics and Network Rail claim that not one single train has been cancelled during construction. (Network Rail, 2012) The new concourse is an amazing structure that seamlessly incorporates the heritage of King's Cross into an awe inspiring entrance to an improving and expanding city. This is a huge achievement when you take into account the scale of the project and the nation should take pride in such a feat.

It is another shining example of Great British innovation and there is absolutely no doubt that the project should have gone ahead, as there is a real need for the regeneration. However, in an Earth 2.0 scenario, the question of whether the project would have gone ahead arises. The answer to this question is largely dependent on whether the London Olympics would go ahead in this scenario. Although the legacy of the Olympics is not yet entirely clear, many people are unsure if it was economically healthy for Great Britain to host the games. Without the Olympics, it is extremely debatable whether there would be a driving force behind the project.

Nonetheless, in reality the London Olympics did go ahead and was regarded as a huge success as an event. In turn, it is clear the redevelopment of King's Cross has been and will be a triumph of civil engineering in the United Kingdom.

Bibliography

Arup, 2012. *Fast Facts.* [Online]
Available at: http://www.arup.com/Home/Projects/Kings_Cross_Station/Facts.aspx
[Accessed 11 12 2012].

Arup, 2012. *Kings Cross Station.* [Online]
Available at: http://www.arup.com/Projects/Kings_Cross_Station.aspx
[Accessed 06 12 2012].

Ashley, R., 2012. The role of the civil engineer in society: engineering ethics and major projects. *ICE Civil Engineering ,* 165(CE3), p. 99.

Doherty, A., Dora, J. & Newsome, C., 2012. Enhancing Britains Railway Infrastructure. *Civil Engineerings Special Issue,* 165(CE6), pp. 20-26.

Durant, S., 2010. *Victorian Railway Stations.* [Online]
Available at: http://www.victorianweb.org/art/architecture/london/55b.html
[Accessed 06 12 2012].

Hawkins, J. & McKittrick, B., 2012. Construction Sector Transparency Initiative: making construction more accountable. *ICE Civil Engineering Proceedings,* 165(CE2), pp. 82-88.

Holgersen, S. & Haarstad, H., 2009. Class, Community and Communicative Planning: Urban Redevelopment at Kings Cross London. *Antipode,* 41(2), pp. 348-370.

King's Cross Central Limited Partnership, 2012. *Delivery Team.* [Online]
Available at: http://www.kingscross.co.uk/delivery-team
[Accessed 11 12 2012].

King's Cross Central Limited Partnership, 2012. *The Development.* [Online]
Available at: http://www.kingscross.co.uk/the-development
[Accessed 07 12 2012].

King's Cross Central Limited Partnership, 2012. *Who's Developing King's Cross.* [Online]
Available at: http://www.kingscross.co.uk/whos-developing-kings-cross
[Accessed 11 12 2012].

Littlefield, D., 2012. London (Re) Generation. *Architectural Design,* 82(1), pp. 32-35.

Network Rail, 2012. *Kings Cross.* [Online]
Available at: http://www.networkrail.co.uk/aspx/6288.aspx
[Accessed 07 12 2012].

Rostron, J., 2001. *Environmental Law for the Built Environment.* 1st ed. London: Cavendish Publishing.

Turner& Townsend plc , 2011. *Network Rail - King's Cross Station redevelopment programme.* [Online]

Available at: http://www.turnerandtownsend.com/184/_1854.html
[Accessed 07 12 2012].