Executive Summary
In 2012 London Underground (LU) embarked on an ambitious programme to upgrade more than seventy stations over a period of five years and at a cost of £330m. The work itself was relatively straightforward – to replace life expired mechanical, electrical, fire and communication systems as well as failing roof, wall and floor finishes and defective staircases - but it had to be done at night when the stations were closed, in confined areas and with constrained access.

LU decided to contract directly with Tier 3 and Tier 4 suppliers for the whole programme and manage the design and construction work itself. LU introduced formal production management to engage the suppliers in planning and managing the work on site. The programme was launched at Baker Street Station in December 2012 and Embankment Station in November 2013. Whilst the programme was still in its development stage the production management systems proved invaluable as a basis for planning and managing complex activities and for ensuring that the suppliers could complete the tasks they agreed to undertake. The planning process also proved to be a catalyst for LU’s project teams to engage the suppliers, resolve issues and collaborate to get the job done.

Introduction
The Stations Stabilisation Programme (SSP) was set up to upgrade more than seventy of LU’s stations over a period of five years at a cost of £330m. The upgrades are focussed on keeping the stations safe, legal, operable and maintainable, and involve the replacement of life expired systems and premises assets. It was routine work that had to be undertaken by different specialist suppliers, mainly at night and often in confined areas with constrained access. Whilst it was important that the work was completed on time and within budget, it was equally important that it was done efficiently which meant finding a new way of working with the suppliers to plan and coordinate their work.

In 2012 LU launched their STAKE delivery programme with the objective of creating more collaborative relationships with their suppliers and using these to develop more innovative and efficient work practices. The SSP was the first programme to be delivered under the STAKE contractual arrangements and was a test bed for the new ways of working. As LU controls access to their stations and is responsible for the safety of the workforce, it has made sense for them to take on the role of Construction Manager in SSP contracting directly with the suppliers. This was an opportunity to engage the suppliers in the planning and management of the work and in improving their performance from station to station across the programme. A key feature of this new way of working has been the introduction of formal processes for planning and managing production on site.

What we did
LU retained DS Consulting from Stuttgart to implement the collaborative planning and production management systems for the first project at Baker Street (circa £22m). DS Consulting specialise in lean construction processes and work with many leading infrastructure owners including Alstom Power and BMW.
The first step was to arrange a collaborative planning session with representatives of all of the suppliers who would be involved in the project. The session lasted for a day and was facilitated by DS Consulting. Using simplified layouts of the station, a large sheet of brown paper pinned to the wall and packs of coloured sticky notes, they engaged the suppliers in the detailed planning of the project working back from the completion date. The objectives of the session were to define the optimum sequence of activities for the station upgrade and to list for each activity all of the inputs required for it to be completed. At a later stage in the production process, these lists would be critical in ensuring that every activity could be completed before a supplier committed to implementing it.

On completion of the collaborative planning exercise, the facilitators took away all of the material that had been produced and from it developed the programme for the project together with the layouts of the station showing where each activity was taking place. The process of producing this programme ensured that the suppliers owned it and had an interest in implementing it successfully. The process also exposed many conflicts and risks that might not have been identified in a more traditional planning process. It created a sense of common purpose amongst the suppliers and the LU Project Team that would be critical to the success of the project.

Before the start of work at Baker Street Station, LU set up a planning room on site. It contained all of the information from the planning sessions as well as a series of planning boards that would be used in the day-to-day management of production. Planning boards are 1.5m high panels containing a series of slots into which printed T-shaped cards can be placed. The boards represented a total of three weeks of shifts and the cards represented individual activities from the mutually agreed project programme. The planning boards were updated weekly on a rolling three week basis.

Once a week, the suppliers’ project managers met with the LU Project Team in the planning room to review the work planned for the next three weeks. In this ‘making ready’ exercise, every activity was reviewed to check whether the inputs were ready and all preceding tasks had been completed. If an activity was ready to be implemented the card remained in place on the board and it could be included in the immediate work programme. If any inputs were still outstanding, the card was marked; actions were agreed and completed to ensure the inputs were in place in time or the activity was re-planned as a last resort. This simple process ensured that suppliers did not try to implement activities that could not be completed.

Before every shift LU's Construction Manager and the suppliers’ foremen, went through the cards in the slots for the shift and did a final review to check they were ready to be completed. At the same time they discussed how they would share access, workspace and common resources. At the end of the shift the cards that had been completed were turned over and those that were not completed were recorded and not turned over. This indicated that a new plan to complete that activity was required and needed to be agreed before the activity (and card) could be reinstated. At the end of the shift LU’s Project Team recorded the activities that had not been completed and the reasons why and analysed all of the shift data to produce performance charts displayed on site.
Benefits and Outcomes

The benefits of this approach are that those who undertook the work were those who planned it. The supply chain was engaged in the planning of the project and this early involvement helped develop clear accountabilities and increased planning and programme ownership. This in turn, created shared goals and a collaborative ‘one-team’ approach among the LU Project Team and supply chain. Using a repeatable and standardised approach granted LU greater flexibility to move staff between sites when required and as the programme developed.

The ability to identify issues early and ensure all inputs were in place for an activity to be undertaken was a key benefit. This meant that the programme stability (the number of daily completed activities / the number of daily planned activities) for SSP, from May 2014 to January 2015, was 84%. This is high for the construction industry as traditional construction management approaches reportedly achieve 50-60% programme stability. For the five projects on site during that time, LU planned to undertake an average of 13.83 activities per shift and actually completed an average of 11.95 activities per shift.

The increased certainty of achieving activities as planned had many benefits including:
- Fewer clashes between suppliers resulting from slippage of individual work activities
- Fewer commercial disputes
- Greater confidence around the achievement of critical milestones
- Reduction in project costs against traditionally planned projects

The Embankment Station (circa £14m) project’s completion date was a business critical, prominent milestone and was achieved, in part, to using the approach outlined above.

In August 2014, the remit for the SSP was changed to incorporate interfaces with adjoining projects at the same stations. It is now called the Integrated Stations Programme (ISP). In essence the Programme will be undertaking a more comprehensive scope of works, albeit at fewer stations initially. Due to the success of the Collaborative Planning and Production Management Systems implemented on SSP, these remain LUs planning tools of choice for the new programme.

Further Information

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James Duggan (LU Planner) at the Embankment Project’s weekly progress meeting, reviewing the planning boards with the LU Project team and suppliers.