Celebrating 50 Years of Computing at the Rutherford Appleton Laboratory

Dr Victoria Marshall

During 2014 the Science and Technology Facilities Council (STFC) Rutherford Appleton Laboratory celebrated the 50th anniversary of the commissioning in 1964 of what was then the most powerful general-purpose computer in the world – the Ferranti Atlas-1 – which supported UK research and scientists for over a decade. At the forefront of developments in software and other enabling technologies, the Atlas Computer Laboratory came into being under the directorship of British mathematician and computer scientist Dr Jack Howlett CBE (1912-1999). Over the years, work at the Laboratory has contributed to the governance of the World Wide Web, managed the data which led to the discovery of the Higgs boson, and it continues to support major experiments at scientific facilities both in the UK and internationally.

Scientists at the Atlas Computer Laboratory were also behind the world's first computer animation – a model of stress-loading across an M6 motorway bridge. With its optical sound-track, Finite Elements was the first entirely computer-produced engineering film to be made in the UK, and in October 1976 was the award-winning Great Britain entry in the International Technical Films Competition in Moscow. More famously, animation software written at the Laboratory was used to produce the 3D wire-frame model shown on the navigation monitors in the landing sequence of Ridley Scott's film Alien which won the 1979 Academy Award for best visual effects.

Only three Atlas-1 computers were ever built; the one at Rutherford was the third and largest, and in 1961 cost £3 million. Atlas was designed by Professor Tom Kilburn at Manchester University in collaboration with Ferranti, and was the culmination of many years of development work into what we now call virtual memory and multi-user operating systems. The computer itself consisted of several dozen metal cabinets that filled two floors of the sizeable Atlas Computer Laboratory building which was specially built to accommodate it. The Atlas 'processor' was 5,600 A5-sized circuit boards, which together would have covered an area about the size of a tennis court, around 90,000 times bigger than a modern computer chip. One Atlas disc a metre in diameter could store the equivalent of just a couple of photographs, whereas today a USB stick can store thousands of images.

On Thursday 13th and Friday 14th November 2014, Rutherford Appleton Laboratory hosted two days of events celebrating 50 years of computing at the Laboratory, with particular emphasis on the 50th anniversary of the Atlas-1 originally housed just across the road. Nearly 300 guests attended the event including Ed Vaizey Minister of State for Culture and the Digital Economy, members of the Computer Conservation Society and Science Museum, pupils from local schools, Professor Bob Hopgood my 'old' head of department who created the Chilton Computing website, and many friends, colleagues and Operators both current and retired.

Oxfordshire MP Ed Vaizey and Dr Juan Bicarregui (STFC) examining the Atlas console

Thursday's celebrations commenced with an afternoon of short lectures – some retrospective, some describing current work of the Laboratory and the Scientific Computing Department, some describing future directions for data and computing power. These are reported elsewhere.* The lectures were followed by a champagne reception in the Exhibition Centre, complete with a locally-baked Atlas@50 birthday cake, cut ceremonially by Professor Bob Hopgood and Dr Brian Davies, both Directors of Rutherford computing departments at various times. Some of our Engineering Apprentices dropped-in too. They had heard about punched cards, ferrite-core memory and computers you can't put in your pocket, but had never seen them; they promptly took pictures using their mobile phones.

Ed Vaizey joins in the fun on the IBM console

Friday's celebrations were more about the younger generation. Children from several local primary schools learned about computer programming by instructing a robot (one very brave, blindfolded member of staff!) to move physical 'data' between buckets. Our local MP Ed Vaizey also dropped in to see what was happening and joined in with the children's activities. He declined to be a robot under the control of non-voters, but did use a very modern mobile phone to Tweet about his morning looking at some computers that were older than he was.

Throughout the two days of celebrations we also hosted an exhibition of computing 'then' and 'now'. Our star exhibit was of course the recently rediscovered Atlas console, now cleaned and restored and on show again for the first time in nearly 15 years. We wired it up to a PLC to display plausible patterns of lights, but kept a small bucket handy in case it crashed and someone needed to fetch more pre-pulses. (The Operators' little joke.) The console is a very tactile thing, and more than one person was caught with their hand underneath the protective Perspex flipping a few switches just for old time's sake.

Panorama of part of the Atlas section of the exhibition

We also enlarged to life-size some of the more iconic photographs of Atlas in the 1960s and displayed them around the Exhibition Centre.

One of the photographs was of Jack Howlett's office. We had arranged the photo such that there was a real chair in front of it, and one of Jack's famous abstract prints on the wall above his desk. We must have got it right because one of the Operators nearly burst into tears when he saw it.

Jack's 'office.' The print is a very faded Matisse Interior with black fern

'Big Data' was a modern-day theme; it was an olden-day theme too. Alongside the Atlas console (weighing approximately 160kg) we displayed what must be one of the most impressive consoles in existence – that of our IBM 360/195 (weighing about half a ton). People had forgotten that its wiring was yellow because so much dust had accumulated over the years that it was impossible to tell. We also displayed the skeleton of our Cray X-MP (weighing approximately two tons), and a 39" (99cm) Data Products disks (about 5kg), one of 16 that were used on Atlas.

To round-off the Thursday evening we were delighted that Dik Leatherdale of the Computer Conservation Society agreed to demonstrate his Atlas simulator application.

Bob Hopgood, Dik Leatherdale, Victoria Marshall and Brian Davies next to the Atlas console

Panorama of the "big data" part of the exhibition. The Data Products disc is just visible on the left of the picture; the red image is part of the Finite Elements animation; the wireframe on the other monitor is a VR presentation on the development of a chrysalis

Many people asked whether the 'train sign' they remembered from the wall in Atlas Reception still exists. It does, and it inspired one of the smaller surprises of the day – a key-ring souvenir given to all guests.

It was quite an extraordinary couple of days for everyone.

Drs Jack Howlett and Brian Davies next to the Atlas console in the entrance to the Atlas Building. Just seen on the left is the console of the IBM 360/195; above them is the locomotive nameplate and a photograph of Jubilee Class Atlas 45737

Behind the Scenes...

- A complete Cray weighs about 5 tons; a skeleton Cray weighs about 2 tons. It certainly weighs more than 1.2 tons because when we first attempted to lift it the 1.2 ton-rated forklift tipped over.
- Dusting the wires of an IBM 360 is best done using an old paintbrush and the upholstery attachment of a vacuum cleaner. The vacuum part is important if you have smoke alarms in the room.
- There are very few pictures of the Atlas console, and none at the high resolution required for enlargement to life-size. I really wanted to display the iconic mid-1960s photo of the Engineer at the Atlas console in the machine room taken at 4:25pm, but locating the negative proved impossible because the photographic filing system of 50 years ago can most politely be described as 'quirky.'

Tim Pett (retired STFC staff member) checking out the wiring inside the Cray X-MP

Dr Julian Gallop (retired STFC staff member) examining the wiring at the back of the IBM 360

The nearly-lost photo; the clock in the top left-hand corner reads 4:25

I had given up hope of finding something suitable when, just two weeks before the event, I was introduced to 'the shed behind Atlas' which could in itself furnish an exhibition of networking equipment for the last 40 years. Tucked onto a shelf at the back were several boxes of glass slides, and amongst these was the picture we had been searching for. I carefully carried the boxes to the photographer and reverently extracted this one: "Look! It's got a different neggy number on it!"

Another trip down to the photography archive and we managed to find this treasured negative in a completely different drawer to all the other 1960s negatives. We scanned it at high resolution and gleefully used this photo in the exhibition.

It does however contain a number of moiré patterns. Our theory is that that batch of negatives were thrown away many years ago, possibly due to deteriorating emulsion. Because this one photo was so iconic however someone went to considerable trouble to photograph a surviving print, but did so under glass, never imagining that one day the loss would be revealed.

Afterword:

Following the Atlas@50 event, three tons of computing hardware history was put back into storage, and the treasure trove of papers, pictures, photographs and smaller bits of hardware we have accumulated over the years is now to be made more widely accessible under the curation of the Library.

Rutherford has been here for more than 50 years – computers are not the only large (and small) items we have as part of our science and innovation heritage. There is a small, but enthusiastic group of us lobbying for somewhere in which to display it all properly, and who are always on the lookout for 'old stuff' before that glimpse of our history is thrown away forever.

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Photo credits STFC

About the Author

When she is not poking around in dusty cupboards, Dr Marshall manages the diagnostic computers which run the Astra Gemini laser at Rutherford Laboratory, and develops software to control, analyse and monitor the performance of the beam line and data. She has been privileged to assist Bob Hopgood with the Chilton Computing web site for more than a decade, during which time she has talked to so many people about Atlas 'back in the day' that she sometimes feels as if she was there herself.

Computing website: http://www.chilton-computing.org.uk/

Computer Conservation Society: http://www.computerconservationsociety.org/

*Write-up of the event:

http://www.chilton-computing.org.uk/acl/technology/chilton50th/overview.htm