Amanda Noble and Norma Read,
Why the “Big Bang” Did Not Happen: The CALICO Experience

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Chapter 21
Why the "Big Bang" Did Not Happen: The CALICO Experience

Amanda Noble and Norma Read

As a result of preliminary talks held in April 1992 between the five tertiary institutions in the Western Cape, the Ford Foundation and the American Council of Education (ACE), a team of consultants visited South Africa later that year. The focus of the visit was to assess the level of interchange between the libraries of these five institutions, and to facilitate post-apartheid academic cooperative planning. It was hoped that these endeavors would gain financial backing from the Ford Foundation and others, with a view to greater support for teaching and research at the five institutions, thereby becoming a model for the rest of South Africa in encouraging other areas of cooperation within academe.[1]

The many years of isolation of South African scholars and information providers led to gaps in knowledge, inforation management and curriculum advancement, the redress of which is crucial for economic development. Current national emphasis is geared towards universal education at the primary level, adult literacy programs and information literacy, and this has resulted in cuts in state subsidies to tertiary institutions, together with an increase in the numbers of students, many of whom cannot afford escalating tuition fees. Dramatic rises in the costs of print subscriptions and electronic resources are further compounded by the drastic devaluation of

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[1] Patricia Senn Breivik, Gary Pitkin and John Tyson, "The Western Cape Library Cooperative Project: Regional Planning for Post Apartheid Academic Development in the Western Cape," unpublished report to the Ford Foundation, November 1992.

the rand—from R2 to £1 sterling in 1970, to R16 currently (October 2002), the decline in 2001 alone being 37%. Whereas First World countries experienced a 35% increase in the average cost of a social science journal between 1995 and 2000, the increase for academic libraries in South Africa was 203%. The imposition of VAT on 'knowledge materials,' together with the geographic isolation from the information centres of the world, means additional expenses on many items.

The five tertiary institutions in the Western Cape comprise two technikons and three universities, clustered within 50 km of each other. They have very diverse histories, but all of them are concerned with the transformation of higher education. The region was described in a recent report by the National Working Group on the Restructuring of the Higher Education System in South Africa as "one of the best-endowed provinces in South Africa as far as higher education is concerned,"[2] which further increases the obligation to provide major sustainable progress through the purposeful pursuit of strategic objectives. Research outputs, in the form of masters and doctoral graduates, and research publication units are amongst the highest in the country. In 1994, the two technikons generated more research funding from statutory councils and published more accredited articles than all the other South African technikons combined.[3] In 2000, the three universities in the region produced 28% of the research publication output and 25% of the doctoral graduate output of the public university plus technikon systems in South Africa.[4]

The Western Cape Tertiary Trust, which now operates as the Cape Higher Education Consortium, was formed in September 1993 to "facilitate and expand cooperation between the beneficiaries with regard to sharing of infrastructure, such as libraries, information technology, training of

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[2] *The Restructuring of the Higher Education System in South Africa: Report of the National Working Group to the Minister of Education*, *December 2001*, Pretoria: Dept. of Education, 2002.

[3] J. A. Coetzee, "An Overview of the Western Cape Library Cooperative Project," paper presented at the SAILIS Conference, September 21, 1994.

[4] *The Restructuring*…

personnel, as well as any other form of cooperation which may be beneficial to any of the parties."[5] The Cape Library Cooperative (CALICO) is only one of the projects established by the Trust.

1 The Institutions

The Cape Technikon officially opened in 1923 but was only established by an Act of Parliament in 1979. It has faculties such as Built Environment and Design, Management, and Business Informatics, and offers more than 65 national diplomas and 45 BTech degree courses as varied as Horticulture, Librarianship, Hotel Management, Nature Conservation, and Parks Management—all of which have a heavy emphasis on practical components.[6]

Peninsula Technikon's roots go back to 1962, when a steady growth in apprentices in a variety of trades led to the establishment of Peninsula Technical College. In 1972, the status of the institution was changed to the Peninsula College for Advanced Technical Education, and in 1979 this college became the Peninsula Technikon. The institution was granted partial autonomy in the early 1980s and full autonomy with the passing of the Technikons Act in 1993. Career-specific academic programs at the Peninsula Technikon are offered in three faculties: Engineering, Science, and Business. Short courses and opportunities for further education are offered through the Technikon's Centre for Continuing Education.[7]

A major change to the kind of education and training offered by the Technikons was brought about by the 1993 legislation, which expanded the qualifications offered to include degree courses (Bachelor of Technology, Masters in Technology and Doctorate in Technology). Each of the technikons has approximately 10,000 students.

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[5] "Western Cape Tertiary Institutions Trust Memorandum of Agreement between the Trustees and the Councils," September 14, 1993.

[6] See http://www.ctech.ac.za/users/visitors.html.

[7] See http://www.pentech.ac.za/.

Following the implementation of the University Act of 1918, the University of Stellenboosch was formed by the amalgamation of various colleges and schools, some of which dated back to the end of the 17th century. There are currently 17,000 students, 65% of whom have Afrikaans as their home language. It houses the Theological College for the Dutch Reformed Church, has faculties as varied as Military Science, Agriculture, and Forestry, and, as it is situated in the wine lands of the Western Cape, it has courses in Viticulture and Wine Biotechnology. Historically disadvantaged students comprise only one-third of the student body, but a diversity campaign with equity targets within defined timeframes was launched recently.[8]

The University of Cape Town, founded in 1829, is the oldest institution of the five, and in recent years was restructured into 6 faculties. Renowned as a 'liberal' university, the period 1960–1990 was marked by sustained opposition to apartheid. The student population is now 19,000, with a 48:52 black/white ratio and a rich diversity of students who come from some 70 different countries. Particular emphasis is placed on postgraduate studies, and 30% of students are enrolled in postgraduate programs. UCT is internationally recognized as one of Africa's leading research universities, currently having 14 top-rated scientists out of a national total of 45, a number of whom are recognized as world leaders in their field. An article that appeared in the Financial Times on May 11, 2002, included UCT in a list of 24 world universities chosen by university vice-chancellors as having an international reputation for excellence.[9]

The Extension of University Education Act of 1959 barred black people from attending institutions designated for white people, unless by special concession when alternative facilities were not available. In terms of its provisions, a number of colleges for specific designated categories were established the following year; thus, the University of the Western Cape began in 1960 as an ethnic college for 'colored' students. Following its establishment, the University College Western Cape was placed under the tutelage of the University of South Africa (UNISA) in Pretoria, and was run

[8] See http://www.uct.ac.za/, http://www.sun.ac.za.

[9] "A World Elite is Beginning to Take Shape," Financial Times, May 11, 2002.

by academics who supported racial separation and who saw their role as 'white guardians' of their 'colored wards.'

UWC has worked hard to overcome its apartheid-driven origins, gaining full autonomy in 1984, and is committed to nurturing the cultural diversity of South Africa and to responding in critical and creative ways to the needs of a society in transition. Drawing on its proud experience in the liberation struggle, the university is aware of a distinctive academic role in helping to build an equitable and dynamic society. From an initial enrollment of 170, the student complement is now 10,000, drawn from all of the country's 11 language groups. UWC has grown from three to seven faculties, which comprise 68 departments and 16 institutes, schools and research centers, and was assessed recently by the Human Sciences Research Council as fifth out of 21 South African universities for humanities and social science research.[10]

A recent report of the Working Group on Higher Education has recommended that the number of universities and technikons in South Africa be rationalized from the current 36 to 21, and proposed that the Peninsula Technikon and the University of the Western Cape should merge to form one unitary 'comprehensive institution' offering both university-type and technikon-type programs. After some public debate, this suggestion has been rejected and a merger of the two technikons approved instead.[11] While recognizing what has already been achieved in the Western Cape, the draft report claims that "much more could be done with regard to the joint development and delivery of new academic programs, with regard to the coordination of existing programs to ensure the optimal use of resources and the satisfactory fulfillment of needs, and with regard to cooperation in the building of capacity where it is lacking or inadequate."[12]

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[10] See http://www.uwc.ac.za/.

[11] "A New Institutional Landscape for Higher Education in South Africa," Report of the Minister of Education to the President, May 30, 2002.

[12] *The Restructuring…*

2 The Collections

The strengths of the library collections at UWC and the two technikons reflect the academic programs offered, and help to provide access to undergraduate texts for students who can ill afford to own their own copies. UWC has an audio-visual Self Access Learning Centre to assist students who come from disadvantaged educational backgrounds. UCT has the largest collection of the five, with a number of specialist branch libraries, and has unique research collections in areas such as Government Publications and African Studies. Its Rare Books Division houses what is thought to be the world's largest collection of fore-edge paintings. The recently established Knowledge Commons is the first in Africa, and provides undergraduates with a ‘one-stop shop’ for access to printed and electronic learning and research resources, plus office software to process their work.

As can be expected from its history, Stellenbosch has collections in Africana, Theology and Missiology. The Forestry Library has a unique collection of pamphlets covering all forestry, agroforestry, nature conservation and wood science disciplines. The Western Cape region is particularly strong in the performing arts, with UCT having schools of Drama, Ballet, and Music, both classical and jazz studies, while Stellenbosch has a Conservatory of Music. Together, the library collections that are reflected online amount to approximately 1.6 million bibliographic records.

3 Library Systems

The five institutions used four different library systems.

BOOK Plus (Peninsula Technikon and University of Cape Town)

BOOK Plus, operated by Stowe Computing in Australia, could provide management information, financial data, borrowing statistics, ordering information, etc. At Peninsula Technikon, this system supported registration, circulation, cataloging, acquisitions, and serials functions, while at UCT the OPAC initially comprised only approximately 20% of the total collection

and was only used for searching. Circulation was via an Ontel system. Networking was not a component of the system, and downtime was considerable, with little or no local troubleshooting or support. A programmatic match of BOOK Plus and the Ontel system at UCT caused data corruption which necessitated manual unscrambling of items attached to incorrect bibliographic records. While the two institutions running BOOK Plus had some problems in common, system parameters were not uniform and each was on different software releases.

Integrated Tertiary Software (Cape Technikon)

This was a distributed system operated by Unisys Africa, based on a total software package employed by the institution, with the library module supporting all functions except circulation. Networking was not a component.

PALS (University of the Western Cape)

This Public Access Library System was implemented in 1986 and upgraded in 1989, with modules added in 1990 when PALS was implemented at the Provincial Library Service. Supported locally by UNIDATA, the system was designed to handle a number of libraries linked to the same server, and so was reputed to be efficient in a networked environment. At UWC it handled all internal library operations, though at the time the software did not support a journal article access system.

ERUDITE (University of Stellenbosch)

ERUDITE, operated by Universal Knowledge Software (UKS), a subsidiary of UCS Group, was used for all internal library functions including ordering, enquiries, circulation, serials control, and financial administration, and was integrated into the campus network. A major advantage was its efficiency, and the fact that it was the same software

employed at the time by SABINET, the South African Bibliographic Network.[13]

4 The Vision

Where CALICO differs from other consortia in South Africa was in the vision which embraced "the concept of a single Western Cape library collection, that is housed at different locations with all resources accessible to anyone who has need of them."[14] The collections were to remain in their current locations, but with vastly increased access through a dedicated network linked via metropolitan area services. In this model, the institutions would decide to merge their library operations at a stroke, so that acquisitions, serials management, circulation, and bookkeeping functionality would all operate as if CALICO were a single library.[15] Commitment by all to agreed policies such as cooperative acquisitions and lending, and adherence to agreed standards, would have to be in place to ensure maximum retrieval and also so that all users would assume they were searching a single library collection, even though physical collections would remain the property of the home institution. A factor inherent in the vision to promote information literacy and economic development in the region through information provision was the right of all citizens to access, evaluate and effectively use information to improve their quality of life. Based on shared strength among like institutions, the initial impetus has been with the five tertiary institutions, but more than 300 possible regional beneficiaries were identified, from non-governmental organizations (NGOs) to schools, distance learning centers and the local site of the National Library of South Africa. This indicated a desire to share the

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[13] See http://www.erudite.co.za/.

[14] Patricia Senn-Breivik et al.

[15] *Affirming the CALICO Vision: The Acquisition of the SLIS and its Implications for Policy in Member Libraries: A Discussion Paper* (Cape Town: Project Management Team, October 1997).

burden of undoing the educational inequalities of the past. The cooperative ventures were not seen primarily as money-savers, but rather as ways to increase efficiencies in information and to avoid unnecessary duplication of effort and resources. There was no implicit or explicit attempt for any of the historically disadvantaged institutions to benefit at the expense of the better-endowed; rather, it was understood that together there would be access to a greater range of materials and better services than any one library could provide. More recently, the cost-bearing model has been under scrutiny, due to increased demand on particular libraries from partner institutions.

Investigations looked at practices at each institution and the viability of merging the five databases into a single catalog. In addition to analysis by each institution, two independent consultants who had no vested interest in any one institution also looked at the workflow and standards at each. Three of the institutions cataloged directly onto SABINET[16] and downloaded records, while two cataloged in-house and in theory uploaded their original records and holdings.

5 Exchange Format

At the time, the exchange format within the South African library community was SAMARC. This was based on UNIMARC and was developed in the 1970s by order of the National Library Advisory Committee. It was also used as the base format for various commercial and in-house library systems, but this only furthered South African isolation, as it inhibited the exchange of bibliographic records. An investigation into the different MARC formats and a comparison of the costs and benefits of each was mandated by the Interim Committee for Bibliographic Organization (ICBO) and funded by the South African Department of Arts, Culture, Science and Technology.[17]

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[16] See Pierre Malan, "A National Union Catalog for Shared Cataloging and Resource Sharing by Southern African Libraries," in this volume.

[17] M. M. M. Snyman, *Investigations into a Future Machine Readable Cataloging (MARC) Format for South African Libraries: A Report with Recommendations*, 1997.

At a seminar held at the University of Pretoria in April 1997 to discuss a future MARC format for South Africa, an overwhelming majority voted to replace SAMARC with USMARC as the preferred format. In January 1999, the MARC Office at the National Library of South Africa conducted the first USMARC interactive online training course.

The only format in SAMARC was for bibliographic records, and there was nothing for authorities, holdings etc. SABINET imported records from various sources (incoming records had to be converted to SAMARC, those from Library of Congress from USMARC, and BNB records firstly from UKMARC to USMARC and then to SAMARC). This resulted in information being dropped along the way, since there were not always corresponding tags and subfields in each format. SABINET had to adopt its own authority file by extracting headings from the bibliographic records, so there was an amount of authority conflict which compromised standards and further inhibited record exchange.

While all libraries in South Africa subscribed to an obligation to contribute to a national catalog for purposes of interlending and collection development, SABINET had been unable to keep abreast of quality control, and had opted for holdings coverage rather than quality of records. The fact that libraries that provided the SACat with records did not all catalog centrally resulted in records of different levels and standards of cataloging, and in a national database where retrieval of records was time-consuming both for cataloging and inter-library loan purposes. SABINET Users Committee had set up an ad hoc committee in 1994 to look at the quality of the database as a whole, but also to investigate the state of the authority files in particular. The University of South Africa (UNISA) investigated subject headings, and the State Library analyzed personal names.[18]

In 1995, Sabinet Online became an international distributor for OCLC, and the CALICO libraries were among the first member libraries in South Africa to use OCLC's PRISM service, though not to its full potential, as some of the systems in use had problems with downloading of long records. An earlier release of BOOK Plus had a record-length restriction, but even

[18] Seminar on Bibliographic Standards for Promotion of Cooperation, Pretoria: University of Pretoria, 1996.

when this was increased, particularly long records would not copy to SABINET.

PRISM was useful mainly for music CDs, but SAMARC did not accommodate name title added entries from the 700 tag. This resulted in added entries and variant title tags without any corresponding link. SAMARC used a separate 204 tag for ‘gmd’ (General Material Designation) rather than a subfield in the title field as in USMARC, and this did not convert correctly. SAMARC did not have adequate fixed fields for recordings—printed music translated correctly, but not music CDs, all causing additional manipulation of records before they could be transferred by FTP.

Of the five CALICO institutions, UCT is the only one that uses diacritic codes, mostly for Arabic and Hebrew works. USMARC uses ASCII for special characters, SAMARC had escape sequences, and then BOOK Plus used EBCDIC. Once again this multiplied the potential for error. The tables for conversion had not always been synchronized, and at downloading, the letter with its diacritic might be dropped completely, or else result in a character string remaining embedded in both the bibliographic records and authorities. Once again this caused duplicate headings as well as corruptions in display, filing, and subsequent retrieval.

The University of Cape Town libraries had cataloged on SABINET since 1986, first receiving catalog cards, then a weekly tape and eventually a daily FTP file. When BOOK Plus was installed in 1990, there was no matching program, resulting in duplicate and even multiple occurrences of records loaded from various sources. The basic catalog comprised tapes of bibliographic records that had holdings on SABINET. Some retrospective conversion was done from microfilmed cards by ‘amarc’ Data International in Australia. These records were not upgraded, the data capturers were not catalogers, language problems and distance made quality control difficult so that errors were created and compounded, and the money ran out before the project could be completed. Later retrospective conversion of printed music and scores done by SABINET Special Projects was also problematic, due to lack of music expertise and the poor quality of copy cataloging. The university funded these two projects, since the policy favored outsourcing rather than using data capture on site. CALICO policies favored local

contracting, so in-house restrospective conversion was conducted later for Government publications material and updating of joint serials holdings.

It was necessary for all five institutions to conduct in-depth analysis of their existing catalogs, documenting and prioritizing the clean-up necessary before conversion to USMARC and for possible merging to a single database on the chosen system. This analysis was drawn up in terms of what should be done prior to data extraction, either programmatically or manually, what could be fixed at the time of conversion to USMARC, and what should wait until after implementation or merging, again programmatically and manually. To some degree, what could be done during and after merging was dependent on what system was chosen and what that particular vendor could offer.

Four of the databases required work on headings or authority files; the fifth had no authority module at all, but merely indexes. The ITS database at Cape Technikon filed individual subfields in all author and subject tags in alphabetical order; e.g. a personal name tag having subfields a, q, d, stored them in the order a, d, q. In SAMARC, personal names had an additional subfield 'b' for first name or initials. Correcting the order of subfields was one task identified as having to be done programmatically prior to data extraction.

For various historical reasons, such as importation of records from different sources and embedded or implied punctuation, as well as changes to the length of filing keys, the BOOK Plus database at UCT contained duplicate and variant headings, which resulted in user frustration and possible non-retrieval of relevant items. Cleaning up headings was part of regular cataloging processes, but data corruption caused backlogs and loss of linkage between headings and bibliographic records. Out of more than 667,000 headings, it was estimated by mid-1996 that a possible 40,000 were duplicates, and a further 10% needed maintenance. Professional expertise and familiarity with the history of the database was essential for manual correction.

While Peninsula Technikon also used BOOK Plus, the parameters had been set up differently, and authorities were repeated by type. An author or corporate body might appear in three separate files depending on whether it had primary, alternative or secondary responsibility.

Fixed fields were problematic at all five institutions. UCT had opted to strip them completely from incoming records, and had only limited information in item records from which these could be rebuilt during extraction.

6 Connectivity

The implementation of a shared library system presupposes adequate network connectivity. UNINET, which was based on the X25 communications protocol, existed as a higher education telecommunications network that provided a backbone for library cooperation at the national level, but bandwidth was purchased from Telkom, the telecommunications parastatal, which had monopoly status. All of the consortial initiatives within South Africa required adequate and affordable bandwidth, and so a task force was formed to meet with the Minister of Communications and senior Telkom executives. In late 1998, Telkom executives met with a consortium of US donors in New York, and committed themselves to finding a long-term solution to networking requirements as part of Telkom's contribution to South African development. In turn, the US donors, led by the Mellon Foundation, undertook to fund what became known as the US Donors' Bandwidth Project for Higher Education in South Africa. A not-for-profit company TENET was established to manage the transition to the new solution.

Meanwhile, Telkom designed a WAN for the CALICO project with 2-MB links between the cooperating institutions. The upfront setup costs and rental for this frame relay network, known as the Adamastor Network, were funded by the Open Society Foundation for South Africa. Maintenance of the main UNIX servers on which both the Production and Development versions of the shared databases are run has been outsourced to Comparex Africa, a local ICT company.

7 Choosing the System

The first major step towards the realisation of the CALICO vision was the purchase of a Shared Library Information System. A Project Management Team (PMT) comprising IT, library and management staff was established.

"The brief of the PMT was to interpret and try to convert years of discussion into a proposal for a shared library information system that could be implemented if funding were obtained."[19] In August 1996, the PMT sent out a formal Request for Funding (RfF) to The Andrew W. Mellon Foundation in the United States. The RfF gave a description of CALICO and its vision and included specifications for the envisaged system and a detailed budget. The Board of the Mellon Foundation approved the RfF and agreed to provide the funds for the purchase and implementation of such a system.

In 1996, the Western Cape Tertiary Institutions Trust sent out a Request for Information (RfI), and this was followed by a Request for Proposal (RfP) to a number of suitable vendors.

On receipt of the response to the RfP from vendors, a short list of three possible systems was decided upon, and arrangements were made for them to host demonstrations in the Western Cape. These took place in April and May 1997. Staff, both academic and library, and students were invited to attend and were requested to complete evaluation forms for each of the systems. The three systems selected for this exercise were ALEPH 500 (Ex Libris), INNOPAC (Innovative Interfaces Inc.) and Virtua (VTLS).

Following the demonstrations, the short list was reduced to two: INNOPAC, and ALEPH 500. A team of librarians and IT staff from the five institutions was selected to travel to Europe and the United States to visit various sites where either one of the two systems was in use. This site visit took place in May 1997.

The next step in the process was for the selection team to evaluate the two systems on the basis of the demonstrations and the site visit report, and to decide on a vendor of choice. A recommendation could then be made to the Western Cape Tertiary Institutions Trust, who would enter into negotiations with the recommended vendor.

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[19] James Leatt, "Finding a Fit between Vision, Technology and Organization: The CALICO Case," in *Commonwealth Collaboration in Universities: Three Case Studies*, ed. Alison Rees (London: Association of Commonwealth Universities, 2001).

Given that CALICO was buying a system for the future, it was felt that the ALEPH 500 system met all the given criteria. The following set of criteria was considered in relation to the systems:

Long-term viability of the product

ALEPH 500 was a technologically advanced system at the beginning of its life cycle. It was seen to be technologically appropriate for CALICO's long-term goals. For example, the system is based on Oracle; it offers multi-tiered client-server architecture; it is possible to use SQL (Sequential Query Language). From the point of view of being able to support a union (merged) catalog, it was important for the chosen system to be able to support a distributed platform, that is, one database living on several computers. A merged, single catalog such as CALICO was planning forces a single database. ALEPH 500 was capable of supporting such a distributed platform. Also, ALEPH 500 was acceptable to CALICO from a product strategy perspective: a significantly advanced new-generation product is offered every five years or so, with zero upgrade costs to the user. Another very important feature for this time, ALEPH 500 was Year 2000-compliant.

Ability of the vendor to cater for a consortial environment

The ALEPH 500 system would be able to offer CALICO patrons a seamless virtual library, and Ex Libris was willing to negotiate with CALICO to meet consortial needs. Ex Libris would be able to convert bibliographic data from SAMARC to USMARC and would be able to merge the data into one catalog.

Vendor strength

Ex Libris was seen to be an innovative and financially sound company that was growing rapidly in both market strength and in system sales. This opinion has been confirmed in recent years as sales of ALEPH 500 have increased, and it is now used at 700 sites in 50 countries. Most important for library staff was the issue of local support. Ex Libris has a local

distributor based in Cape Town, Avion Information Systems and Services (AVIONISS), that would provide the first level of support.

Affordability and sustainability

ALEPH 500 was affordable.

Expansion and outreach

It would be possible to add new member libraries with little difficulty. There was, however, one major cause for concern. The CALICO vision implied very specific requirements for the circulation of material, and the library staff was worried that the ALEPH 500 system would not be able to handle these. As a result of these concerns, circulation experts from CALICO were invited by Ex Libris to go to Israel to meet with staff there and discuss ways of meeting these requirements. This visit took place in December 1997.

This delayed the negotiation process, but by May 1998, both the vendor and the Western Cape Tertiary Institutions Trust, then operating as the Adamastor Trust, were satisfied, and the contract was signed. Plans to implement ALEPH 500 in the five CALICO libraries began.

8 Implementation: 1998–1999/2000

To facilitate the implementation of ALEPH 500, a central implementation team, the Pit Crew, was established, comprising Library IT staff with both library functionality and technology expertise. This team was later dissolved and a project manager appointed to oversee the implementation. Each institution also established an in-house implementation group to work with the Pit Crew, and later the Project Manager, during the implementation phase.

The migration of the bibliographic data from the five library systems to one CALICO database involved three distinct activities. Firstly, the data would have to be extracted from the separate databases to a data format (a flat-file); secondly, it would have to be loaded onto the ALEPH system in

this format; and thirdly, the data would have to be merged and then converted from SAMARC to USMARC. This process would ensure that only one bibliographic record per title existed in the shared CALICO bibliographic file. The literature on the subject of merging identifies three options for handling records identified as duplicates:

1. "One record is chosen as the master record and the others are deleted.
2. All records are kept but clustered around a master record.
3. One record is chosen as the master record and variant fields from the duplicates are added to the master."[20]

Option one would involve deciding on selection criteria, such as always keeping the record with the highest encoding level, or always keeping the record 'belonging' to the institution perceived to have the highest quality records, but would necessarily result in some libraries losing data that they considered valuable and useful to their patrons. Consequently, the preferred option for CALICO was the third one.

9 The 'Big Bang' Approach

The plan for implementation at this stage was that all institutions would go live at very much the same time: the big bang approach. In other words, the bibliographic data would be extracted from all five institutions. The first database would then be loaded onto the ALEPH 500 platform; then the second would be loaded and the data matched and merged with the first; then the third would be loaded, matched and merged with the now combined first and second databases, etc., until all five databases had been loaded, matched and merged. Ex Libris would provide the matching algorithm, and the conversion from SAMARC to USMARC would be carried out by AVIONISS, using specifications drawn up by and purchased from Sabinet Online.

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[20] Susan S. Lazing, "To Merge or Not to Merge: Israel's Union List of Monographs in the Context of Merging Algorithms," *Information Technology and Libraries*, 13/3 (1994).

While the systems librarians and implementation teams were working on the implementation, the Regional Catalog of Monographs Committee (RCMC) was investigating the feasibility of the CALICO vision of a merged database. The RCMC was established in 1995, prior to the selection of the system and the signing of the contract, and was composed of catalogers from the five libraries. The mandate of this committee was to investigate the possibility of creating a union catalog for the Western Cape. To be able to do this, they would need to establish whether it would in fact be possible to merge the databases, given that the institutions were using different systems and that there were disparities in the cataloging practices followed by each institution. The other option was for each library to maintain its own database separately on a shared automated system, but this would conflict with the overall vision of CALICO.

They were also mandated to investigate methods of overcoming the use of different systems and local practices and to develop and implement a cooperative cataloging program between the five libraries.

To facilitate the making of these decisions, two independent consultants were asked to investigate the differences in the catalogs of the five libraries, establish which cataloging standards were used and identify the differences in the interpretation of these standards, and to make a recommendation on the basis of their belief concerning the possibilities of merging the databases of the five libraries into one.[21] The reports of the consultants were submitted to the RCMC and highlighted a number of issues that could impede the formation of a merged catalog.

[21] Karin De Jager, "Cape Library Cooperative, Regional Catalogue of Monographs Investigation: Report," unpublished paper (Cape Town: University of Cape Town, 1996); Ziska Johnson, "Investigation into the Differences between the Five CALICO Libraries and the Feasibility of Forming an Amalgamated Catalogue," unpublished paper (Stellenbosch University, 1996).

10 Deviations from Standards, and Local Practices

Although all the libraries adhered to international standards like AACR2 and Library of Congress Subject Headings (LCSH), there were deviations in some instances.

University of Cape Town

Subject headings from an in-house African Studies thesaurus had been added to records using the standard SAMARC 600–607 subject headings tags. The 650 SAMARC tag for keywords was not used, and no subfield code had been used to identify these headings as being from a source other than LCSH. SAMARC allowed a subfield $2 to identify the source of the headings.

MeSH (Medical Subject Headings)

Subject headings were used on titles belonging to the Medical Library, and like the African Studies headings, the source subfield $2 had not been used, so there was no easy way to isolate these headings.

Staff in the Library's Reserve section added very basic records to the database, for material such as photocopies and articles that had been placed on short loan. This was necessary so that the material could be circulated online. Typically, these records would not have any subject analysis or publication and imprint details. Thus, there were records of varying levels of completeness.

Peninsula Technikon

Library of Congress Subject Headings had only been used since 1993. From 1989 to 1993, SEARS had been used, and prior to that, free language subject headings had been applied.

Titles in Afrikaans had the Afrikaans version of the corporate heading, and English titles used the English version.

The way in which headings for Government departments had been structured was inconsistent: there were entries under the name of the

country and then the department, and also entries directly under the name of the department.

Cape Technikon

As at the Peninsula Technikon library, both English and Afrikaans subject headings were used, depending on the language of the publication.
Free text indexing terms were used in the SAMARC 650 keyword tag.

University of the Western Cape

Cataloging standards had not been applied uniformly, since the Library did not have a Cataloging Department. Cataloging was the responsibility of the subject librarians, along with their reference and other duties, and there was no quality control or checking of their cataloging work.

Although Library of Congress Subject Headings were used, they were not uniformly applied, and the Thesaurus of South African Socio-Political and Economic Terms from an Anti-Apartheid Perspective[22] was also used for titles with a specific South African content, which were not covered in sufficient detail in LCSH. Like the University of Cape Town, these non-LCSH headings were added in the standard SAMARC 600–607 tag and not in a keyword tag. British spelling was used in the subject headings, and not the standard American. 'South Africa' was routinely dropped from the headings for South African government departments and bodies, and all were entered under 'Department'. Headings for personal names were not consistent. If the title of the work was in both English and Afrikaans, then both versions of the name were given, if the title was in Afrikaans, then the Afrikaans version was used and the English version for a work published in English.

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[22] Christopher Merrett, *Thesaurus of South African Socio-political and Economic Terms from an Anti-Apartheid Perspective*, 2nd ed. (Pietermaritzburg: University of Natal Library, 1991).

University of Stellenbosch

This Library had a very high standard of cataloging, and there were few deviations from the recognized standards. Only authorized subject headings from the latest version of Library of Congress Subject Headings were used, and only authorized forms of personal names were used. English forms of corporate names were used if the work was in English, and Afrikaans if the work was in Afrikaans.

11 Authority Files

All of the libraries, with the exception of the University of the Western Cape, had authority or headings files. All reported duplicate headings, except for the University of Stellenbosch. In fact, the University of Stellenbosch was the only institution with an authority file that was well maintained, with few duplicates and deviations.

12 Staff Perceptions

The consultants interviewed staff in the Cataloging Departments of the Libraries and asked whether they thought a single catalog was feasible. It became apparent that not all staff thought such a union catalog was possible, and many were in "favour of retaining control over their own databases and simply providing bibliographic access to the other members of CALICO."[23]

The primary concern was to maintain the integrity of the database. Staff felt that it would be difficult to maintain high standards of cataloging, primarily because of the differing levels of expertise of those who would have cataloging rights in the database. For example, cataloging of material at the University of the Western Cape was the responsibility of the reference librarians, and not specialist catalogers. Similarly, Circulation and Acquisitions staff added brief records to the University of Cape Town

[23] De Jager.

database. It was felt that the local cataloging practices of each institution would affect the success of the merge and would compromise the quality of the database.

13 Recommendations

The consultants came to the conclusion that it would be possible to merge the five databases, but a number of conditions would have to be met. Primarily, mutually acceptable standards would have to be negotiated and established. Individual cataloging practices would have to be standardized and minimum levels agreed to. Most importantly, all the institutions would have to commit themselves to adhering to these standards. It was also recommended that certain staff should take responsibility for quality control of the database. It was agreed that maintaining the merged catalog would be expensive and time-consuming, and CALICO would have to ensure that sufficient resources, both financial and staff, were made available.

Following the release of these reports, the RCMC began to work on two projects that would help to standardize cataloging practices and ensure that an acceptable standard of cataloging was maintained in the merged catalog. The first of these was the compilation of a Cataloging Procedures Manual which would establish cataloging standards and processes, and the second was the formulation of core records for all formats. These were completed in 1999. In addition to working on the above projects, each institution undertook major clean-up projects on their own databases prior to merging.

While the RCMC was preparing the catalogs for the final extraction and merge, a major problem had arisen at the University of the Western Cape. The PALS system was being run on hardware that was becoming increasingly expensive to maintain, and it no longer made sense for the institution to continue to pay for its maintenance when a new system had been purchased and implementation was imminent. The Project Management Team and Ex Libris discussed the possibility of a staggered implementation, with UWC converting to ALEPH 500 ahead of the other four institutions.

As a result of UWC's problems, it was agreed that the 'big bang' approach to implementation would not be followed, but that each institution would go live at different times during the course of 1999. This had major implications for the proposed merging of the catalogs. Since implementation was to be staggered, all stages of implementation would, therefore, also be staggered. Extraction and loading of the data would take place individually prior to each institution going live, and since CALICO was committed to working on ALEPH 500 in USMARC format, conversion from SAMARC to USMARC would also have to take place prior to each institution going live. The merging of the five databases could now take place only after all the institutions had gone live on ALEPH 500, and would be the final step in the implementation process.

14 Implementation Schedule

The implementation of ALEPH 500 in the CALICO libraries took place according to the following schedule:

- February 1999: the University of the Western Cape went live with all modules on version 11.5;
- March 1999: the Cape Technikon went live with the cataloging and acquisitions modules, also using version 11.5;
- May 1999: the University of Cape Town went live with the cataloging module, again on version 11.5;
- Version 12.1 became available in July/August 1999, and the three 'live' institutions upgraded. It was hoped that functionality needed by the CALICO libraries that was missing in version 11.5 would now be available;
- July 1999: the Cape Technikon implemented the circulation module and the Web OPAC.

UCT had planned to implement the circulation module with version 12.1, but staff were still not satisfied that they would be able to offer their patrons the same level of service as they had using BOOK Plus. Consequently, it was decided to wait for the next version, 12.2, that would allow them to offer an equivalent service.

- October 1999: the Peninsula Technikon implemented all modules with the exception of acquisitions;
- November 1999: version 12.2 was ready for installation;
- November 1999: University of Cape Town implemented the circulation module and the Web OPAC, and Peninsula Technikon implemented the acquisitions module using the new version.

It was imperative that ALEPH 500 be implemented at all the institutions prior to January 2000, as the old systems were not Y2K compliant. Since Stellenbosch University ran a fully integrated system on ERUDITE, it was important for it to wait until year-end before extracting and converting the financial transactions from ERUDITE to ALEPH 500.

- December 1999: the University of Stellenbosch implemented the cataloging and acquisition modules;
- January 2000: it implemented the circulation module, Web OPAC, the serials module and all financial transactions.

15 Post-Implementation 2000–2001

Thus, by January 2000, the five CALICO institutions were all using the same library information system, ALEPH 500 version 12.2, and all were running the system from the same server. CALICO was still a long way from realizing the original vision of a shared union catalog, and in reality it appeared as if CALICO had become "a mere aggregate of current library practice,"[24] precisely what the Project Management Team did not want to happen.

Following implementation, each institution configured the system to meet its own institution's specific needs. For example, each institution still followed its own circulation practices, and the system was configured to meet these specific needs and rules, despite the fact that some attempts had been made by the institutions prior to implementation, to standardize these and to agree on common parameters within the table set up. There is no

[24] *Affirming the CALICO Vision…*

shared circulation system, and patrons do not have equal access rights on all campuses. Each institution has assumed responsibility for maintaining its own database, and although there are common practices and standards which are being adhered to more stringently, it is not the shared catalog of the CALICO vision.

The users of the institutions are able to search the collections of the other institutions, but they do not have equal access rights on all campuses. They are able to borrow material from the other libraries, but this is organized through the inter-library loan departments of the institutions.

Does this mean that the original "bold vision of a shared library information system—a 'library without walls'" or a "'single, pooled library system' that would link collections housed separately"[25] has been abandoned? No, it does not, but where does CALICO go from here to meet the vision?

The face of the modern library has undergone rapid changes in the last few years and each of the five CALICO libraries has been affected by these changes. The traditional print collections have been supplemented and enhanced by the online database industry that has "enabled libraries to provide access to additional resources that are not necessarily owned by the library."[26] Changes in the format and in the source of information from traditional print to electronic has led inevitably to changes in the needs of the library users and the CALICO libraries found themselves facing a new challenge. To summarize: libraries and the vendors of library systems need to find a technological solution that will "support robust integration of locally-held information resources with licensed networked databases and with Internet-based resources."[27]

A number of library vendors have met this challenge and have developed new services and software that will allow end-users access to both print collections and electronic resources. As users of the ALEPH 500

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[25] Leatt.

[26] Tom Kochtanek, "New Developments in Integrated Library Systems," http://gessler.emeraldinsight.com/vl=2844020/cl=23/nw=1/rpsv/librarylink/technology/nov01.htm.

[27] Kochtanek.

system, it was inevitable that CALICO would investigate the two new products developed by Ex Libris: MetaLib and SFX. "MetaLib is the perfect platform for managing a hybrid library environment, including both the emerging electronic collection with its digital resources and the traditional library with its print resources. MetaLib serves as a gateway to local and remote databases."[28] "SFX is a unique and revolutionary tool for navigation and discovery, delivering powerful linking services in the scholarly information environment. With SFX libraries can define rules that allow SFX to dynamically create links that fully integrate their information resources regardless of who hosts them – the library itself, or external information providers."[29] Given the new technology available, at its meeting on March 28th, 2001, the CALICO Management Committee "agreed that CALICO would purchase from remaining Mellon funding one version of MetaLib/SFX."[30] At the following meeting held a month later on April 26th, "[i]t was formally noted that the decision to purchase MetaLib/SFX software replaced the original decision to merge the catalogs of the five institutions."[31] Upgrading to ALEPH 500 Version 14.2 took place in mid-2002, and implementation of MetaLib and SFX at the five institutions will begin early in 2003.[32]

16 Conclusion

It has been a long journey from the initial vision of 1992 to the current situation, and 'over-democratization' can be seen as having been a major

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[28] See http://www.exlibris.co.il/metalib/index.html.

[29] See http://www.sfxit.com/body.html.

[30] Minutes of the 13th meeting CALICO Management Committee, Wednesday 28th March 2001, Boardroom, University of Stellenbosch Business School, point 11.

[31] Minutes of the 14th meeting CALICO Management Committee, April 26, 2001, UWC Council Chambers, Bellville.

[32] For implementations of MetaLib and SFX, see also Bohdana Stoklasová and Pavel Krbec, "CASLIN Uniform Information Gateway," in this volume.

deterrent to the implementation of the CALICO vision. The effort to involve as many people as possible in the decision-making process resulted in a multitude of committees and working groups and in time-consuming institutional consultation, where "CALICO became hostage to the veto of one, and often found itself going at the pace of the slowest."[33]

Developments in technology have overtaken the original plan to merge the five catalogs. With the purchase of MetaLib and SFX, CALICO will achieve a virtual union catalog without having to go through the complexities of physically merging the five databases. The difficulties of actually merging the databases, with their different standards of cataloging and idiosyncratic practices, and the time-consuming checking of a merging algorithm have been avoided. Advances in technology will in fact offer far more than the original vision: a CALICO user will be able to search the library catalogs of all five institutions, as well as being able to access the libraries' electronic resources at the same time via a single gateway. Patrons will have to familiarize themselves with only one interface, but will have a wealth of scientific and scholarly information available to them, both in print and electronic format.

Appendix: Acronyms and Abbreviations

ACE	American Council of Education
AVIONISS	Avion Information Systems and Services
BTech	Bachelor of Technology
CALICO	Cape Library Cooperative
CTK	Cape Technikon
ICBO	Interim Committee for Bibliographic Organization
ITS	Integrated Tertiary Software

[33] Leatt.

NGO	Non-Governmental Organization
OCLC	Online Computer Library Center
PALS	Public Access Library System
PTK	Peninsula Technikon
RCMC	Regional Catalog of Monographs Committee
SABINET	South African Bibliographic Network
SACat	South African Catalog
SAMARC	South African MARC format
SQL	Structured Query Language
TENET	Tertiary Education Network
UCT	University of Cape Town
UWC	University of the Western Cape