AccessionIndex: TCD-SCSS-X.20180907.001
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Accession By: Trevor Peare
Object name: History of TCD Library computing, Trinity College Dublin
Vintage: c.1968
Synopsis: The evolution of TCD Library computing.

Description:
The Old Library of Trinity College, built 1712-1732, is famous worldwide as one of the most impressive libraries in the world. Its main chamber is the Long Room, nearly 65 metres in length, filled with 200,000 of the Library's oldest books. However, TCD Library is much more, spanning several major library buildings and major offsite repositories. It is the largest library in Ireland and as a legal deposit it has the rights to receive material published in the Republic of Ireland free of charge. Paraphrasing the TCD Library history from [1]:

The Library's history dates back to the establishment of the College in 1592 and it is the largest library in Ireland. Today it has over 6 million printed volumes with extensive collections of journals, manuscripts, maps and music reflecting over 400 years of academic development. The most famous of its manuscripts, the Book of Kells and the Book of Durrow, were presented by Henry Jones, Bishop of Meath and former vice-chancellor of the University, in the 1660s. Other special collections include the Ussher Collection acquired in 1661 and the Fagel Collection of 1802. The Library was endowed with Legal Deposit privilege in 1801 and continues to receive copies of material published in the United Kingdom and Ireland.

The Library supports the learning and research needs across all disciplines of the College; it is a major research library of international repute; it provides services to a wide range of external users and institutions; it contributes to the development of creative initiatives in information provision and its exhibitions of manuscripts and other treasures attracts hundreds of thousands of visitors to visit the Old Library each year. Although an institution of great antiquity, the Library pioneers modern methods of resource discovery and developments in the teaching, learning and research processes.

The TCD Library was an early user of computing in Trinity College Dublin.

Many thanks to Trevor Peare, Keeper of the TCD Library Systems, and those of his colleagues who helped him reconstruct the history of TCD Library computing below.

It proved impossible to describe what the Library was doing with circulation without some understanding of context of what else was going on. A time-line of Library buildings and movement of collections over the 1970s and 1980s (prepared by Trevor Peare, see Figs.5, 6, 7, and 8) shows just how mobile the books in the Library were as they were moved from temporary location to temporary location as different buildings were commissioned (the Berkeley Library, then the Arts Building and the Luce Hall). There was a lot going on, and there were big changes with the introduction of automation alongside all of that.

A note on early automation in Trinity Library (1968 – 1988) [1,2,3,4,5,6]

Trevor Peare and colleagues

Introduction

The Library's collaboration with the Computer Laboratory dates from the Laboratory's formation in 1968. A computerised catalogue was developed on the Laboratory's first computer – an IBM 360/44 – shared with teaching, research and some administrative processing.

The Catalogue

Trinity's computerised catalogue was one of the very early uses of MARC (Machine Readable Catalogue) magnetic tapes produced by the British National Bibliography's (BNB) Office in the British Museum Library (now the British Library). The MARC format was established in the 1960s as a standard for sharing library catalogue records by computers.

The BNB records were created from newly published books received by the Legal Deposit Libraries' Agency (an office independent of the British Museum Library) on behalf of the libraries (including Trinity's) entitled to one copy of every book published in the UK. The weekly BNB tapes had records for books corresponding closely with the deliveries of c.600 books each week from the Agency to Trinity. [7]

The weekly shipment of books arrived at the New (later, Berkeley) Library loading bay in large wooden crates. The books were transferred to "The Copyright Office" – a small room in the Lower Basement for processing and the empty crates returned to the Agency in London.

Matching in Accessions

The early "matching" system in the Library involved arranging the newly arrived books in an alphabetical title sequence. Each book was matched against a printout, also in title order, by a Library Assistant calling out the title of each book in turn and another Library Assistant checking it off on the printed list. The matched books were then held separately and the checked off printed list was used by Computer Laboratory staff to prepare punched cards to program the computer to print out "worksheets" for each book the next day. The worksheets were inserted into the corresponding, date-stamped, books by Library Assistants in a secure area ("cages") of the Accessions Department on the ground floor and sent to cataloguing staff for checking and shelf mark assignment. The annotated worksheets were returned to the Computer Laboratory for updating the catalogue, again by using punched cards for the input. The Computer Laboratory Annual Report for 1972/73 records that 74,000 punched cards were prepared for the Library. This process continued until 1979.

In 1974, following additional programming and the installation of data lines from the Computer Laboratory to the Library, records for books received outside the Legal Deposit process (purchases, donations, etc.) were entered directly into the system by staff in the Library Secretariat using a printer terminal. Cataloguers hand-wrote the details onto pre-printed "original cataloguing" worksheets and these were used for the input.

Ten years of the Library catalogue
After 10 years, the Library catalogue had 1.4M records in the system and a cumulative annual catalogue for the reading rooms was produced using computer output on microfiche. The early catalogue was a fan-fold printout in binders to be replaced in 1973 with roll microfilm in cassettes which was used until 1977. Cumulative monthly supplements were produced between each annual run.

Student lending / Circulation
By 1972, the Library was interested in automating the system for managing student loans. This was prompted by the increase of student lending books in the Library's collections following the move of the Modern Languages Lending Library from Regent House to the 1937 Reading room in 1967 and the transfer of the Lecky Library collection (Business and Humanities) from the Museum Building to the area under the podium (the "Annex") of the New Library in 1971.

The borrowing (circulation) of these books were managed by the Browne Issue System [8] and in 1979 a report stated there were c.50,000 books available for student loans.

With the opening of the Arts Building in 1978, the arts and humanity books in the Berkeley annex and the modern language collection in the 1937 Reading Room were moved to the new Lecky Library, forming a significant lending collection in the one reading room.

A new computer for circulation of the arts lending collection (a DEC PDP-11/34) was funded from the equipment allocation of the Arts Building and installed at the Computer Laboratory in 1979. Work started on programming immediately by Gail Hogan and her team.

However, development of the system was seriously delayed by the changeover of the catalogue system from the IBM 360 to DEC computers.

Changeover of Catalogue System
This changeover was started in 1977 when a DEC 2040 system was installed in the Computer Laboratory as a replacement for the IBM system. A DEC 2020 was installed in 1979 (after a College appeal) for Library and administrative use instead of having to share resources with teaching and research computing. The programs were a complete re-write of the PL/1 software on the IBM in COBOL-68 (later COBOL-74) and the incorporation of new rules (AACRII) for catalogue description and other improvements. Again, this work was done by Gail Hogan and her staff.

There was a certain urgency about the catalogue system as the IBM computer no longer had the capacity for the growing catalogue and much of the processing of the annual public catalogue and the monthly supplements were being done on UCD's IBM machine.

By 1979, the new system was capable of direct online input at terminals in Cataloguing and Accessions. Matching of newly arrived Legal Deposit books with records in the system was done online with a VT100 terminal linked by an acoustic coupler until a data line was installed the following year. Instead of worksheets being

printed, a “search number” was written in the book so that Cataloguing staff could quickly find the matched record to add a shelf mark at their terminals. The work of the Secretariat staff was very much reduced, but the individual staff helped with the online processing in Cataloguing and Accessions until the system was fully stable and backlogs were at least under control. Sections of the catalogue were made available for amending in turn; the system did not have sufficient capacity to make every record available all the time. The annual production of a microfiche output catalogue continued with monthly supplements for reading rooms.

Circulation database

It had been hoped that the catalogue system together with a back file of BNB records would provide a large proportion of the book records for the new circulation system. However, surveys showed there was very little overlap as many of the books were foreign language publications and by non-UK publishers.

It was decided that the lending collection records would be best created by keying in brief details of each book into a new database. This was done by Lecky Library staff over a period of about 4 months using a VT100 terminal connected by an acoustic coupler to the Computer Laboratory. There were delays in installing direct lines to the Library buildings, not least because of a long strike in the Post Office. The opportunity was taken to weed the lesser-used books in the collection and only titles in active circulation were recorded.

Barcodes (Code 39) were inserted into each book and the student ID card printing process amended so that ID cards had barcodes in time for student registration in October 1981.

However, not appreciating the consequences, the barcodes were just associated with the titles of books, and not the individual copies or volumes of multiple holdings. This led to problems at the counters for some years as it was difficult, if not impossible, to know which copies were on loan or due for return. Over the years, the individual barcodes and copies were matched up correctly. Barcodes were read at the counters using light pen scanners.

Circulation went live for the Lecky Library books in July 1982, soon after the network lines were installed, and reported to be working well in December 1982.

The Luce Hall opened in 1981 with a Science Library on the ground floor, bringing together most science books which had been in a variety of temporary locations. It included all the Science Lending collection. The circulation PDP-11 computer had additional memory and storage installed using funds from the Luce Hall equipment allocation.

In 1983 barcodes were inserted into science lending books. For the Science Books (a much smaller collection than the Arts Lending collection), there was a good coverage of the collection in the automated catalogue system and those records were transferred to the circulation system.

Science lending went live in 1984.

End of in-house systems
The Library catalogue system running on the DEC 2020 and the circulation system on the PDP-11 essentially ran independently until 1988 when the Library's first commercial Library Management System (LMS) was installed from the American Dynix Corporation. However, it was two years before the complete transfer to the new system was completed although OPAC (Online Public Access Catalogue) terminals were installed in the reading rooms earlier.

Other activities
Also during this period, a project started in 1986 to convert the card catalogue (Library acquisitions 1964-1970 and including the brief circulation records) to full computerised records. This project used IBM-compatible microcomputers (ERGO machines) running DOS and search keys were matched against a variety of internal and remote databases. This was completed by 1988 [9].

A Shelton Sig/Net Microcomputer [10] in the Library was used for word processing (Wordstar) and had an in-house book purchasing system (from 1985) running on it to about 1989 when it was replaced by IBM-compatible microcomputers for word processing and book purchases incorporated into the Dynix system.

Trevor Peare
Keeper (Systems) 1990 – 2003
September 2018

Elements of the IBM 360/44 mentioned above, such as the system administrators control panel, some internal components and disk packs, and the card punch, have been preserved in this Collection, for example see [11, 12], and Figs.1 and 2.

The Library's first dedicated computer system, the PDP-11/34 also mentioned above, was specifically for the Library's real-time Circulation Control System. It was located at, and operated by, the TCD Computer Laboratory (now IT Services) in their Pearse Street machineroom. When decommissioned, it was saved by Paul Harrington (who acquired it from Michael Doherty), stored in his mother's stables in Roscommon, then finally donated to this Collection in 2018, see [13], and Figs.3 and 4.

There is another important link between the Library and The John Gabriel Byrne Computer Science Collection: Prof.J.G.Byrne conducted a decades-long personal campaign [14] to computerise the Library's 1872 Printed Accessions Catalogue. This involved automatic optical character, word, language and lexicon recognition of entries in at least eighteen languages, eventually becoming the established online catalog for the old accessions, with a highly-praised user interface. While his efforts were initially entirely concerned with digitization and OCR software, when it was completed he developed the access interface right up to some weeks before his death. In 2018 the raw data was transferred to the Library so it could be used to incorporate the records from the Printed Catalogue into the current online Catalogue, Stella.

The homepage for this catalog is at: https://www.scss.tcd.ie/SCSSTreasuresCatalog/
Click *'Accession Index'* (1st column listed) for related folder, or *'About'* for further guidance.
Some of the items below may be more properly part of other categories of this catalog,
but are listed here for convenience.

Accession Index	Object with Identification
TCD-SCSS-X.20180907.001	History of TCD Library computing, Trinity College Dublin. The evolution of TCD Library computing, c.1968.
TCD-SCSS-X.20180907.002	History of computerisation of TCD Library's 1872 Printed Accessions Catalogue. The long personal campaign by Prof.J.G.Byrne, Dept.Computer Science, c.2005.
TCD-SCSS-T.20121208.018	IBM 360/44 console and subsystems. Control panel, CPU logic, core memory from IBM 360/44 installed in Trinity College Dublin to provide a service to all sectors of College, including the Dept.Computer Science, from 1969. c.1965
TCD-SCSS-T.20121208.017	IBM Card Punch Model 29C. Classic IBM punched card punch. c.1969
TCD-SCSS-T.20150615.001	DEC PDP 11/34. Rackmounted minicomputer with octal keypad, with RL01 disk drive and LA36 DECwriter printer, from the first dedicated TCD Library computer system. c.1976

References:

1. Trinity College Dublin Library, *History of the Library*, see:
   https://www.tcd.ie/library/about/history.php
   Last browsed to on 7-Sep-2018.

2. Trinity College Dublin Library, *Calendar*, 1968 onwards.

3. Trinity College Dublin, *Computer Laboratory Annual Reports*, see:
   https://www.tcd.ie/itservices/general/reports-archive.php
   Last browsed to on 18-Aug-2018.

4. Trinity College Dublin Library, *Library/Computer Group Minutes, 1973–*,
   available in the Manuscripts Department.

5. Trinity College Dublin Library, *Technical Services Annual Reports 1978–1989*,
   available from Keeper (Collection Management).

6. Peter Fox, *Trinity College Library: a History*, Cambridge University Press, 2014.

7. Alan Tucker, *Library Automation in Trinity College Dublin: a progress report*,
   Long Room, 2 (Autumn/winter 1970), 36-37.

8. Wikipedia, *Browne Issue System*, see:
   https://en.wikipedia.org/wiki/Browne_Issue_System
   Last browsed to on 16-Aug-2018.

9. John Fitzgerald, Gail Hogan, Colette Ní Mhoitleigh, Trevor Peare, *Retrospective conversion at Trinity College Dublin*, Vine 69 (1987), 13-24.

10. The Register, *UK micro pioneer Chris Shelton: The mind behind the Nascom 1*, see: https://www.theregister.co.uk/2013/08/21/unsung_heroes_dr_chris_shelton/ Last browsed to on 25-Aug-2018.

11. Trinity College Dublin, *IBM 360/44 console and subsystems*, see: https://scss.tcd.ie/SCSSTreasuresCatalog/hardware/TCD-SCSS-T.20121208.018/TCD-SCSS-T.20121208.018.pdf Last browsed to on 7-Sep-2018.

12. Trinity College Dublin, *IBM Card Punch Model 29C*, see: https://scss.tcd.ie/SCSSTreasuresCatalog/hardware/TCD-SCSS-T.20121208.017/TCD-SCSS-T.20121208.017.pdf Last browsed to on 7-Sep-2018.

13. Trinity College Dublin, *DEC PDP 11/34*, see: https://scss.tcd.ie/SCSSTreasuresCatalog/hardware/TCD-SCSS-T.20150615.001/TCD-SCSS-T.20150615.001.pdf Last browsed to on 7-Sep-2018.

14. Trinity College Dublin, *History of computerisation of TCD Library's 1872 Accessions Index*, see: https://scss.tcd.ie/SCSSTreasuresCatalog/hardware/TCD-SCSS-X.20180907.002/TCD-SCSS-X.20180907.002.pdf Last browsed to on 7-Sep-2018.

See the extensive set of documents in the related folder in this catalog.

Figure 1: IBM 360/44 in action c.1974, image courtesy Prof.J.G.Byrne
The verso carries the printed inscription 'IBM 360/44 Computer Laboratory, Trinity College Dublin
(L to R) Majella Ryan, Jack Grace, Tony Flynn September 1974'

Figure 2: IBM Card Punch Model 29C, three-quarter view

Figure 3: TCD Library's first dedicated computer
DEC PDP 11/34 central processor safely in the Collection, front three-quarter view

Figure 4: TCD Library's first dedicated computer
DEC LA36 DECwriter safely in the Collection, front three-quarter view

Year	Buildings	Collections	Computer Lab	Automation	Other Notes
1961-1966	1961 first huts in Fellows' Garden	1964 Library takes responsibility for Lecky (in Museum Building) and Regent House Libraries Closed Access books in huts.			
1967	"New Library" (Berkeley) Opens (Basement area under podium, aka "Annex" used for lecture rooms)	Humanities (History, Law, Classics) moved from 1937 RR to New Library. Modern Languages Lending Library moved from Regent House to 1937 Reading Room. (English, French, German, Italian, Spanish) Biomedical Library opened in Biomedical (Welcome) Building		(December) Working Party on Library Applications – pilot proposed using BNB MARC tapes.	
1968	Computer Laboratory in new huts in Fellows' Garden		Computer Laboratory starts. Installation of IBM 360/44	Work on Library catalogue starts	Alan Tucker in original staff.
1969			(January)Formal opening of Computer Laboratory	Catalogue implemented May 1969	Computer catalogue as a fan-fold printout. 15"X11" in folders.
1970					Peter Brown appointed Librarian 1 October
1971	Mss Reading Room in Old Library opened. Science reading room in Chemistry Building opened.	Lecky Library transferred from Museum Building to New Library "Annexe" (20,000 volumes) Lending Library in 37RR combined with Library's Mod. Lang. collection in preparation for Arts building			

Figure 5: Time-line for TCD Library Automation 1961-1971
Courtesy Trevor Peare

1972	Computer Laboratory moves from huts to 200 Pearse Street. Huts used for Science books	Entry in Calendar for 1972 states: 1. Science Library Hut has Engineering Mathematics, Technology, Geology, Agriculture and Lending books; 2. Temporary East End Science Reading Room (Chemistry Building) – Natural Sciences Biological and Medical Sciences; 3.Biomedical Library - graduate reference library. Music Library in New Library Annex. Mod Language Library in 1937 RR and in basement below		Catalogue produced on roll microfilm in Cassettes	Circulation planned for implementation in two years	First meeting of Library/Computer Group
1973	Work on Arts Building starts		Records for non-Legal Deposit Books included in catalogue.			
1974	Santry Phase I opened	As per 1972 plus Science undergraduate lending in Science Hut, with non-lending.				
1975	St. Mark's Hall brought into College use.					
1976		All Science books from Huts moved to New Library Exhibition Hall. (Lecky still in Annex)				
1977			Money authorised for replacement machine for IBM 360. DEC 20/40 installed July 1977 (Teaching, Research, Library and admin.)	Catalogue produced as Computer output microfiche. Secretariat tried VDU entry for one week – preferred printer-terminal.	Alan Tucker leaves for Cambridge, bringing TCD's systems. Gail Hogan appointed as Systems Analysist, in Computer Laboratory.	

Figure 6: Time-Line for TCD Library Automation 1972-1977
Courtesy Trevor Peare

1978	Arts Building / Lecky Library opens 1978. New Library named as Berkeley.	Berkeley Library Lecky collection and Mod. Lang. books moved (from 1937RR) to Lecky in Arts Building Science and Engineering move to 1937 Reading Room from Berkeley. Science books from Chemistry building and Science Lending Collection from Berkeley moved to St. Mark's Hall, Pearse Street.	Transfer of Catalogue to DEC 20/40 starts.			Huts removed from Fellows' Garden
1979		Music in 1937RR. All non-Science lending in Lecky Library	DEC 20/20 installed for Library and admin use only. Circulation PDP-11 installed for circulation.	VDUs introduced for Cataloguing. Online matching system in Accessions (from May '79) with acoustic coupler		Len Mathew's Report – 70,000 Arts books 2/3 LEN
1980		Periodicals move from first floor in Berkeley to work room under Podium and reading room in old exhibition hall. Clearing of Catacombs in 37RR starts.	Work on Circulation system on PDP 11 starts			1.4M entries in catalogue (average 5.7 entries for each record in Microfiche)
1981	Luce Hall opens	St. Mark's Books moved to Luce Hall.	Transfer of catalogue to DEC 20/20 completed. Data lines to Lecky and 1937 RR delayed. Acoustic couplers used for data input	Changes in AACR II delays work on Circulation. Lending Record input starts March for 4 months. Barcodes printed and inserted September 1981. Student cards with barcode issued at registration October 1981		Using Catalogue for circulation records ruled out.

Figure 7: Time-Line for TCD Library Automation 1978-1981
Courtesy Trevor Peare

1982			Lines installed to Lecky mid-1982.	Circulation system live in July 1982. "Working well" in December 1982	Book detection system being installed
1983		Maps stored temporarily in St. Mark's – after removal from basements in No. 6 and West Chapel and prior to Map Library established in old Gym building	Work on extending Circulation to Science collection starts. Additional disk space etc., funded by Luce Hall equipment grant.	Barcodes being inserted into Science books.	
1984				Science Lending goes live	Cherry Prendergast joins Computer Laboratory.
1985					
1986	Santry Phase II opened				October 1986 Card Catalogue conversion starts (One year typing search terms)
1987					
1988			Dynix runs on a VAX machine	Dynix installed. Circulation on Dynix started in Lecky and 37RR in October 1988	Last book input to DEC 20/60 on 9 December 1988. (16 weeks before first book into Dynix) Accessions stopped putting books into title sequences.
After 1988		1992 Hamilton opens with Luce Hall and 37 RR Science collections. 1993 Stearne Library opens – in huts at St. James's previously.			1989 Summer - first OPACs in Iveagh Hall. 33 OPAC terminals by November 1989.

Figure 8: Time-Line for TCD Library Automation 1982-1988 and afterwards
Courtesy Trevor Peare