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The Creation, Care, and Feeding of a Knowledge Base: Practical Advice

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Abstract: Over the past dozen years, the Computing Support Center on the Bloomington campus of Indiana University has grown a knowledge base that is a key component in the support strategy at IU. In this paper we share some of what we’ve learned about the hows, whats, and whys involved. The intention is to provide some practical information that can assist those who are just beginning the process of building a similar tool or who are looking for ways to improve what they currently have.
Introduction

There has been a growing interest in how knowledge bases can contribute to providing better and more cost-efficient IT support in both schools and businesses. And while we may not yet have consensus on a metric to support a cost/benefit analysis, the intuitive benefits seem to be clear.

A knowledge base:

- Can make it possible for people to help themselves rather than having to use more expensive human resources
- Can be made available around the clock, 24/7/365
- Can make information available for reuse for different purposes by different units or departments – reusable intellectual property
- Can function as a repository of information about legacy systems that new support staff have never experienced – an institutional memory.
- Can capture the knowledge that people possess before they move on to the next job
- Can provide a consultant with the collective expertise of a whole community of Subject Matter Experts
- May help reduce those long queues on the phone line or in your walk-in facility
- And if it doesn’t reduce the number of direct contacts you get at your help desk, a greater percentage of those contacts will be for problems that really require expert help

Definite benefits have been realized at Indiana University. The Knowledge Base at Indiana University has proven itself to be a key asset for its users. It has received recognition from the national media and garnered awards from the Society for Technical Communication, the Association for Telecommunications Professionals in Higher Education, and Educause.

Because we’ve enjoyed success with our Knowledge Base at Indiana University, we’ve been asked lots of questions. We appreciate the opportunity to share some of what we’ve learned in the last ten years about the creation, care, and feeding of a knowledge base.
The presentation begins with a brief description of the Knowledge Base, its origins, and its use. Following this, we will address a host of common questions. The discussion is organized under four headings that represent the logical sequencing of tasks associated with information management: identification of content, collection of information, dissemination to users, and maintenance.

**A brief description of the IU Knowledge Base**

The IU Knowledge Base is a tool used to share information about computing and information technology as used by students, faculty, and staff at IU. It contains more than 6,700 documents. Most of these documents are in question/answer format, with an average length of two screens. There are more than 24,000 cross references among documents within the KB (about four per document) and more than 4,600 links to resources outside the KB. Access is provided using a search engine at [http://kb.indiana.edu/](http://kb.indiana.edu/). Approximately 10% of KB documents are also available through a menu interface at [http://kb.indiana.edu/menu/](http://kb.indiana.edu/menu/). A new interface that combines new search capabilities and a comprehensive menu interface is nearly complete and should be available next year.

**Origins and Use of the Knowledge Base at IU**

The KB was created in the late 1980s as a consultant tool in the Computing Support Center on the Bloomington campus of Indiana University. The Support Center was, and remains, the front door for help with information technology on the IUB campus. The original content of the KB came from a set of answers that consultants wrote in response to questions received by e-mail. The answers were saved and organized as files that could be inserted into e-mail messages sent as responses to similar questions from other users. The benefit to the consultants who composed and saved the information was obvious and immediate. Inserting a previously saved text was much easier and quicker than rewriting the same information over and over.

A realization quickly emerged that other consultants would benefit if they had easy access to this information. “Easy” meant a computer-
based searchable database, not another printed document to join the
materials already waiting on overflowing bookshelves and stuffed in
file drawers.

Funding was provided to pursue a solution. Options were few and the
original efforts less than satisfying. Then, with the advent of gopher,
a door opened and we ran through. Now our consultants had easy
access to all those answers to questions that our users were asking
by using a simple search box. And, of course, the user population
had access to gopher as well, so it was a short step to transform what
originated as a consultant tool into a self-help tool as well. The
advent of the World Wide Web made possible better interfaces, and
made for easier access and management. At this point, senior
management made a major long-term commitment to growing this
tool. Over the years, content and functionality were added and a good
tool became a great tool.

The Knowledge Base is still used as a key consultant tool within its
original home, the Computing Support Center, but it has essentially
become a self-help tool for the end user. The Knowledge Base also
functions now as a tool used by many other units within University
Information Technology Services to help those whom they serve,
e.g., the Education Program, Security, Messaging, Network
Operations, Web Technologies, Policies Office, the Office of Planning
and Communications, Database Management Services, and
Departmental Support. In addition, it supports new initiatives like IU’s
distributed learning application (Oncourse) and tutorials licensed from
NETg. Today, the KB serves users on all eight Indiana University
campuses, a population over 100,000.

We think some important aspects of our experience are related to our
success:

- The IU KB began as a grassroots effort.
- The people responsible for creating it were the immediate
  beneficiaries.
- Content was directly related to user questions.
- It began within a group that already had a culture of sharing.
• Senior management supported the effort very early in the process.

The following are offered as suggestions that flow from our experience:

• Starting small allows you to iron out the problems that would be unmanageable in a larger initiative.
• Look for people who are already sharing information. They understand the core principle upon which a knowledge base must be built: sharing.
• Offer to help them by providing tools to make what they already do easier. Choosing the right tools is easy, compared to changing a work culture based on hoarding information or hostility.
• Pay attention to current work practices, and try to integrate the new procedures into what is already familiar.
• Make sure the people who do the work experience the benefit immediately.
• Be ready to offer support at the right time.
• Be careful. Multiple grassroots KBs can develop. Integrating across units takes leadership and a clear directive.

The importance of overcoming obstacles to sharing cannot be overstated. It is easy to unwittingly support the opposite.

About collecting content

Where do you go for content?

It’s already been mentioned that the place to start is with the person already sharing information. This is the person who can benefit immediately from a knowledge base. This is also the person who knows what users want to know and how to explain it.
The next people to approach are Subject Matter Experts. These are the people who are constantly fending off interruptions while they try to apply their knowledge to tasks that require their unique expertise.

Finally, you need to identify communication channels that can be monitored: change management minutes, distribution lists, workgroup meetings, etc. If these information sources don't exist, they have to be created. Solicit feedback from those who use the KB. Watch the Web logs for your KB site to see what people are looking for.

Notice the assumption that most of the information will be provided by experts outside the team that is managing the knowledge base. Another approach is to hire technical experts, whose job it is to research and write the documents from scratch. This approach has several shortcomings. It severely limits the breadth of coverage; also, only a limited number of documents can be made available.

In the approach used at IU, everyone contributes to the process according to their specific expertise. The Subject Matter Experts are not expected to produce a finished document, or even a draft. They are only expected to make the KB team aware of the need for documentation and provide the basic accurate content. Skilled writers produce the document, which is then reviewed by a content expert.

How can you overcome the resistance to sharing information?

In the academic environment, hoarding of information is less of a problem than is lack of time. The people who have the information are busy doing their jobs, and they are not anxious to add the additional role of information provider for the knowledge base to their job description. For information collection to be successful, these information providers have to see the benefit to themselves. Their jobs have to become easier because they’ve contributed.

Acknowledge that additional work is being required, but don’t apologize. The message should not be, “Please help us build a knowledge base”, but “We’re here to help you do your job.” The ultimate goal is to cultivate the understanding that the knowledge
base is a service for the information provider as well as for the customer.

Following are some specific things you can do. All have as their objective to make sure that the people who are contributing information see the benefit to themselves and their users, and to make sure that their participation requires as little additional effort as possible.

- Learn about the way people currently work, and integrate your tool for collecting information into the normal workflow. For instance, consultants need a way to capture information for the knowledge base right in the midst of helping a customer. The trouble tracking tools used at IU allow us to capture and manage this information easily.
- Provide templates to assist them in providing information.
- Be flexible. Provide multiple means for people to submit information (e.g., e-mail, phone, Web forms, distribution lists, face-to-face meetings).
- Get submission into the KB in a timely manner. Not only are people waiting for access to the information, the delay can kill the motivation to those who contribute information. At IU, the time from submission of a document to availability in the KB is less than a week.
- Let people know what’s happening with the information they’ve submitted.
- Provide a way for priority information to be made available immediately.
- Don’t recruit information providers without going through the manager. This should be a negotiation. “We’ll provide you with this kind of service, you will manage the process on your side, making sure we get the information.”
- Provide managers with reports detailing the KB work done by their team.
- Use both formal and informal lines of communication with information providers. Get to know the people involved and get a feel for the constraints and pressures associated with their jobs.
About making content available

Where is the KB available?

The Web is, of course, the key vehicle. We do not make the KB available on CDs, because we would no longer have the ability to update it. The computing environment is so dynamic that having CDs floating around would ensure that people would access incorrect/old information. For the same reason, we encourage other units and institutions to point to information in the IU Knowledge Base, rather than copying it. It’s disconcerting to know that there are documents out there bearing our name, as the copyright requires, that may very well contain errors that have long since been revised and updated in the Knowledge Base itself.

The text search and menu interface on the Web were mentioned earlier. We are exploring two other vehicles a well. In IU’s online distributed learning application, Oncourse, we’ve provided a menu and search box tool restricted to documents related to this specific application. http://oncourse.iupui.edu/help/kbdocs.html

In the case of our Web-mail application, KB documents function as the actual help system within the application.

Two other growing uses of the KB are the inclusion of links to KB documents within e-mail, and printed documents. For instance, when our security team announces the arrival of a new virus on our campus, they typically point to articles in the KB that describe the virus more fully and guide the user through the process of removing it. Links to KB documents function as a kind of shorthand.

Providing access to KB documents inside online applications and as links in e-mail announcements is a way to deliver content right at the point it’s needed.

What else is done to enhance accessibility?

- The KB is reliable. The KB is twinned on two Sun UltraSparc servers running Solaris 5.6. The machines are backed up daily.
Our editing environment resides on a Sun Enterprise 250 with a RAID array.

• Searches are very fast. The index of documents and all the documents themselves are cached. This is important, since documents are built from several elements that reside in different tables and files.
• Hidden terms have been associated with documents to assure that users can find what they want, even if they don’t use the right term. There are over 65,000 of these, an average of 12 per document.
• The KB orders search returns to place the most likely documents first in the return list.
• The documents in the IU KB are cross-referenced to related texts within the KB. There are 25,000 cross-references.
• Because the KB serves seven campuses and contains lots of campus-specific information, the KB is designed so that, by default, documents specific to a campus are only returned to searches originating on that campus. Entire documents and parts of documents can be manipulated in this way.
• The IU KB also functions as a portal to 5,000 links outside the KB.
• Clarity, accuracy, consistent formatting, and predictability all contribute to readability and make the information more accessible. KB editors have created an extensive Style Guide and use a UITS-wide Standard Terms List to support this effort.
• Accuracy is achieved through review by content experts and at least three sets of editor eyes in the peer review process.

About Maintenance

What process is used to keep documents updated?

Our goal is to review every document every year. At this time, the average time since last revision across documents is 67 weeks.

Documents come up for review in several ways.

• Consultants in the Support Center suggest revisions when they encounter problems during the normal course of their work.
• Users contact us using a form available on the Web or by writing directly to us. Information providers do this as well.
• When KB editors become aware of changes to systems and services (through monitoring newsgroups, meetings, change management reports, etc.), they will search the KB to identify documents that will require revision.
• In addition to all these, we have a program that calculates a value for each document, based on the number of times it’s been accessed and the length of time since it was last reviewed. Using this value to identify those documents most in need of review, editors usher a specified number of these through the review process each week.
• The process is supported by meta-information that is associated with each document. This includes date of creation, last modification, last verification by an expert, author, resource person to contact, etc. In addition, various statuses are assigned to documents, indicating the stability of the information (the “dir” command in DOS is not likely to change anytime soon, for example), and the relative need for review (“awful” means the information is correct, but the writing stinks). There may also be an expired date set for a document that will force it onto our to-do list at a specific time.

Last year over 5,000 revisions were made to existing documents. This year we are on an even faster pace.

As mentioned previously, there are approximately 5,000 links to pages outside the KB. A link check runs weekly and three editors review the output and make any necessary repairs.

Another weekly task related to improving the KB is the analysis of searches that do not return any hits. These goose-eggs, as we call them, suggest documents that need to be written, or needed revisions to existing documents that will make them easier to find.

How do you know if you’re doing a good job?

This is the ultimate maintenance question, and we do devote some effort to answering it.
We’ve conducted extensive usability tests in the past. These revealed some problems that we’ve addressed. We are strongly committed to usability testing and more is planned for next year. (Our weekly analysis of the search logs is directly related to usability.)

Surveys are done as well. A few questions about the KB are part of a yearly survey conducted for University Information Technology Services. We also contact several users each week with a three-question survey. A longer survey has been constructed and will have been distributed to 2,000 users by October of this year.

Last semester, we partnered with a graduate student in Information Systems Technology in an effort to define some new tools to measure how well we’re doing our job. This student is doing an evaluation of the IU KB as his dissertation. He’s conducted interviews with a variety of stakeholders, both inside and outside UITS. He also conducted a focus group with users. The extended survey mentioned above was constructed as a result of his study.

Our participation in various competitions has also let us know how we stack up along certain dimensions.

Also, we track a number of quantitative measures related to usage and maintenance, some of which have been discussed here.

**Conclusion**

The IU Knowledge Base has developed over a period of a dozen years. While it is probably much larger and more elaborate than the proverbial 20% that will meet 80% of your needs, we hope our experience will be useful to you. The basic lessons have been:

- A knowledge base is less a matter selecting tools than it is a matter of building a culture.
- Creating a knowledge base is not a single act of creation. It is an ongoing creation. Prepare for this at the outset.
- Don’t go it alone. Enlist the people already doing the job on a smaller scale.
- Formal and informal partnerships are a must if your KB is going to reach any size.
• Identify the key content. It’s probably less than you think.