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Redesigning the Academic Library Materials Budget for the Digital Age: Applying the Power of Faceted Classification to Acquisitions Fund Management

Maria Savova
The Claremont Colleges

Jason S. Price
Statewide California Electronic Library Consortium (SCELC)

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Most academic libraries are facing increasing funding challenges that necessitate improved budget communication and advocacy, in addition to the more traditional planning and monitoring of funds. Moreover, electronic resources (e-resources) continue to evolve rapidly, spawning new material types and modes of acquisition. This paper defines four key facets of a materials budget that has been optimized for the e-resources environment and describes a process that can be used to redesign any academic library budget structure for the digital age. Specific examples of important practical advantages that have accrued over the six years since the fully faceted materials budget structure was implemented are included.

$\underset{\text{resources. The Association of Research Libraries (ARL) reported that the}}{\text{A}}$cademic libraries serve as stewards of their institutions' information
114 university libraries it represents spent over $1.54 billion on library materials in 2014–15.[1] Data from the Association for College and Research Libraries (ACRL) for the same year shows over $2.18 billion spent on library materials by the 1,455 libraries that completed its survey.[2] Although these expenditures represent a steadily declining proportion of total institutional expenditure (from a peak of 3.7 percent in 1984 to a low of about 1.8 percent in 2011), the library is still an important cost center in institutions of higher education.[3]

The global economic crisis that began in 2008 brought strong downward pressure on library funding that has not been matched by a decrease in the cost of scholarly information. Consequently, university administrators are paying much more attention to library expenditures and scrutinizing annual funding requests. Although disparity between the growing cost of scholarly information relative to library funding is not new, the economic crisis greatly intensified the problem. During that period, inflation in the higher education price index (HEPI), which serves as a proxy for the change in income of higher education institutions, shrunk to an average increase of less than 2 percent per year.[4] In contrast, the average academic book (8 percent) and serial (6.8 percent) price

Maria Savova (maria.savova@clare mont.edu) is Director of Scholarly Information Resources, The Claremont Colleges Library. **Jason Price**, PhD (jason@ scelc.org) is Director of Licensing Operations, SCELC Library Consortium.

increase has been three to four times greater over the same period.[5]

As a result of the annual 5 to 6 percent gap between information resource costs and the increase in institutional income, library funding requests designed merely to maintain spending power are being denied as a matter of course. Provosts and presidents are forced to choose between reducing library purchasing power every year (i.e., by holding increases to 5 percent or less) and making cuts in other campus departments. Many have held library budgets flat or reduced them, leading to greater shortfalls.[6] Recent reviews of the library budget literature have identified loss of purchasing power as a recurring theme.[7]

Even historically well-funded libraries need to improve their ability to manage and advocate for acquisition funding.[8] Good stewardship now requires advocacy just to keep up with inflation. Increasingly, libraries are commonly required to answer a variety of specific budget-related questions that can be grouped into the following general categories:

1.   On what, exactly, is the money being spent?
2.   How much money is left to spend this year?
3.   How much money will be needed in future years?

These may seem like obvious questions, and indeed are not new. What *is* new is the frequency and sense of urgency with which they are asked, the underlying complexity that must be managed to respond accurately, and the greater importance of answering them well.

This paper's thesis is that the increased pressure on library budgets, combined with changes brought about by electronic resources (e-resources), require optimizing academic library materials budget structures to address these questions more effectively and accurately. More specifically, the authors advocate for an expansion from the standard two-dimensional hierarchical budget structure (based on subject and content type) to a four-dimensional faceted structure that also distinguishes all resources by material format (print or electronic) and acquisition mode (subscription, purchase, etc.). While most current budgets address material format and acquisition mode to some extent, faceted budget design allows these four key aspects of acquisitions expenditure to be addressed for each resource in every account. Furthermore, faceted design provides for more powerful and flexible communication and advocacy that are necessary to meet the intensifying demands faced by library acquisitions budget administrators. As such, the primary question this paper addresses is: How can academic library budgets be redesigned to best address questions about current and future acquisitions spending in the digital age?

Key Budget Functions

Library budgets support planning.[9] The importance of a budget structure that supports reliable short- and long-term planning increases as both library funding and expenditures become more volatile. Given the declining trajectory of institutional support, libraries are increasingly relying on temporary funding sources. For instance, if one-time grant funding is used to launch subscriptions in support of a new program, the library needs to plan to maintain at least some of them for the long run. It is also becoming much more common to need a plan to address pay-per-view and demand-driven purchases, and the increased potential for surplus or deficit associated with them.

Library budgets facilitate monitoring.[10] Library acquisitions budgets must allow selectors to track expenditures throughout each fiscal year. Ideally, there are fund accounts that are spent without staff intervention and others that are entirely discretionary so that fund managers know at the *beginning* of the year the amount they have to spend on one-time purchases by the end of the year. Conversely, structures that allow ongoing and one-time funds to be spent from the same account are an impediment to effective budget monitoring. Despite this major drawback, co-mingling of one-time and ongoing expenditures still seems to be a common practice.

Library budgets must also serve as communication tools.[11] In addition to the internal audience of library fund managers that need to understand where their funding fits in the bigger picture, the library budget structure should facilitate effective communication with faculty and institutional administrators. Fundamentally, library acquisitions budgets should be designed to be transparent, or at least enable fund managers to easily produce reports that answer the questions that faculty and administrators ask regularly.

A key new component of budget communication is advocacy, requiring libraries to simply and clearly communicate the real effect of the ongoing inflation gap on library resources. Librarians often complain about the dire state of their budgets, but administrators commonly remain unconvinced. Budget advocacy requires that institutional administrators and faculty understand the causes and impacts of budget shortfalls. When they do, they can serve as informed decision makers and advocates for funding the collections that affect their institutions' teaching and research.

Literature Review: A Brief History of Academic Library Acquisitions Budget Structure

The authors' review of the acquisitions budget literature did

Table 1. Generalized history of the evolution of the "format" dimension of the two-dimensional academic library materials budget structure.

Stage 1: "Format" as Material type	Stage 2: "Format" as Material type + Acquisition mode	Stage 3: "Format" as Material type + Acquisition mode + Material format
Books	Books firm orders	Books firm orders
	Books autoship	Books autoship
	Books standing orders	Books standing orders
Microform	Microform	Microform
Audio-visual	Audio-visual	Audio-visual / media
Serials	Serials	Serials
-		Electronic resources

i. Note that the other dimension would typically have been "subject area," with 20 to 100 more or less fine-grained categories.
ii. In Stage 3, we transition to using "material format" to refer to print vs. electronic.

not reveal previously published papers that address change in academic library acquisitions budget structure over time. Instead, the focus has been on allocation formulas (i.e., how to decide how much money to put in each account).[12] Alternatively then, to provide context and motivation for adoption of a next generation budget format, the authors offer a generalized history of academic library acquisitions budget structure. It is based on a mix of direct experience, conversations with colleagues, and tangential references to budget structure in the literature referenced in context below.

This narrative is designed to describe the evolutionary path that led to the problem that the faceted budget structure is designed to solve: there has been a dramatic increase in the variety of resources that academic libraries acquire and the means by which they acquire them, without an accompanying fundamental revolution in the budget structure used to manage them. This history emphasizes the issues that have compounded as libraries have attempted to address at least four dimensions of resource acquisition with two-dimensional budgets and introduces the case study that is the basis of the recommended solution.

Before the proliferation of e-resources, the typical academic library's materials budget was structured in a two-dimensional matrix that allocated funds across subject areas and "formats" (i.e., books, serials, microforms, audiovisuals, etc.).[13] Throughout this paper, the authors use *material type* to refer to these categories because *material format* is now more commonly used to describe the access medium (e.g., the print versus electronic nature of the material). For the remainder of this brief history, the authors use "format" to refer to the second dimension of the hierarchical budget that was paired with subject area. Each subject area had an account for each "format," although "format" often included multiple categories containing the same material type. For example, libraries created separate categories for books acquired through an approval plan or standing order (see stage 2 in table 1).[14] While the "format" aspect included a

mixture of concepts, there was still a clear distinction of funds by material type, medium, and level of discretion within each individual account (i.e., the same fund was rarely used to pay for orders that are spent "automatically," such as subscriptions, together with those that are discretionary, such as firm orders).

Starting in the late 1980s, libraries slowly began to acquire resources delivered via the internet and World Wide Web.[15] When e-resources were added to library collections, they were initially tracked as part of the (print) serials budget.[16] As they grew in significance, they were typically assigned to a separate line-item as "electronic resources," initially as a stand-alone fund outside of the subject divisions, but often eventually as an additional "format" represented in each underlying subject.[17] Following the pattern used for incorporating different acquisition modes for print books, the e-resources category was added as an additional "format" for convenience. During the period when "e-resources" meant mostly ongoing e-journal content and represented a small part of the total materials budget, this addition did not pose a significant problem for key budget functions. The long-term outcome of its addition was much more problematic, however, because both e-resources and their associated acquisition modes continued to diversify into a panoply of options far more heterogeneous than those for print books.

Without dismissing the initial advantages in spending flexibility that a loosely defined e-resources fund created, it poses significant disadvantages in today's context. First, these omnibus accounts became excessively large: as of 2011, the average ARL library was spending nearly two-thirds of its acquisitions budget on e-resources, while the average North American library was spending nearly three-quarters of its budget on e-resources by 2014.[18] Second, and more importantly, these accounts became unpredictable catch-alls. E-resource accounts are commonly used to acquire: (1) multiple material types (serials, books, primary

sources, abstracting and indexing databases, streaming media, etc.); (2) resources that are acquired and/or maintained under multiple acquisition modes (one-time purchases, subscriptions, access fees, and e-standing orders); and even across (3) multiple subjects, due to the more interdisciplinary nature of many e-resource collections.[19] Finally, the expectation that these accounts contain all electronic format acquisitions is often not met, because many libraries pay individual e-book firm orders from their book accounts alongside their individual print book orders.[20]

With regard to budget function, the most serious issue with the e-resources fund is mixing acquisitions with different levels of discretion, which occurs when more than one acquisition mode is used for content purchased from the same account. It is almost impossible to plan purchasing of one-time resources when part of the funding is committed to ongoing expenditures. Because electronic subscription money is not sequestered, it is difficult to make major one-time purchases before the fiscal year end, out of fear that there will be insufficient funds left to meet ongoing commitments. This can result in a failure to provide crucial resources to users in a timely manner or missing out on special offers that might come earlier in the fiscal year. Furthermore, the challenges of spending a previously unknown (and potentially large) amount in the very short period of clarity that exists after all ongoing commitments have been met and before the budget year closes may lead to discretionary funding being misspent or remaining unspent. Unspent funds can make it appear to outside observers that the acquisitions budget is larger than necessary, even though the opposite is more likely.

The Problem and a Solution: More Dimensions are Needed

Partially in response to these shortcomings, libraries have begun to restructure their budgets to improve accounting and reporting, to realign the budget with strategic objectives, and/or to recover from related unintended consequences of earlier restructuring.[21] These are efforts to solve the fundamental problem this paper addresses: two-dimensional library budgets have been stretched and warped beyond their capacity to the point that they can no longer support basic budget functions. No amount of adjustment of a two- (or even three-) dimensional budget structure will suffice. Instead, libraries need to dismantle and reallocate their accounts into a four-dimensional faceted structure to enable the planning, monitoring, communication, and advocacy that is necessary to effectively manage a library acquisitions budget in the digital age. This new budget schema must accommodate new types of information resources and

the new ways in which they are being acquired.

Due to the increased complexity inherent in information resources management in the digital age, the acquisitions budget structure should be approached as a *faceted classification system* composed of independent facets representing the core aspects of each information resource acquisition. Each facet encompasses a separate taxonomy, comprised by clearly defined, mutually exclusive, and collectively exhaustive attributes.[22] The advantage of a faceted budget schema over a hierarchical one is that it allows for every resource to be assigned one attribute from each facet. This creates a multidimensional structure that enables the budget to address today's more complex acquisitions environment. Additionally, faceted schemas are flexible and expansible, allowing them to evolve as the library's needs change in concert with developments in material types, formats, and methods of acquiring library content.

The faceted structure presented in this paper is based on a budget that was implemented at The Claremont Colleges Library (TCCL) in 2012 and remains in use as of 2018. The TCCL is a single library serving a consortium of five liberal arts colleges and two graduate institutions with total population size of about 7,500 FTE. While the library's combined constituencies represent the equivalent of a medium-size university, there is a strong emphasis on undergraduate liberal arts education, and the library also supports significant master's and doctoral graduate education and research programs.

A Faceted Acquisitions Budget Structure and its Components

Choice of Facets and Attributes

Based on TCCL's experience, the authors suggest that libraries need to expand their budget structures. Library acquisitions budgets now must accommodate at least four essential aspects of library expenditure: (1) cost center (which could be based on administrative unit/branch/department, discipline, or group of subject areas), (2) material type, (3) acquisition mode, and (4) material format. This section addresses each of these aspects (or facets) and their categories (or attributes), describing a faceted budget structure in detail. While these four aspects should be necessary and sufficient for most academic libraries, a major benefit of faceted schemas is that aspects can be added or removed when warranted. For example, as TCCL integrates endowment funding into its overall budget planning, adding a facet to indicate the funding source (i.e. institutional appropriation or endowment) could prove useful. Conversely, smaller institutions that do not currently divide their funds by subject might not have use for separate cost centers.

In the traditional library budget structure, the total budget was first divided among dozens of subjects (or cost centers) according to the size and scope of each academic department, and funds within subjects were allocated by material type. Supporting dozens of categories for any one facet under a four-dimensional budget structure is impractical because of the multiplicative nature of faceted schemas. With the addition of two new dimensions (i.e., acquisition mode and material format), the number of combinations grows exponentially with each additional cost center. Given this limitation, an institution's cost center attributes should be as broad as possible. Cost centers should be based on disciplines or branches, or some combination of the two, not dozens of individual subjects. Many university libraries have already aggregated their funding in this way, and publisher packages continue to move libraries in this direction.[23] For others, consolidating their individual subject accounts into broader discipline or administrative cost centers will require significant change.

While limiting the number of cost centers is necessary to create a manageable faceted budget, there are other compelling reasons to consolidate subject accounts. The aggregation of resources into databases and packages has reduced the number of subject-specific resources: many more now encompass multiple subjects, making subject-level tracking misleading and/or untenable. Additionally, subject consolidation allows for closer collaboration among selectors within a discipline, plus increased flexibility in spending on multi-subject purchases or subscriptions. Furthermore, consolidation creates larger accounts for ongoing resources, which moderate the impact of unexpected fluctuations in individual subscription prices. In this configuration, responsibility for the shared discipline accounts would need to be assigned to a single fund manager within a discipline group or be assumed centrally by the collections manager. Within the few budget accounts where more fine-grained planning or control may be necessary, like firm order purchasing of books by subject specialists, the fund manager can overlay a subject breakdown and/or create regular reports that leverage the subject information in underlying order records.

TCCL's cost centers are Arts and Humanities (AH), Social Sciences (SS), Science, Technology, Engineering, and Math (ST), Multidisciplinary (MD), Special Collections (SC), and Asian Studies (AS). Each institution would define cost centers to address its unique situation. For example, a regional university that supports master's programs in business and education might decide to break out these cost centers (together or separately), rather than including them within a broader Social Sciences cost center. Similarly, if an institution lacks Special Collections and/or Asian Studies programs, those cost center categories would not be included.

The *material type* facet distinguishes among different publication types. Libraries can choose the material type categories that best reflect the nature of their collections. TCCL divided its material types into four groups—books, journals and journal databases, media (audiovisual), and non-journal content (primary sources like newspapers, datasets, digitized historical documents, etc.). Journal-related content was separated into its own category due to its unique role in research and teaching and to support separate reporting for journals in annual library surveys. If the materials budget includes non-material expenditures, such as ILS or discovery system subscriptions, cataloging costs, memberships to shared archives, etc., "service" could be added as an additional material type to allow them to be tracked and reported within the faceted structure.

The *acquisition mode* facet addresses the nature of spending and the level of discretion the library experiences when acquiring materials in each category. TCCL's acquisition mode categories include:

- Ongoing—all subscriptions, access and platform fees, membership fees, etc. These are commitments whose prices can be predicted based on historical data and multi-year contracts. Unexpected fluctuations in individual orders are common, but accounts with many orders are more predictable.
- Approval plan autoship—many academic libraries use profiles to automate purchasing from one or more book jobbers. While the profiles can be modified as needed, they are fairly stable and a profile's output can be predicted based on historical data, accounting for inflation and publishing trends. These purchases do not require active ordering and the plan is a commitment to purchase until it is changed or suspended.
- Standing orders—comprise somewhat stable annual commitments to purchase book series' titles as they become available. Despite individual series fluctuations, the overall allocation of the fund can be predicted based on historical information.
- Demand-driven—this relatively new way of acquiring library materials is becoming an important part of many academic libraries' acquisitions strategy.[24] It represents a unique level of discretion since it is driven by users, not library staff.[25] Tracking it in a separate fund allows the library to monitor these expenditures closely and supports library administration with ongoing evidence of the library's responsiveness to specific user needs. Demand-driven acquisitions can be mediated or unmediated.
- Firm orders—this category requires librarians and staff to actively select and order library materials.

As the nature of spending for the different acquisition modes shifts from automatic to manual, the level of discretion increases from low to high (see table 2).

Finally, the *material format* facet indicates the resource's medium—i.e. print/physical or electronic. Physical expands the print attribute to address DVDs, CDs, etc. As noted, material *format* differs from material *type*—format is an indicator of delivery medium (physical or electronic) and type indicates the content's container (e.g. book, journal, video).

Combining Attributes of each Aspect to Create Fund Codes

Following Ranganathan's colon classification approach, which became the basis for modern faceted classification, our fund code syntax ensures that one appropriate category of every facet is reflected in each code.[26] The order in which the different aspects appear in the fund code reflect: (1) cost center, (2) material type, (3) acquisition mode, (4) format. There is no special significance in this order, except perhaps that it is easiest to sort funds by the aspect that appears first. AHBFE, for example, corresponds to arts and humanities, book, firm, electronic. The set of fund codes for books in the Arts and Humanities is comprised of all useful combinations of attributes of the acquisition mode and material format facets (see figure 1). The remaining combinations are formed similarly, depending on the specific situation for each cost center and the material types it acquires.

Adopting the above attributes results in forty possible accounts per cost center: (4 material types) x (5 acquisition modes) x (2 material formats), or 240 accounts across all six cost centers. However, only twenty-two of each set of forty represent meaningful combinations: some acquisition modes do not apply to all material types. Furthermore, some cost centers do not use all twenty-two meaningful combinations. At TCCL, for example, e-book approval is not used, and the Special Collections division does not acquire electronic formats. Limiting the active accounts to those that are both meaningful and useful reduces the total number of accounts used across all TCCL cost centers down to a manageable sixty-eight.

This calculation reveals that the addition of the two new budget facets (acquisition mode and material format) comes with a cost. Because each additional cost center will result in up to twenty-two additional accounts, it would not be practical to use dozens of subjects as cost centers. Assuming that libraries that track subject-level spend generally use thirty or more subjects, they would need to manage more than 660 potentially meaningful accounts if they were to include the other three recommended facets for every subject. Even after removing unused accounts for some

Table 2. Acquisition modes comparison per nature of spending and level of discretion

Acquisition mode	Nature of spending	Level of discretion
Ongoing	automatic	low
AP autoship	automatic	low
Standing orders	automatic	medium
DDA	governed	medium to high
Firm orders	manual	high

cost centers, it would be too cumbersome to maintain the hundreds of remaining accounts.

For more specifics on TCCL's faceted budget structure and an extensive description of the process necessary to transition from a standard two-dimensional budget to a custom faceted budget, consult the implementation guide, which includes sections on (1) choosing of facets and attributes, (2) "translating" past acquisitions expenditures into the faceted format, and (3) operationalizing the schema, including allocating, reporting, and macro-budget forecasting.[27]

The Rewards: Simple, Accurate Tracking of Allocations, Funds Remaining, and Future Needs for Any Facet Combination

This final section demonstrates the powerful new ways that libraries that adopt a fully faceted four-dimensional budget structure are able to: (1) analyze current funding allocations, (2) track discretionary funds remaining in the current fiscal year, and (3) create multi-year funding need forecasts. It returns to the authors' three basic questions, highlighting the improvements in *fund-level* reporting made possible for each due to the faceted 4D model.

Each question is addressed with before-and-after figures depicting the most accurate summary response available from the two-level hierarchical "before" design versus the faceted, four-dimensional "after" design. Each pair represents one of many possible examples of the improved functionality made possible under the faceted 4D schema: its mutually exclusive and collectively exhaustive nature empowers simple manipulation of fund level values with pivot tables and pivot charts to address a multitude of questions. The simplicity and repeatability of these analyses support effective ongoing internal and external communication of budget specifics.

Although libraries with systems that support custom reporting based on *acquisition-level* order records might be able to create somewhat more sophisticated "before" reports than depicted here, those reports depend on fixed
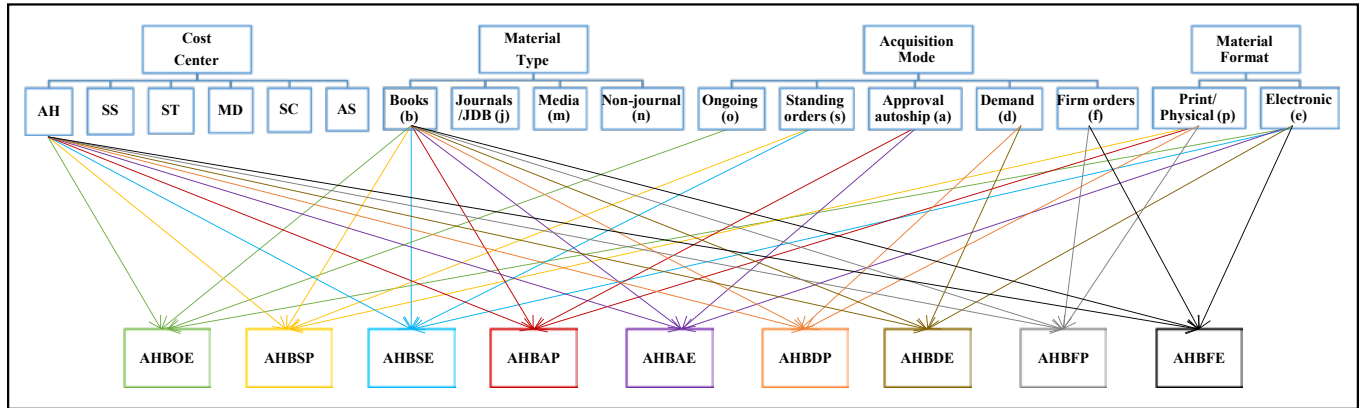
Figure 1. Set of Fund Codes for Books in the Arts and Humanities Cost Center
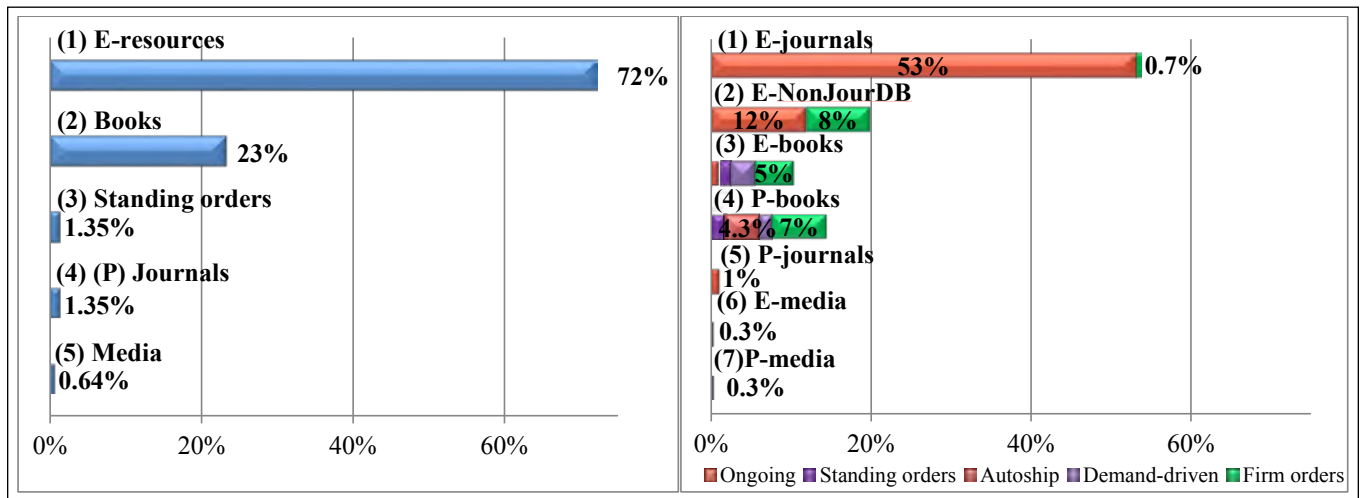

Figure 2. Format Expenditure Report—Before and After

field data that is often incomplete and/or inaccurate, and the resulting synthesis, analysis, and reporting is labor intensive and complex. All the proportions and values shown in the "after" figures are based on combinations of *fund-level* budget or actual totals: no acquisition-level effort is necessary, other than that required to assign each acquisition to the appropriate fund.

On What, Exactly, is the Money being Spent?

This question is subdivided into two more specific allocation-based questions that collectively address three of the four facets. Although examples for the fourth (i.e. cost center) are not included, in practice the authors frequently include it to provide evidence to faculty that the library's spending patterns appropriately reflect each discipline's priorities.

How Much Does the Library Spend on Print Books or Electronic Journals?

This question could not be answered with the "before" fund structure (see figure 2). Print books could not be separated from e-books since both print and e-book firm orders were paid from a book fund. Similarly, e-journal expenditures could not be separated from primary source purchases or e-book package subscriptions as all three categories were paid from the e-resources fund. The only "format by material type" question that could be addressed under the "before" schema was the allocation to print journals. The library budget did not address single-facet material type or format questions such as: how much is being spent on books versus journals? Or, how much is the library spending on print versus e-resources?

Under the "after" 4D budget schema (see figure 2), these questions are easily answered. Each of the material
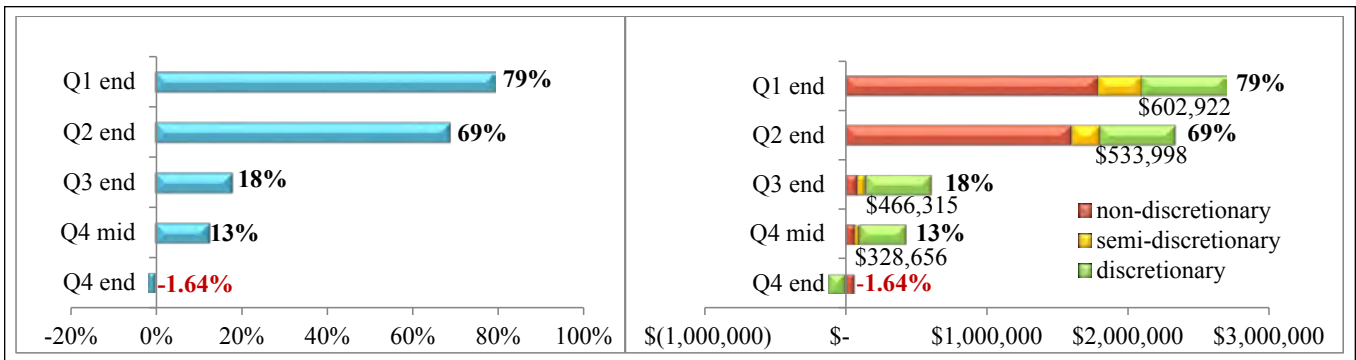
Figure 3. Funds Remaining—Before and After

Figure 4. An Early TCCL Figure Used to Communicate the Inflation Gap Based on Industry Averages of 6 to 8%

types has separate print and electronic funds, so one can easily report that 15 percent of the budget is spent on print books and 54 percent is spent on e-journals. In total, 25 percent is spent on books overall versus 55 percent on journals, and 84 percent is spent on electronic resources (figure 2, bars 1, 2, 3, and 6), leaving just 16 percent for physical resources (figure 2, bars 4, 5, and 7).

How Much Did the Library Spend on Purchases Versus Subscriptions?

Although most subscriptions are included in the

e-resources fund using the old schema, it also included many purchases, so it was not possible to distinguish between amounts spent via these two acquisition modes. Adding the standing order, autoship, demand, and firm order acquisition mode totals (depicted by the purple, orange, yellow, and green portions of each bar) illustrates the proportion of the budget spent on purchases (~33 percent).

How Much Money is Left to Spend this Year?

The primary audience for this question is internal to the

Table 3. Average annual increase percentage per different types of ongoing resources

Ongoing Commitments per MT/MF	% of Total Budget	Annual Expenditure (USD)	% Increase
E-journal subscriptions	58	5,800,000	5.40
Non-journal subscriptions	18	1,800,000	3.05
E-book subscriptions	3	300,000	8.49
Print journal subscriptions	1	100,000	4.08
Average for all ongoing commitments	80	8,000,000	4.97

library. However, it has a direct effect on the ability to meet user demand in a timely manner: the people developing the collection need to track throughout the year how much money is left to be spent on larger purchases by the fiscal close. That is, of course, what budget allocations are designed to do. Answering this question is a simple matter when all of the expenditures within a given fund account are designated for one-time purchases, but when ongoing subscriptions consume a large, unpredictable portion of the allocation, it is impossible to determine how much is available for discretionary spending until all subscription payments have been made. This uncertainty, which is unavoidable in two-dimensional subject x content type "before" budgets, causes the proportion of discretionary dollars in every "multiple acquisition mode" fund to be obscured until all no- and low-discretion (subscription, standing orders, etc.) orders have been paid.

With the "before" budget structure (see figure 3), knowing how much has been spent during the first three quarters of the fiscal year does not provide information regarding how much discretionary funding is left to spend because an unknown portion of the remainder is still committed to non-discretionary spending. Since the majority of subscriptions are not paid until Q3, the "before" answers to "How much (one-time purchase) money is left to spend this year?" were: [Q1 and Q2]: We really have no idea. [Q3]: We have some idea, but still cannot be sure. [Mid Q4]: Now we know, but only one month is left to spend it!

In contrast, adding the *acquisition mode* facet of the "after" budget allows separation of estimated discretionary purchasing from ongoing commitments at all levels of focus at the start of the fiscal year (see figure 3, "after," green portion of bars). This allows libraries to track discretionary balances throughout the year, enabling them to make major purchases whenever optimal, based on clear intelligence regarding the amount of discretionary funding still available. As with all budget allocations, the values sequestered for ongoing commitments are estimates, while historical annual increase data from well-defined groups of resources organized under the faceted budget schema provide best estimates and a track record of their level of accuracy.

With this schema, the response to the question "how much money is left to spend this year?" is much more robust regardless of when it is asked: non-discretionary allocations are designed to be spent entirely automatically. While the library still has to address fluctuations in the predicted increases in subscription cost, calculating that prediction as close as possible in advance applying the new structure limits uncertainty to a minimum.

How Much Money Will be Needed in Future Years?

The two-dimensional budget structure did not support forecasting. Furthermore, its mixed acquisition mode funds created conditions that obscured the extent to which e-journal subscription inflation was squeezing out book purchase funds. In addition, TCCL faced two years of budget cuts, which turned slow deterioration into a full-blown crisis. The "before" budget structure left library administration unable to make a case based on past spending patterns: the case for restoring and increasing the materials budget was constructed from historical industry averages (see figure 4). The resulting "open jaw" attracted immediate attention, although it could not realistically answer the fundamental question: how much will be needed to maintain purchasing power for the *local* collection in the future? In fact, using historical industry averages to create a purchase index put the library at risk of asking for more funding than needed because the actual local increases were somewhat lower (see table 3) and the proportion of the budget related to each was unclear.

In contrast, the four-dimensional budget structure supports detailed analysis of cost increases based on the specific underlying resources in the library's collection. With this "after" budget structure, differential inflation rates for specific groups of materials are easy to calculate. Fund-level analysis showed that the overall annual increase across the range of subscription types varied from 3 to 8.5 percent (see table 3). These data are based on a line-by-line review that determined the appropriate percent increase for each resource based on historical data and current multiyear contracts. The dollar amounts were altered for confidentiality; however, the percentage increases and the proportion of the whole pertaining to each category are accurate. Subscription prices of e-journals increased
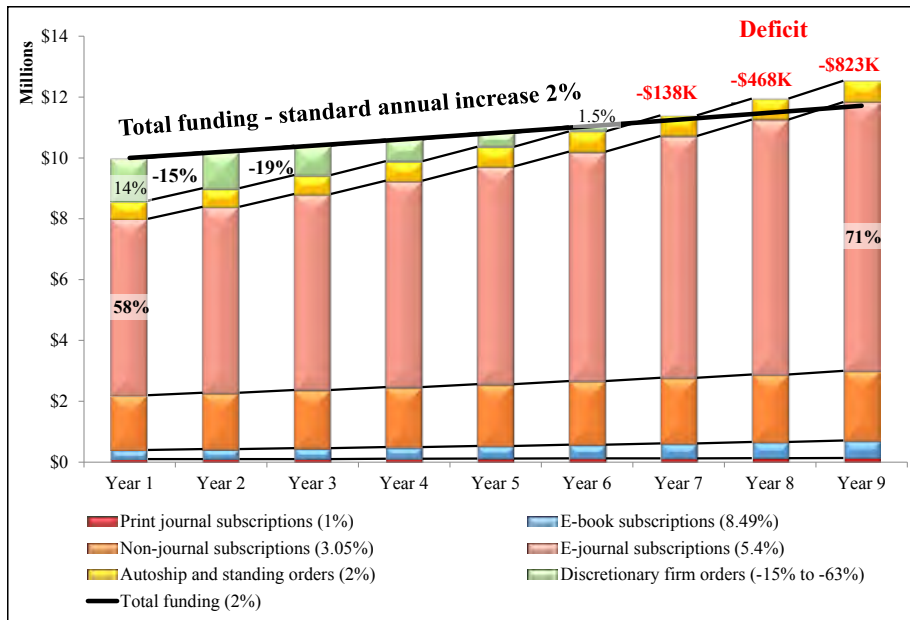
Figure 5. Forecast of the Impact of Inflation on Discretionary Funding under a 2% Annual Funding Increase Scenario
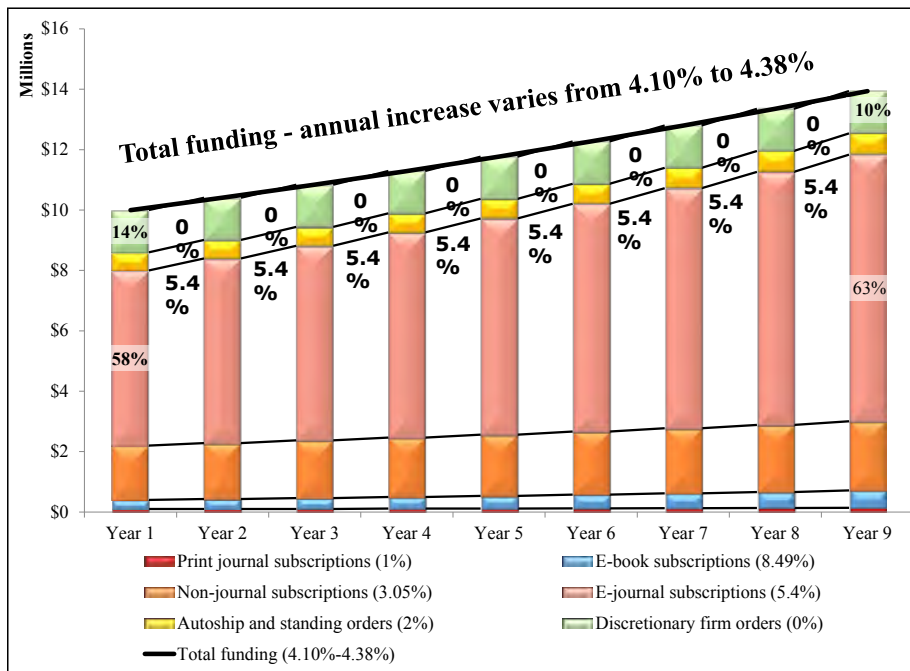

Figure 6. Forecast of the Funding Necessary to Maintain Local Spending Power

These locally derived increase percentages were then combined with the percentage of the total budget spent on each category to forecast the impact of local inflation on future spending power (see figures 5 and 6). Assuming a 2 percent annual increase in materials budget funding, this analysis demonstrates the sizable negative impact of materials inflation on future discretionary purchasing. If current subscriptions are maintained, the discretionary portion of the budget in year one (14 percent) shrinks dramatically in years two through six and is completely gone by year seven.

Using these same underlying data to address the question at hand, overall budget increases needed to maintain discretionary spending into the future can be projected (see figure 6). All non-discretionary and semi-discretionary resources are renewed by applying their respective overall increases annually. In this scenario, funding for discretionary purchases (in green) is maintained by keeping the dollar amount flat, although this does not account for inflation in the per unit cost of firm orders. The inflation rate of each group leads to a change in its overall proportion of the budget, as exemplified by e-journal subscriptions growing from 58 to 63 percent of the total budget over the span of nine years, while the proportion of firm order funding shrinks from 14 to 10 percent over the same time period.

It is important to emphasize that the annual funding increases represented by the top line (see figure 6) were derived by applying the appropriate increase to each acquisition mode/material type/material format combination, taking into account its relative proportion of the total bud-

faster than non-journal subscriptions (e.g., primary source subscriptions and hosting fees, etc.). Similarly, large e-book subscriptions created added inflation pressure, while print journal increases were more moderate.

get expenditure. Here is the answer to the final question: TCCL needs an increase of 4.10 to 4.38 percent annually to maintain purchasing power. It is one thing to claim consistently that more materials funding is needed, and it is

another to present compelling, data-rich figures and tables to support those claims specifically and accurately. The ability to project future needs in this way has served the library's users extremely well by gaining the support of The Claremont Colleges administration and faculty.

Conclusion

In a time of greater scarcity than academic libraries have previously experienced, and when there is a growing expectation for immediate access to the burgeoning universe of increasingly discoverable content, it is crucial to manage library acquisitions budgets as well as possible. Budgets must excel in their support for planning, monitoring, communication, and advocacy, empowering libraries to optimize where and how these limited funds are spent. Yet few academic library acquisitions budget structures meet this standard. They cannot support these basic budget functions because they have not kept pace with the increasing variety of resources and the new ways that libraries acquire them.

Steady growth in the number and variety of e-resource acquisitions *has* forced some incremental adjustment to the prevailing budget structures of the previous century. However, content and price model complexity has increased to where the incremental strategy of adding additional categories to the typical two-dimensional budget is failing. Most current library budget structures cannot support accurate, efficient, and effective answers to basic budget questions, especially in the new environment where e-resources are the majority.

Thus significant budget restructuring is needed. The authors believe that twenty-first-century budgets must be designed as multi-dimensional models that employ fully faceted classification schemas. This paper focuses on a four-dimensional structure that has been used at a mid-size

academic library for six years. Although the appropriate attributes and their combinations will differ for each library, these four facets (cost center, material type, acquisition mode, and material format) should be both necessary and sufficient for most academic libraries. Furthermore, the faceted structure can be easily tailored to support any academic library's unique situation. A detailed practical implementation guide is provided by the authors as a separate publication to describe the process used to transform our budget to make it easier for others to redesign their own.

Sample figures produced from the restructured budget and created for librarian, faculty, and university administrator audiences provide examples of the efficacy of the new structure. These figures and tables provide ready examples of answers that elucidate how library funds are spent, predict end of year actuals throughout the year, and demonstrate the effect of the current budget scenario on future library purchasing power. Because effective command over and communication of these factors is becoming fundamental requirements for good stewardship of library resources, this paper posits that the majority of academic libraries should restructure their budgets to include the facets and functionality described herein.

In conclusion, one can identify a number of outcomes supported by a fully faceted budget structure: it clarifies the library's stewardship of institutional resources; it facilitates both internal and external communication and advocacy; it provides for greater ongoing control of the spending throughout the year; it establishes a structure for the annual allocation process, allowing for greater transparency in decision-making; and it supports long-term planning and incorporation of strategic directions into the budget. The authors believe these outcomes provide powerful justification for multi-dimensional fully faceted budget redesign as well as any organizational changes that might need to go along with it.

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