

**KIC Your Way to Better Customer-Friendly Business Practices:  
Paperless Duplication in an Academic Library**

Jim Nance

Samuel S. Richardson

Richard Saunders

Paul Meek Library  
University of Tennessee at Martin

## Abstract

*The Knowledge Imaging Center (KIC) II is an effective library photocopier replacement for the early twenty-first century. It provides users an eco-friendly alternative for capture and delivery without paper, reducing costs during times of budget constraints. Here are some key points from our adoption of the machine:*

- *initial outlay of about \$22,000; fits within the library's copier-replacement cycle*
- *paperless imaging provides a "green" option/alternative to on-site self-service photocopying (our first-year reduction amounted to a little more than a hundred reams: \$400 in direct paper costs—but about a quarter ton of paper waste)*
- *no user training needed (ours is installed as a walk-up service option)*
- *may be harness-wired for cost-recovery*
- *mechanically simple—two belts and one exactly moving part—reducing likelihood of repairs or down-time*
- *easily integrated into inter-library loan workflow without generating printed copies*
- *ease-of-use can provide off-site students direct access to material in the circulating collection*

*University libraries have endeavored to be on the forefront of providing students simpler ways of reproducing and delivering photocopies of professional and popular literature. With ever-evolving technology, decreasing budgets, and a need to be more eco-friendly combine to demand libraries provide more and better duplication options for students and faculty. An option that the Paul Meek Library turned to was the Knowledge Imaging Center II (KIC) system. The KIC allows the user to scan and digitize any hard copy and save it to a USB file or send it to a personal email. It uses a standard BookEye 2 planetary scanner with specially designed software that allows the scanner to function at about the same level as a self-service photocopier. Its oversize table provides a scalable imaging area four times the size of a typical photocopier, which lets the machine be a one-size-fits-most: large enough to accommodate bound oversize items and can also do small items as well.*

*Unlike a photocopier or other glass-platen scanners, the planetary scanner connected to the KIC allows the user to photocopy a book face up, without the spine being squashed against a copier platen, lessening the chance of damage and decreasing overall book-repair costs. While a photocopier or scanner is focused only on the surface of the platen, a planetary scanner exploits depth-of-field resolution due to a longer focal length, so that despite the page curve of an open book, everything is in focus. Also, whereas copiers have moving parts that break down, requiring high maintenance cost, the KIC has precisely one moving part.*

*The KIC also reduces costs and is eco-friendly by requiring neither paper nor toner. The technology that has allowed the user to bypass paper output and capture, distribute and use images digitally has been around for a number of years through electronic databases. The KIC has brought it a step further by allowing the user to scan, digitize, and deliver digital copies to a USB device or via email to their personal computer. Most other planetary scanners that tend to be produced for technical work settings where operators are specially trained, making the equipment unsuitable for untrained users. Conversely, the KIC is very simple to operate, specifically designed for public, library settings. A touch-screen GUI is user-friendly for self-directed operation.*

## **Introduction of the Organization**

The Paul Meek Library is the main library for the University of Tennessee at Martin and is a key resource for satellite program students in Selmer, Parsons, Jackson, and Ripley, a score of extended campus sites, and dual-credit students across West Tennessee. The University had a 2008 fall-term enrollment of 6,306 FTE students, 84% of which were on-site learners. The Library is a 120,000-square-foot facility featuring an all-night study area with adjacent computer lab, special collections area with exhibit gallery, and a media services area with education/learning resource materials. The collection contains more than 470,000 volumes including 33,000 electronic books, over 7,000 videotapes and DVDs, 1,100 print periodical subscriptions and electronic access to approximately 100 research databases representing an additional 10,000 full-text journals. The Paul Meek Library has a full time staff of twelve librarians and fifteen support personnel, plus student workers. For FY2008–09 the library gate count stood at 338,110 visits, which made 47,369 circulations (books checked out) and approximately 86,500 duplications this year on three photocopiers (more on that later). Over the same year we filled 1,632 inter-library loan (ILL) requests for other institutions, about two-thirds of which are for articles we typically photocopy and fax to the requesting institution or borrower.

## **Statement of the Problem/Initiative**

Photocopies seem to be a foundation of modern bureaucracy. One piece of paper—a class schedule, map of campus, draft letter—can be had so cheaply as to be given no thought. We make it, but then most get thrown away after a few minutes use or until we print another version. Accumulate the costs incident to that convenience and the outlay to provide such service increases rapidly. Is this a *real* cost of doing business, or just what we are used to? For four

decades we have assumed that duplication is critical, but institutions are taking a hard look at budget lines for printing and duplicating equipment toward reducing costs. Paper, toner, service contracts, equipment replacement, all require money up front. Reduce users' reliance on paper and the direct costs for duplication shrinks, not only budget outlays but waste streams are reduced. For most student documents with a short life cycle, committing a copy to paper may be a needless step. The challenge is to have available equipment simple enough that "born digital" becomes attractive enough for documents to *stay* digital and replace paper-based replication without compromising simplicity or accessibility.

Duplication has also become a basic function of modern information literacy in libraries: students duplicating their notes, searchers copying a page or two from a reference work, staff filling interlibrary loan requests, walk-in users making file copies of personal documents. Much of that duplication could be migrated to digital-format only, but most imaging equipment is specialized to one particular function. At a fundamental level a photocopier is an integrated scanner and printer with a limited range of output choices. Except for very high-end color printers, photocopiers remain limited to bitonal (black and white) capture, which is suitable for text but hobbles a very expensive machine's usefulness for any other of the increasingly broad demands for imaging on a campus. A photocopier does one thing very well, but nothing else. The fundamental problem is that the tasks demanded of duplication equipment have changed—the machines haven't.

## **Design**

The Paul Meek Library began looking informally into adding a large-format flatbed scanner to its suite of service equipment in 2007. Based on the Knowledge Imaging Center (KIC)

II system's clear advantages over other equipment, the library's equipment proposal was accepted and funded by the Vice Chancellor for Academic Affairs. The equipment was operational and available to the public toward the end of August, 2008.

The KIC is a turn-key imaging/output system developed by the Digital Library Systems Group (DLSG) that melds three separate tools into a single public-use system: a planetary scanner, control software that regulates the scanner settings and provides file manipulation and external communications, and an Ethernet connection from the machine hardware to the campus servers, allowing images to be sent to any email address or FTP site across the world. Setup and operating the machine required no expertise or investment beyond what was available on campus. We supplied a new Dell computer to DLSG specifications to drive the software (which requires two Ethernet cards), a 21-inch monitor for display, and were required to have a standard 110v outlet and live Ethernet connection at the installation site. The total came to about \$22,000. For an additional \$2.69 we also swapped out two metric bolts attaching the scanner support to the case with harder, automotive-grade replacements, seeing no reason to dump expensive equipment on the floor because of soft steel. An annoying spate of recurrent short-term power outages prompted us to invest in an APC Smart-UPS SUA-750 uninterruptible power supply. With it we avoid having to constantly restart the electronics (another \$300). Despite the up-front investment the KIC has clearly proven its worth across a broad range of potential uses—even some not considered when we thought about buying one.

### **Implementation**

In August 2008 the Library acquired the component-based KIC II system and installed it as publicly accessible service equipment in the library Reference area. It occupies about the same floor space as a standard photocopier and can be operated by most people without help.

The initial outlay (totaling about \$22,000, for scanner, case, computer with extra Ethernet card, touch-screen, cordless keyboard and mouse) is offset by recurring reductions in direct cost for paper, toner, and maintenance and replacement (15–17 years opposed to 3–5 years). It will accept a wiring harness for most coin-operated and card-swipe systems, like CBORD. We opted to have it accessible free of charge; since it costs nothing to reproduce an image using the KIC, no expense is passed on to student or community users. They like that.



## **Benefits**

Universities have struggled for years to reduce incidental costs to students. In a climate of budget constraint, the KIC reduces long term duplicating costs when compared to photocopiers. The KIC system is simple and robust, designed specifically for public-access library settings and user bases. It is built around the principle of user independence: unmediated,

self-directed walk-up use. We have found it works quite well for a host of library-support activities as well. There are over 100 KIC installations in libraries across the country, mostly at research institutions or law schools. UTM is the smallest institution and is thus far the only Carnegie (M) library to have one. Even so, after a year we have decided that institution or library size doesn't matter—it is still worth having.

The equipment has a bed and imaging area to capture material with dimensions up to 17x24 inches, including flat sheets, bound volumes, and even small 3D objects. The overhead (“planetary”) imaging arrangement allows an image from a magazine or bound volume to be visually “flattened” digitally, so that page curve is almost eliminated from all but the tightest bound items without damage. Files can be captured in 8-bit greyscale, 24-bit colour, and bitonal (black and white) formats at resolutions between 100 and 600dpi, and then output as JPEG, TIFF, PDF, and PNG formats. The software allows individual images to be cropped, adjusted and reordered via a touch-screen, which requires no typing or coding skills to operate. A capability of the newest machines (not ours) allows text to be captured, the file passed through an OCR/.wav function, and output digitally as a spoken audio file—it reads aloud: think, “visually impaired students.”

Most of the use among students has been for duplicating things like class notes, course-reserve material, and research-support pages from printed material. Students also capture and integrate graphics from professional or popular literature directly into class presentations/ papers. They capture schoolwork for electronic portfolios. They send document images to administrative agencies and application material to other schools and prospective employers. Just about any use to which a duplicate might be put, we have seen it done on the KIC machine—but do not throw away wasted copies, do not need to clear jammed paper, do not swap toner cartridges. In fact, the

machine has not been “out of order” at all during the year, something that cannot be said of even our newest photocopiers.

A major cost to libraries incidental to having photocopiers available is book repair resulting from users squashing the binding of a book against a copier or scanner platen. The planetary arrangement of the integrated BookEye 2 scanner allows items to be lit and duplicated face up. The planetary arrangement exploits a long focal length for increased depth-of-field resolution, so that despite the complex curves across the page of an open book, everything remains in focus. Damage to the circulating and reference book collections have lessened by a few percentage points since the machine has been available.

Lacking the funds to invest in several separate pieces of specialized imaging equipment, the KIC’s versatility makes it ideal for a small institution needing a single device usable for more than one or two tasks. Other than just routine copying things for students, here are some of the uses to which the machine has been put in the past year:

*Public-use duplication* The library retains photocopiers for user convenience, but the KIC has clearly become the duplicating option of choice. Having a digital-output machine for free sitting beside a coin/card photocopier that charges 10-cents a copy certainly has been one reason for its popularity. The free duplication option has cut into cost recovery through the photocopiers, but in addition to direct cost saving for supplies, library-patron frustration from jammed or out-of-service machines has lessened appreciably, and the good-will with students already paying heavily for campus resources cannot be calculated. The large-format table (17x24 inches) has allowed community members to duplicate large family photographs, students to capture maps and atlas pages, and faculty to post large tables and computer print-outs for colleagues half a world away.

*Waste-stream reduction* The KIC provides a “green” option/alternative to on-site self-service photocopying, reducing library paper consumption and the footprint left by the institution in its waste stream. In the calendar year ending 31 August 2009 the machine made 51,144 images—but the other three machines *together* pumped out around 86,000 copies. Average the number and it clear that the KIC has already become the duplication option of choice for students and other library users. If the KIC use figures were translated into standard photocopier-ese it would amount to having saved us an estimated five service calls, two toner cartridges, and over a hundred reams of paper: around \$400 in direct paper costs but representing more than a quarter-ton of paper waste.

*Smooths ILL fulfillment* Inter-library loan (ILL) fulfillment can be simplified and expedited by reducing the number of steps involved in supplying articles and chapters requested by cooperating institutions. Previously, the ILL office printed a received request, pulled a volume and made a photocopy, faxed the copy to the ARIEL software, and then transmitted the file. The KIC allows us to print a received request, pull the volume, and send a PDF file direct to the requesting institution without a time lag between steps (loaned books still ship). Not only do the images tend to be better quality, but we can also offer the option of capturing in color, which is frequently important for illustrated works.

Beyond traditional ILL function, we can now also offer our distance-education students access to material in from the collection without it leaving the building since KIC provides a workable access platform for off-site students’ use of material from the library’s circulating collection. Users check the catalogue for relevant titles then request a title page and table of contents or index. A volume is pulled and the file sent direct to the student. With the contents in hand they can then pick chapters, which are scanned and sent direct to their email with a note

that the files may not be shared with other students. Since such requests can be filed only by UTM students, are supplied from material only in our collection, and goes direct to the student in response to their schoolwork, the process falls within the procedural limits implied in 17 USC 108 (Copyright) and applicable case law.

*Digital imaging projects* Since the software converts digital images directly to multipage PDF files, we were able to pursue digital initiatives that were once simply impossible or too expensive for an institution our size. The two common image-delivery software, ContentDM and DigitalCommons, each required annual subscription costs equal to the cost of the machine itself, but the KIC allows us to capture files in the final-use format in one neat digital package. Separate image files do not have to be linked to organize and retrieve data. Technical investment and staff time required to create metadata for individual image files was eliminated entirely. We can compile Web-based delivery in straightforward HTML coding, which can be handled by student workers. The same process has worked so well for capturing and delivering digital files that even Special Collections can include its holdings in our digital collections. The campus yearbooks are now publicly available to alumni anywhere in the world. The result is accessible on a Web site: (<http://www.utm.edu/yearbooks>). We plan to add a variety of important nineteenth century documents and several rare or fragile books in the collection to a similar resource, without having to use expensive software like ContentDM in the process.

The KIC II has been a benefit to library and university departments, not only to the students that use it. A use summary almost seems to be advertising; we are that pleased.

#### *Conformable*

- Eminently green alternative for library photocopier replacement—clears the waste stream

- May be harness-wired for cost-recovery card or coin operation, or to a dedicated or networked printer (ours may be used at no cost by any on-site patron, a great point of community resource and outreach)

#### *Self contained*

- With the exception of power and an Ethernet connection, the unit is self-contained. Image capture, correction, and output is on the same unit
- There are two belts and one exactly moving part in the entire machine. The solid-state, optical, and processing components do not wear or require the type of preventive-maintenance service that photocopiers do. Since the output is image files rather than a physical medium, there is no paper path to clear, toner to fill, or fusers to burn out

#### *Shorten workflows*

- Has been integrated into ILL workflow with or without generating printed copies for filling requests.
- Ideally suited to allow off-site and distance-education students direct access to material in the circulating collection

#### *Reduced material damage*

- Planetary positioning and an image-correction algorithm allows an image from a bound item to be “flattened” digitally, which prevents spine damage incident to photocopying
- Light much less intense than photocopier or flatbed scanner, less damaging to fugitive inks present on delicate historic items

#### *Flexible*

- Large-format capture in colour or grey-scale at varying resolutions to 600dpi. Generates a variety of common digital formats as single or multi-page files

- Scalable imaging area lets the machine be one-size-fits-most: large enough to accommodate bound oversize items, can do small items as well
- Not limited to 8-1/2x11 output

### **Retrospect**

After reflecting on the purchase, the staff has concluded we would do nothing differently. The KIC has proven successful beyond expectations. Yes, it is expensive—about the same as a really good photocopier or a couple cheap ones. Still, we are satisfied. The professional staff, students, and University faculty have decided that the Knowledge Imaging Center II lives up to its promise.