



Changing the Face at the Busiest Airport in the World through Project Management

Refurbishing Heathrow Airport Terminal 1, On Time, On Budget, With No Disruptions to Travelling Public



Terminal 1 had been out of date and badly in need of refurbishment, with the 40-year-old building not seeing any significant updates since it was built in the 60s. With serious refurbishment going elsewhere at Heathrow Airport, as well as the upcoming opening of Terminal 5 and the introduction of international passengers to Terminal 1, it was in need of a major overhaul.

Background: Dated and In Need of a Revamp, But It has to be Business as Usual...

BAA Airports Ltd. was tasked with the refurbishment of Terminal 1, a 40-year-old building within Heathrow Airport, the busiest international airport in the world, whilst constantly keeping the terminal open to the 20 million annual travellers.

In 2004 BAA and the Star Alliance network, established in 1997 as the first truly global airline alliance to offer worldwide reach and seamless service to the international traveller, signed a memorandum of understanding that would result in Star Alliance moving into Terminal 1 at Heathrow Airport. Terminal 1 had previously been for short-haul European destinations only, but the introduction of Star Alliance meant that international passengers would now also be using the terminal.

This work was required to facilitate the move by a number of Star Alliance airlines who were moving their operations from Terminals 2 and 3 to Terminal 1. The successful completion of this project was the enabler for the complete transformation of Heathrow Airport that is used by more than 90 airlines, which fly to more than 180 destinations worldwide.

As well as a commitment to completing the project within a very strict deadline, health and safety issues were also a big concern given that the project had to be delivered within a live operating passenger terminal. Any interruption to the operation of the terminal building, and the stakeholders or passenger experience would likely result in delays for the airlines operating from Terminal 1 and as such, significant financial penalties for BAA. Public and media perception of BAA would not be enhanced should such a situation arise.

David Buisson, PMP, was chosen to lead the project. Mr. Buisson is a certified project manager with more than 13 years experience of managing complex and challenging projects by implementing the standards set out by the Project Management Institute (PMI®) through *A Guide to the Project Management Body of Knowledge (PMBOK® Guide)*—Fourth Edition. Under his direction, a team of professionals from a variety of backgrounds and industries tackled one of the most important transport projects in the UK, keeping it ahead of its European competition.

Challenges: Complex, Problematic and Large-Scale— A Project Manager's Landscape

The project team had to resolve a large number of challenging and unexpected problems during the refurbishment, including asbestos in the ceiling and inconsistencies to the floor level.

It was also a complex and challenging project for the team because the work was delivered in 42 different phases, whilst remaining operational at all times. There was also a tight time schedule to deliver the project, which was marred by additional scope being added constantly and several delays from airline partners with regards to their move date.

In these circumstances, the project manager consistently referred to *A Guide to the Project Management Body of Knowledge (PMBOK® Guide)* – Fourth Edition for guidance on how to manage difficulties.

Human Resources Management

The People

Management of different people and teams on this project was quite challenging because of its scale and size. There were 11 top-tier suppliers who reported directly to the project manager, and dozens more who subsequently reported in to them, overall involving a very large number of workers.

Communications and time management would prove to be a challenge on a project involving this many different parties, especially because the project manager was keen to maintain a collaborative approach to problem solving.

The Planning

The large number of third parties working on this project potentially could have had severe repercussions on scheduling. If one contractor was late in finishing levelling the floor, this could delay the contractor that was scheduled to install the furniture, causing a larger knock-on effect throughout the project.

Cost and Procurement Management

Budget Changes

Budgetary reviews on the project meant that some major late changes were made on the project including some to the original plan with only four weeks to go. The original design for the installation of a “cladding” system above the ticket desks for BMI Airlines that would improve both the aesthetics and lighting for the area was deleted from the scope of works just four weeks before the check-in desks were scheduled to open. Upon learning of the decision, the project team was faced with an almost

“There were a number of factors associated with this project that made success a big challenge. Managing multiple stakeholders, suppliers, and contractors within a strict deadline and budget would ordinarily be difficult, but doing this alongside keeping the terminal continuously open for passengers was a huge issue that required strict planning and coordination, and the framework of the PMBOK® Guide was an invaluable resource for me to best manage all facets of this project.”

David Buisson, PMP, Project Manager

insurmountable task of finding an alternative solution that was acceptable to the various stakeholders and could also be procured and installed in less than four weeks.

Scope Management

Structural Challenges

A big challenge for the team was repairing damaged floor work in the terminal that was left when the building was initially constructed 40 years earlier. Repairing the floor potentially added an extra 21 weeks of work to the project. The floor in the East Linear face of the terminal was discovered to have been constructed from different materials to the rest of the flooring in the terminal. The floor was an uneven concrete surface instead of the regular terrazzo tiling, which to correct, would have added a significant amount of time to the refurbishment.

Technological Challenges

Information Technology (IT) proved another challenge in the delivery of this project because the team had to replace existing systems within the terminal building. This was a big challenge because it not only included standard office network systems, but also specialist flight systems such as Flight Information Display Screens, regulatory systems for passenger processing, and closed-circuit television.

Environmental Challenges

Completing this project sustainably and installing sustainable and energy saving measures were an important component in the refurbishment project. Given this was a renovation project and not the construction of a completely new building, installing truly sustainable features to save water for example, was very difficult in an old fashioned building.

Communications Management

Communications was also a big challenge for the project because there were multiple high-level stakeholders involved who had to be consistently updated each time there was a risk identified or when there was a change to the schedule or budget.

Risk Management

Key to the success of any project is risk mitigation, which is clearly outlined in the *PMBOK® Guide*. There were a number of risky tasks on this project which were essential to complete, and had they failed would have been catastrophic and could have resulted in the closure of Terminal 1. This would not have been a desired outcome from a passenger experience or public perception point of view.

“Risk had to be tightly managed and identified early on to ensure that a solution could be found before it turned into a major issue that would take the project off-time and off-budget. My knowledge and experience of using the PMI PMBOK® Guide meant that communications management was strictly adhered to and regular meetings.”

David Buisson, PMP, Project Manager

Asbestos Risk

A big concern for the team that could potentially have been very damaging was discovering asbestos in the ceiling. A number of the ceiling tiles in Terminal 1 were damaged and needed to be replaced, therefore the asbestos needed to be removed safely. Bearing in mind that 20 million passengers pass through Terminal 1 every year, the problem could not simply be solved by erecting scaffolding in these areas, taking down the damaged tiles and replacing them, as this would create a health and safety risk to the passengers and staff of Terminal 1. The agreed plan was to construct an air-tight floor to ceiling area in the roof void around where the damaged ceiling tiles were and extract the asbestos accordingly by a suitably qualified asbestos removal contractor.

Electrical Risk

Undertaking renovation works in a building that is 40 years old has inherent risks, and particularly so when electrical refurbishment is involved. It was discovered that the East Linear check-in facility required the installation of a new distribution board to meet the greater electricity demand. In installing a new distribution board the power to the entire terminal had to be temporarily turned off. This had never been undertaken in the 40 years since the building had been built and consequently there was little confidence that when the power was turned off all of the equipment would restart when switched back on.

An added dimension to this was that the distribution board in question provided power to the Central Search Area where passengers were processed through BAA Security, which is the main route to their departing aircraft. It was therefore critical that the project leaders got this process right otherwise the terminal would not be able to process passengers and may have to close down until power was restored.

Solutions: Mitigating Risk and Obstacles to Come In On Time and On Budget

There were a number of difficulties that arose during the refurbishment of Terminal 1 at Heathrow that had budgetary, scheduling, health and safety, and communications implications. This section examines the solutions that were used in response to these challenges, and the aspects of the *PMBOK® Guide* that were examined to support developing these solutions.

The People

Given the large number of stakeholders involved in the project, it was important for the project manager to ensure that all parties delivered the quality of work and level of standards that BAA normally expects. Consequently, a very clear mandate was issued to the plethora of third-



This large-scale project had to be delivered whilst remaining completely operational for customers—challenging enough in any circumstances, but this was particularly the case for Terminal 1 at Heathrow Airport given the fact that some 20 million people a year travel through the airport.

party suppliers and contractors involved to ensure that they followed a very specific framework for the quality and design requirements of the project.

Suppliers and contractors were able to fairly pitch for work on the project through a competitive tender process that ensured the best people got the job. A collaborative, non-hierarchical approach to human resources management was taken to ensure that maximum value was achieved and maximum knowledge extracted from the range of skills and professions contributing to the project.

As a commitment to the Project's Human Resource Management knowledge area within the *PMBOK® Guide*, it was agreed very early on in the planning stage of the project that to have an effective and coordinated delivery team that could respond instantly to the demands of this project, the main contractor should be located in the same office as the project team. The project team felt that with unexpected changes to the scope of work such as the floor, the team would be able to deliver most effectively by being located in the same place.

Additionally, weekly and monthly meetings were held with all suppliers to address any grievances, problems, or issues. When a problem did arise, the project manager would personally ensure that the issue was resolved quickly before moving on. Good communications and people management ensured that the project progressed smoothly.

The Planning

The key to managing the project was to strictly manage the individual contractors to ensure each small project was delivered on time.

Budget Changes

Budgetary commitments meant that a number of last-minute changes were made to the project. The project team and main contractor held a brainstorming session where one of the suggestions was to use hoarding panelling that had been used over the past 12 months for various other construction works. Approval for this proposal was endorsed by the relevant stakeholders and the cladding was duly installed prior to the required deadline.

The cost estimating and budgeting efforts during the early stages of the project were very challenging and, in particular, getting the balance right in terms of work that would be undertaken at night versus those in the daytime hours. This had a significant impact on the project budget as work undertaken at night is far more costly and productivity is lower.

Structural Challenges

Mending the floor whilst keeping to the project deadline was a challenge, given that other work was taking place simultaneously in the area. The

£6.3million worth of additional work was added without an increase to the original project budget.



team had also envisaged being able to use the area for storage. The project team met with the main contractor, terminal maintenance, and other contractors to discuss the issue of re-flooring this particular area and to develop a joint phasing plan to sequence the work and what areas would be protected for site storage of materials and tools. This was required to ensure that the unexpected re-flooring work was finished in line with the original time schedule for the East Linear Face of the terminal, and that it did not become a barrier for other works to be completed. Despite the prospect of a 21-week delay, the team still delivered on time.

Technological Challenges

In many ways, it was the IT behind the project that ensured that it was successful, delivered on-time, and delivered on-budget.

IT was an integral part of the Terminal 1 project because it allowed the project to be constantly monitored for problems by all parties involved. The IT team at BAA developed custom software for the project that incorporated an “Online Change Control” system that allowed any members of the team based on- or offsite to capture changes and send them online to the senior project manager for instant approval or rejection.

Given the large number of contractors working on- and offsite, the system proved crucial to the delivery of the project. If groups working offsite identified a problem for example with the budget, they could raise an issue through the specially designed software that would go directly to the project manager who could instantaneously approve/reject any requests. This saved invaluable time on the project and meant that work could continue with less delay than would have been previously experienced.

Environmental Challenges

BAA has a strong commitment to ethics in their Corporate Sustainability Programme, which is dedicated to improving design, construction, and integration and decommissioning.

Despite the challenges of updating a building from the 60s, the project team strove to incorporate sustainable changes to the lighting and heating.

Changes were made where possible including using energy saving bulbs throughout, and low-energy heating.

The Risks

Asbestos Risk

In response to the asbestos risk, the project team, including the Health and Safety officer, main contractor, and terminal operations team, reviewed all of the potential options and risks and agreed that the solution was to create an airtight area within the contaminated roof void that would not leak into the airport.

The use of this software played a vital role in communications management for the project, allowing the entire project team to have visibility of all activity on the project almost in real time, minimising time wasting or duplication of work. This was a part of the commitment to good communications between the team and allowed for easier access to the project plans.

Weekly coordination meetings were held to ensure that any problems or issues were picked up immediately and dealt with. Each meeting would examine a five week look ahead at the work schedule anticipating any future issues before they might happen. Project manager David Buisson would examine the top five risks every week with various contractors, visiting them onsite to determine a solution to the problem.

“This project was a huge success despite considerable odds against it. It was completed on-time, on-budget with no major problems and whilst remaining open to the public. The success of this project is due to excellent management that is borne out of a good grounding from the PMI PMBOK® Guide.”

David Buisson, PMP, Project Manager

A qualified asbestos removal contractor was then able to work within the airtight roof void area where the damaged ceiling tiles were and extract the asbestos. Once this work had been completed and air samples taken to confirm that the area was safe, the main contractor could remove the damaged tiles, replace these with new ones, and decorate them accordingly. This process was repeated a number of times throughout the terminal with no interruption to the passenger experience or terminal operation.

A big part of developing a solution for the asbestos problem was assessing and implementing project risk management. For this project, two primary risk management schedules were developed and maintained with one at a strategic/leadership level whilst the other dealt with the day-to-day risk factors.

Electrical Risk

Switching off all power to the old terminal building carried the heavy risk of the power not returning at all. The project team therefore convened a high-level meeting with all relevant stakeholders and the main contractor to discuss the issues and formalise a plan. Subsequent meetings were held with all of the interested parties to review the plans, risks and mitigation activities, roles, and responsibilities prior to the actual work being undertaken between the hours of 11 p.m. and 3:30 a.m. on 3 November 2008.

The output and results of the various meetings and discussions were captured in a formal process guidance document including all relevant technical data associated with this work. The meticulous planning ultimately proved to be a success when the power was turned off in the terminal building, the distribution board replaced, and the power restarted without incident or inconvenience to any of the areas impacted.

For every aspect of the project that involved any risk, risk schedules were reviewed, updated, and published through a formal review meeting held every month. In addition, the main contractor undertook the same process of risk management for its respective activities along with its key suppliers. Through this process, the top three risks identified in the risk schedule were escalated to the project board every month for elevation within the relevant business unit.

Results: Delivering Value and Efficiency Through the Use of the *PMBOK® Guide*

Heathrow Airport Terminal 1 was completed on time in September 2008. The project involved more than 500,000 working hours and kept within its £57.6 million budget.

- The project delivered on time and within budget despite the numerous problems that arose, especially the unexpected extra work that could have caused major delays to the project delivery.
- The project had a good health and safety record with no reported incidents, despite dealing with serious hazards like asbestos.
- There was effective team work between the numerous contractors, suppliers, stakeholders, and various support functions.
- All challenges were successfully met by the project team including £6.3m of unexpected out-of-scope work that was engineered into the final solution without an increase to the approved project budget.

References

Project Management Institute. (2008). *A Guide to the Project Management Body of Knowledge (PMBOK® Guide)* – Fourth Edition. Newtown Square, PA: Project Management Institute.