



# ***Data Centre Move and Lessons Learned***

NEIGHBOURHOOD SERVICES AND COMMUNITY  
INVOLVEMENT SCRUTINY COMMISSION: 13<sup>th</sup> October 2014

Decision to be taken by: n/a

Decision to be taken on: n/a

Lead director: Jill Craig

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## Useful information

- Ward(s) affected: All
- Report author: Ian Colledge/ Jill Craig
- Author contact details: 37 1111
- Report version number plus Code No from Report Tracking Database: v 1.0

### 1. Purpose of report

This report describes the recent data centre move and includes a summary of the work involved, the planning behind the activity, issues faced after the move and lessons learned.

### 2. Report

The data centre was in New Walk Centre so needed to be moved before the building could be decommissioned. This provided the opportunity to relocate to a purpose built, energy efficient, facility.

The replacement data centre is a standalone building which meant that we moved from having significant numbers of ICT users connected locally at NWC, to having all users connected across a wide area network. This led to a significant change in the volumes of network traffic that need to be managed, and thus a whole new IT network design.

The Data Centre consists of around 400 pieces of specialist ICT equipment (mostly servers), installed in around 50 cabinets. This equipment is connected together by around 3,500 individual data cables and runs virtually all the main ICT systems in the council. It also generates a large amount of heat which drives a need to be energy efficient with cooling the space it is located in.

The Data Centre serves around 7,000 ICT users and hosts around 320 different business applications of varying sizes. Several of these applications are used on a 24/7 basis under normal circumstances.

The high level tasks which had to be undertaken to deliver this project were;

- Design, build and prepare the new facility
- Plan the physical move
- Execute the physical move
- Maintain core services during the physical move
- Ensure business continuity planning took place

Each of the above tasks is now explained in greater detail

#### **2.1 Design, build and prepare the new facility**

A specialist Data Centre company were engaged through a tender process to design and build the new facility. This work started in November 2013 and completed late June 2014.

This allowed some key features to be delivered within the building, most notably the use of “free air cooling” which uses natural air run across cold water pipes to provide cooling in the main data hall – as opposed to the use of traditional air conditioning units. This has resulted in a reduced power consumption of around 40%.

The project also installed 55 Photovoltaic (PV) roof panels which contribute up to 35kwh of power. The PV power contribution exceeds the free air cooling power consumption, so as a direct result the Council’s data centre can describe its cooling as carbon neutral.

## **2.2 Plan the physical move**

After assessing the risks involved, it was established that executing the move in a single weekend carried the least overall risk – as a staged migration would have brought a large number of additional technical complications through needing to effectively run two facilities in parallel. The weekend of 4<sup>th</sup> to 6<sup>th</sup> July was established as the weekend of the move.

The need to completely shut down, move and then restart all LCC systems was very much a one off event, and many of the systems had been up and running for years without ever being shut down

A “dry run” shut down exercise was therefore carried out on Sunday 1<sup>st</sup> June to ensure the shut down and restart procedures were fully honed, as well as bringing out any system hardware failures, which are not uncommon when a system is shut down then restarted.

In the weeks leading up to the move as much equipment as possible was decommissioned or rationalised to ensure only essential kit was moved to the new data centre.

Specialist contractors were engaged to execute the move, to ensure that the equipment was suitably packaged and carefully moved. It was essential that specialists undertook this work due to the sensitive electronics nature of the equipment.

A lift engineer was engaged to be on site, as all the equipment ideally needed to be moved in the lifts and so one of the biggest concerns would be if both lifts broke down

Additionally, a specialist data centre move expert with a track record of executing similar projects was engaged to advise on the strategy and detail of the move.

We set up a communications portal using the Leicester.gov.uk website (which was unaffected by the move) to allow communications to flow between management stakeholders over the move weekend.

## **2.3 Execute the physical move**

At 16.00 4<sup>th</sup> July around 20 key ICT staff began the shutdown process. This took around three hours to execute.

At 19.00 4<sup>th</sup> July HP started the process of disconnecting all cables (around 3,500 data cables and around 1,000 power cables) and then one by one moving the data cabinets out of the building via the lifts, to the loading bay where these were loaded onto lorries and driven to the new facility.

All cabinets were loaded up and moved to the new facility by 02.00 Saturday, where they sat in a holding area



From 22.00 Friday the process started of emptying each cabinet one piece of equipment at a time.....



...and then installing each piece of equipment into its new cabinet position, and cabling it up correctly.



This was meticulous work which took up until 06.00 Sunday to complete.

Whilst this work was ongoing, the main LCC internet connection was switched across from NWC to the new facility and tested, ready for the power up on Sunday. (However this was then accidentally ceased by the supplier on the Saturday - see lessons learned)

At 06.00 Sunday the 6<sup>th</sup>, around 25 LCC technical and support staff started work to commence the power up process. This again needed to be meticulously worked through, and this process finished by around 18.00 Sunday (which was around four hours longer than planned).

At this point additional LCC ICT resources from the application support teams were brought on-board to test that systems were up and running, and where issues were identified, activities then were kicked off to commence investigation and resolution.

## **2.4 Maintain core services during the physical move**

LCC IT were able to maintain telephony and email through the entire weekend, by providing these services from our Disaster Recovery (DR) site.

This was a notable technical achievement, due to the complexity of the tasks necessary for the specialist teams to “flip” these services across to the DR site on Friday evening, and then “flip” back at the end of the weekend. This also provided valuable learning should LCC ever need to invoke its disaster recovery systems in the future

## **2.5 Ensure business continuity planning took place**

LCC IT worked very closely with corporate communications and risk management in the lead up to the move, to ensure that LCC management were fully aware of the impact of the migration weekend, and in a number of cases it was necessary for business managers to enact some aspects of their business continuity plans over the weekend (e.g. libraries, leisure centres).

A series of communications went out to staff and managers in the lead up to the migration weekend, via e-mail, FACE and Interface

## **Impact**

The impact over the weekend itself was well managed and understood, and there were no residual business issues from the fact that certain services were unavailable over the weekend itself (e.g. libraries, leisure centres).

Overall the exercise was a success. The vast majority of services were functioning normally on Monday morning, and most staff therefore noticed little disruption to their normal working pattern despite the enormous logistical and technical challenges of moving the entire core ICT estate over a single weekend.

There were however a number of issues which ran on into the following week,

Core IT services (telephony and email) were up and running Monday morning, and most business applications were functioning normally either first thing Monday morning, or by late Monday morning after a few issues had revealed themselves.

Isolated incidents continued to be resolved throughout Monday 7<sup>th</sup> and Tuesday 8<sup>th</sup> July. Most challenging was a problem with the specialist servers which manage internet traffic, which affected systems reliant on internet connectivity such as Libraries, HR, on-line payments, Payroll, Citrix, Webmail and Biffa. This was resolved through a complete technical rebuild of these servers. This was difficult to diagnose, and complex to resolve. Whilst most internet services were recovered by the Wednesday morning, Libraries services were not fully operational until the afternoon of Friday the 11<sup>th</sup> July.

The lack of Libraries public internet services caused disruption to the Public and put a lot of pressure on our Library colleagues who, despite the challenges they were facing, were incredibly supportive and understanding of our efforts to recover the service.

It also took a few days to recover connectivity with the NHS as the loss of service, and the extent of the impact, took time to be notified to the recovery team.

A major incident with Lync telephony arose on the Wednesday which was unrelated to the data centre move, but which necessitated diverting key technical resources onto investigating and resolving outstanding issues.

### **Post move**

Following the move we started to receive calls from certain users reporting poor network performance. This has been the subject of a major and on-going investigation. The business applications affected are:

- OpenRevenues
- OpenHousing.
- MapInfo
- Agresso (Agresso Web users are unaffected).

On-going investigations have identified that all of the above applications transfer a large volume of data from central servers located in the Data Centre to local desktops and laptops, and this means that these applications do not now function as well as they previously did, with the data centre now being located further away from the users of these systems.

In order to assist services affected by these problems we have put in place a work around for key users using a technology used by home workers (Citrix). However, this is considered a temporary workaround and we are currently investigating a series of more permanent solutions to these problems.

## **Challenges**

Given the scale and urgency of the move and the necessary “big bang” approach it is unlikely that all incidents could have been avoided as it was not possible to test the move in advance. Discussions with suppliers and other partners suggest that what we experienced was usual for such a significant move and was considerably less than might have been expected given the unusual urgency we were facing.

Major building work was still being undertaken at the new Data Centre closer to the move than originally planned. It was not however possible to delay the move due to the need to vacate NWC. This meant that certain preparatory work was delayed and the data centre could not be cleaned to the highest standard required, and as a result there were some connectivity issues caused by dust in fibre optic connections.

Key members of IT and Property staff left the council in the months before the move which put additional pressure on the remaining staff.

At 6am on Sunday morning it became evident that a small amount of equipment had not been transported from New Walk Centre. Retrieving and installing this equipment added a delay to the work on the Sunday.

The internet connection had been disabled by our internet provider over the weekend.

They had incorrectly ceased the new circuit rather than ceasing the old circuit at NWC. Had this not occurred, we would have brought corporate internet services back on line much sooner and had capacity to focus on other areas. The circuit had been moved and tested by both our staff and our internet provider on the Friday evening so diagnostic effort was incorrectly focussed on our infrastructure

Although significant effort went into planning communications before the move, and during the weekend, in hindsight not enough preparation had gone into planning how we would communicate to the business the following week.

## Lessons Learned

Some of the lessons learned would only relate to the specific activity itself, which is unlikely to be repeated for many years (noting that we had had our Data Centre at NWC since computing first came into use around 35 years ago, up until this move).

However, we did learn some lessons in the run up to the weekend, over the weekend and in the days following the move that are reflected here:

- Before the move we spent time categorising the systems we support between Platinum, Gold, Silver and Bronze dependent on their significance to the business. This was invaluable in helping us prioritise recovery effort.
- In the run up to the move we also refined our major incident process. In the event of a major incident, for example the loss of a Platinum or Gold service for more than 15 minutes, we quickly appoint a Major Incident review lead (to co-ordinate activity), a technical lead (to lead the technical investigation) and a communication lead (to ensure that key stakeholders and users are kept informed). The activity is recorded in a Major Incident Review document. After the event, the key players meet to discuss what lessons can be learned to avoid repeat incidents. The data centre move was managed as a major incident.
- In the four weeks running up to the move we put in a change freeze which meant only critical system changes were applied. The comprehensive, more challenging, change control arrangements that we introduced to justify urgent changes have been maintained to cover routine change activity as well – these include the need for thorough testing to be carried out and evidence that an agreed roll back process exists
- Managing the move as a major incident we mobilised a large team of staff, each with specific roles and responsibilities, including welfare and communications. We had staff on site throughout the move – from 6pm Friday through to the early hours of Monday morning, and then back on site from 6am to handle any post weekend issues. All the staff responded brilliantly to the challenge, but the pressure was relentless and after a few days key staff began to get very tired. Our appointment of a welfare officer was a sensible one, as this person kept the teams fed and watered, but a key lesson learned for any major incident is to manage working hours more strictly so that staff take proper breaks.
- IT Services have always carried out early morning system checks, but during the period following the move we extended the range and depth of the checks; brought forward the time they start, and included key users in the process (Customer Services, Libraries, City Hall Executive support). This proved very useful at the time and these more rigorous checks are now routine; this ensures that early morning problems are resolved well before the majority of staff have even started work.

- During the few 'bumpy' days following the move we relied on the council's Intranet, Interface, as our main means of communicating with users. Users quickly fed back that they would prefer us to send corporate-wide emails, which we then did, however we need to be careful not to overwhelm users with emails or they start being seen as SPAM.
- We recognise that many of our users rely on Webmail and Citrix services and if these aren't working then users have no access to either email or the Intranet. To address this we created a staff-update page on [www.leicester.gov.uk/staff-update](http://www.leicester.gov.uk/staff-update) We kept this up to date during the weekend of the move and have retained it as part of our bcp arrangements.
- The single greatest lesson learned was the reliance the council now has on the Internet. The limited internet connectivity immediately following the move impacted a number of areas that use applications either entirely, or in part, hosted externally and on the increasing numbers of customers choosing to transact with the council via the Internet – either from their own devices or from devices in City Libraries. Following the move, 'internet connectivity' is recognised as a Platinum Service by IT Services and the council's Channel Shift strategy, now features as a key council programme. A report on Channel Shift is scheduled to be brought to this meeting at a later date.

### **3. Recommendations**

The Scrutiny Commission is invited to note the details of the data centre move and lessons learned

### **4. Report/Supporting information including options considered:**

n/a – Lessons learned report

### **5. Financial, legal and other implications**

#### 5.1 Financial implications

There are no specific financial implications arising from this lessons learned report

Colin Sharpe, Head of Finance, ext. 37 4081'

#### 5.2 Legal implications

There are no direct legal implications

Kamal Adatia  
City Barrister & Head of Standards



### 5.3 Climate Change and Carbon Reduction implications

The Council has a corporate carbon dioxide (CO<sub>2</sub>) reduction target of 50% of the 2008/09 level by 2025/26. The new data centre will contribute to these savings through the use of free air cooling, heat recovery and renewable energy. These savings will be monitored in updates of the Council's Carbon Reduction Road Map.

Louise Buckley, Graduate Project Officer (Climate Change), 372 293

### 5.4 Equalities Implications

#### **Equalities Implications**

The good practice described in the report is reflective of good equalities practice in meeting our Public Sector Equality Duty: a robust identification of potential impacts arising from a change, communication with/engagement of everyone affected by the proposed change informing them of what actions will be taken if there are negative impacts, and ongoing reflection of how best to address any negative impacts that arise after the fact through subsequent mitigating actions.

Irene Kszyk, Corporate Equalities Lead, ext. 374147

### 5.5 Other Implications (You will need to have considered other implications in preparing this report. Please indicate which ones apply?)

n/a – Lessons learned report

### **6. Background information and other papers:**

n/a

### **7. Summary of appendices:**

n/a

### **8. Is this a private report (If so, please indicated the reasons and state why it is not in the public interest to be dealt with publicly)?**

No.

### **9. Is this a “key decision”?**

No

### **10. If a key decision please explain reason**