

Data Management

Connie Cleary and Mike Bohlmann

Connie Cleary is the associate director at the Office of Technology Management for the Chicago campus of the University of Illinois. Mike Bohlmann is the manager of information systems for the Offices of Technology Management on both the Chicago and Urbana-Champaign campuses of the University of Illinois.

Introduction

How do you store, track, and retrieve all the information that comes into and goes out of a technology transfer office? What information is critical to the proper functioning of the office and the business operation? What information should you store and track, and what information is a noncritical piece to the operation of the office? What technology transfer processes are managed by the system? These are some of the questions you will be asking yourself as you embark on your journey to find the best data management system to fit your particular needs.

This chapter looks at the process and examines what is needed to have the most accurate and timely information available to the staff in a technology transfer operation so that they can make intelligent decisions.

Finally, no matter how small or large an office, best practices should be maintained for all. It is a must to define realistic, attainable goals for the office and then prioritize those goals. The focus of this chapter will be to provide guidelines for good data management for technology transfer offices

Getting Started

Offices vary in size, and many staff members fill multiple roles within the operational structure of the technology transfer process. It will be a time-consuming process to identify and create a solution to manage your data, so it is important to have buy-in from your end-users that a new solution is necessary. Having the buy-in from your end-users will make it easier to make them a part of the process to identify and implement a data man-

agement system. If the end-users cannot see how the new system will benefit them directly in their jobs, they will be resistant to the migration process and using the final product. Making success out of a project with little support and enthusiasm from the end-users will be difficult or even impossible. This is not a one-person process, and it will take many months or even years to accomplish.

The biggest factor for most offices in choosing a new system to manage their data is the budget. Data management systems for technology transfer offices vary in price from free to hundreds of thousands of dollars. So, before your staff falls in love with a product, you should determine how much money you have to spend. Most vendors are willing to give a ballpark figure for how much their system will cost to purchase, implement, and maintain. However, before you ask for a preliminary approval on a budget for the project, add at least 50 percent more to that cost. Until you are able to speak with vendors at length about your wants and needs, they will not be able to give you a fully accurate price, and, rather than risk pricing themselves out of the process, vendors are likely to give a ballpark figure that is actually lower than what they expect the project could potentially cost. Most systems available will also require a recurring annual cost, so be sure to include that cost in your office budget.

Once you have the budget for your project established, you can move on to identifying the exact needs for your project's success.

System Acquisition and Migration

Solicit the help of information technology (IT) personnel at your institution, and ask that they serve on a committee to assist in the data management requirements and organization of the office. This is especially important if there are budget constraints limiting your ability to purchase a commercial data management system. Information management personnel can assist in deciding how robust a system your office requires and if you can design a homegrown version that serves your purpose. These professionals are especially important in providing input in areas of compatibility, university or institution system requirements, conversion of legacy systems, and security requirements. Together with business professionals, the goals of the office can be defined and reviewed.

Most technology transfer operations need to track the disclosures they receive, the patent applications they manage, the agreements they make, the contacts they have, and the flow of money related to the patents and agreements they manage. If you already have processes and procedures defined for disclosures, patents, agreements, contact management, and finance, you can more easily identify the key needs for a system to manage that information.

The organization's technology transfer office likely has at least one person who is an expert in each of these areas. It is vital to involve these experts in identifying and evaluating your choice of systems. Each should spend some hands-on time with the system you are evaluating to determine whether it will meet the needs of the office. If you are building a system from scratch, these same experts should work with the developers to determine the requirements of the software.

Your functional-area experts will be vital as well if you wish to use this opportunity to clean up data before migrating it into the new system. These experts will likely already know what weaknesses exist in your system, and they can help identify what problems exist that would be good candidates to clean up before migration. Some problems may be more easily solved by the new system, especially if the new system is based on a more advanced database.

Many commercial applications are available in several price ranges to accommodate each technology transfer operation, from the smallest to the largest. It is vital that you very carefully evaluate each of these programs in areas such as user friendliness; ability to grow with the office; stability of the software; price add ons; and reliability of the vendor to provide services such as support, conversion, and customization. Frequently, the cost to license a piece of software may be initially small, but other costs, such as conversion of pre-existing data into the new system or annual licensing and support, may really add up. Furthermore, the costs of customization can be substantial, and it is very common to have consultants paid on an hourly basis rather than on a final job basis. Therefore, caution is the caveat here.

Another area of concern is the use of resources that must be applied to assisting in the conversion. Office staff will have to be allocated to the project in areas such as file and field definitions, testing of the database, and meetings to discuss the integration of the system into your current business model. Other areas to explore are training of staff and whether fees would be involved for additional days of training.

System and Process Administration

TTOs are staffed with personnel who possess a myriad of skills, each at a differing level. Each job is important to the success of the office because each job represents a different aspect of the technology transfer process. A technology manager is important in the licensing of technology. A compliance specialist is important in monitoring a license and its compliance with federal regulations. A business manager is important in the accounts payable and receivable aspect of the office. A patent coordinator makes sure that proper procedure is followed to protect the inventions patentability and filing status. Additional staff makes certain that all paperwork is properly filed and stored for future reference, as well as for organizational and governmental policy compliance. But the data entry clerk may be one of the most important staff members because he or she is responsible for entering the data that the office personnel track daily.

It is extremely important that detailed written descriptions of each part of the data management process exist and are frequently updated so that the data management process is well-understood, even by the newest members of the team.

Communication

Each office must develop processes that streamline the operation and make data more easily obtainable. The use of living documentation that is maintained by users and administrators can help a great deal in making sure the system is used to its fullest. Maintaining this documentation can be done with simple word processing documents or with a more-advanced method such as with a *wiki*.

A wiki is a collaboratively created Web site that is edited from within the Web browser. For example, the office keeps a copy of the manual for the data management system on an internal Web site. Part of that manual details how to add a new patent application to

the system. Because there are likely business processes that go along with entering the information in the database, you would edit the page talking about entering patent information to include who is responsible for filing the paper documents, how to decide what law firms or lawyers to link to the patent, and who checks to make sure the application is complete. In this way, your process documentation becomes merged with the software documentation giving the user a one-stop place to see how to complete a task. Wikis are good ways to store and maintain textual information for your entire office.

Ongoing communications by training and mentoring within the office provides a smoothly operating unit. It provides the opportunity for building a team that is thoroughly knowledgeable about the office functions. Quarterly meetings to discuss issues and confusion with the data management system will help to make sure that problems are addressed before they compound over time. If there is no one person or persons in charge of the data management system, it might be good to meet more often to further alleviate any problems that might arise.

Entering Data

Accurate data are crucial to the office's survival. It lets staff know what is going on in each of the important areas of the technology transfer process. Financial transactions, benchmarking performance, and productivity are all tracked by way of important pieces of data that are entered and stored in the database. Standard operating procedures for each data entry task should be defined and written in an easy-to-understand format that is accessible by all members of the staff. There is nothing worse than an office having to stop the flow of work because one member of the staff has left or is unavailable for a prolonged period of time. An electronic operational notebook is a good way to define each step of the process. In addition, more than one person should be trained in each task to avoid the paralysis that occurs when someone leaves the office. Cross training always pays off.

Staff should be given instruction on how to enter data, which fields need to be entered, and what kind of information should be stored. The process is not usually intuitive, and a good process for training staff is one of the most worthwhile investments you can make in having a top-notch operation. Additionally, someone who understands why he or she is

performing the process should perform the functions of the data entry position. It is always valuable to train the staff so they understand why the information is important and why the data must be correct. In other words, this function is only one part of the total picture and is integral to how staff can access information. Remember the GIGO caveat: garbage in = garbage out.

Maintaining Good Data

Anyone who works with a large amount of data can tell you of mistakes in the data. For example, a contact's name might be entered as John Smith, Jon Smith, and John W. Smith: all for the same person. It is not a simple task to keep things formatted the same or consistently entered into the system. Usually, one place to start is to make one person responsible for entering new data in each area. For example, you might have one person responsible for adding new companies to your system, another person responsible for adding new invention disclosures to your system, and another person responsible for entering new agreements into your system. People can have multiple roles, but it helps to have only one person entering data to keep things consistent.

The best way to keep your data clean and well-formatted is to have a documented process or set of formats. In this process, you should define things such as what abbreviations are allowed, how users should search the system to check if information they wish to enter already exists, and what an authoritative source of information is. Knowing what source of information is authoritative is good when you need to verify its accuracy. You will likely want to have the signed paper copy of an agreement as the source of information related to that agreement.

Storing Data

There are several different storage techniques such as file cabinets, file servers, and databases. The old standby of having office filing cabinets is the oldest method to store data and may also be the most inefficient: whenever you file an important document, it seems to become lost in the files. If you have multiple people accessing the files, the problem becomes worse. Storing hard copies also takes up a lot of space—often a hard thing to find in many organizations.

Keeping information on file servers helps keep things organized, but it can be difficult to find information when you do not know which specific document you need to retrieve the information you want. Databases offer an opportunity to keep your information organized, as well as make it easy to search.

The storage of electronic data can be in an all-encompassing database that contains financial, patent, licensing, contact, and technology information or it can be partially kept in a homegrown or commercial database with links to other files that capture the remainder of the information. The higher end database system will also let you store text documents, spreadsheets, and other files directly in the database and link them to your other data. So rather than going to the paper file to view a license, you can look at a digitally scanned version of the license from within the system.

In addition to the electronic storage, you may want to define whether the information is stored in a global network drive that will be equally accessible to the staff or contains security levels for the ability to read and/or write to the files. Storing information on a global network drive is like saving documents on your C: drive on a Windows-based computer except that it can be made available to your entire office.

Depending on your organization, there may be policies you must follow in regard to how long you store historical information. Some organizations may even require that some information be destroyed after a given amount of time. Be sure you are aware of how these policies might impact how you structure your data management system.

Retrieving Data

When it comes to viewing information in your system, there are generally two different ways to go about it. You might be seeking a specific piece of information about a patent application or an agreement or something else that is very granular. You might also use the system to generate summary reports for AUTM internal periodic reporting or something more ad hoc. In order to be effective, your system needs to be able to accomplish either of these tasks.

Searching for a granular piece of information is something that all of your users are likely to do at one point or another. The user should be able to enter keywords, dates, or numbers to find the piece of information needed. For example, one of your technology managers may be trying to find information on a technology related to cancer treatments to approach a potential licensee. The technology manager should be able to simply enter cancer into the system and get back a list of all the technologies having something to do with cancer.

Besides looking for a very narrow set of information, you will want to be able to generate information reports from your system. Reports give you summary information such as a list of inventions received from the chemistry department or statistics on the number of patents generated in FY04 by each department or how much licensing revenue has been earned from technologies with NIH funding. Reporting can obviously vary from simple to complex, and you must decide what level of reporting needs to be available, both to the average end-user and to computer-savvy staff members.

The best way to address both audiences is to determine a set of commonly used reports and then provide an avenue for more advanced users to create ad-hoc reports. You likely need to have reports that show the inventions disclosed in a given time period, the licenses signed in a given time period, and the patents filed and issued in a given time period. These are all reports that every technology transfer office will likely need at some point or another. These reports should be created in a way that the everyday user can easily find and view them.

There are a variety of ways to provide ad-hoc reporting functionality. Some systems may provide a means built into them, while most require the purchase of additional software. Some ad-hoc reporting is possible with tools such as Microsoft Excel and Microsoft Access, while more advanced features are available in packages such as Crystal Reports. The product you choose will depend on your budget and the needs you have for a reporting system. Depending on how often you generate reports and the variety of those reports, you can decide what reporting solution is best for your office. If you have technical staff members, it can be easier to create custom reports as time goes on. However, if you do not have technical staff members, other staff members would have to be trained on how to do such work.

Backup

There are two purposes for backups: disaster recovery and archiving. Disaster recovery will get you up and running if your entire system is somehow destroyed, but it can also be used to recover accidentally deleted information. For disaster recovery, it is good practice to perform full backups once per week and differential backups every night. Differential backups only save the pieces of information that have changed since the last time you performed a backup of any type. For archiving, keep an offsite location to store your backups on a periodic basis. Having one backup on site that is a month old, one off site that is six months old, and one off site that is a year old is a good model to follow. In this way, you can prevent the loss of all data should there be some sort of disaster that destroys your system. Check with your organization for its data retention policies to see if you need to maintain backup archives for a longer period of time. To find the right hardware and software to use for backing up your data, work with your computer hardware vendor or your organization's IT staff.

Security

There are multiple levels at which security is important. These levels are at the end-user, in communication between end-user and server, and on the server. You want to be sure you have as few weak links in the chain as possible.

It is vital to determine what classes of information you have, who needs access to each of those classes, and what type of access those groups of users need. You probably do not need to have all your users able to edit patent information, and you likely have users who need to be able to access and edit all information in the system. When you configure the permissions for your electronic files, keep all those details in mind.

Make sure you have a good standard for passwords and that your users follow them. Be sure that your users are not just throwing their unwanted printouts into your office's general trash receptacles. Inform your users that leaving their computer unattended could make the system vulnerable. Be aware of government policy and export regulations to make certain that information is properly protected. Look at electronic access as the same as the keys to your offices and file cabinets. If you do not want someone to have access to something, make sure that it is locked with the keys in the hands of the right people.

Depending on your infrastructure, you may have data going across the Internet or other public networks. Even if your system does not use public networks, it is still wise to make sure that your information is safe when it is transmitted from the server to the end-user. To secure your system, you might use technologies or systems to encrypt the communication between server and end-user to prevent network-style eavesdropping.

The last critical point of security is the server where your data are housed. Just as you keep your end-user computers up to date with the latest software updates and patches, you must do the same on your server. Disable unused services and delete default accounts that do not have a strong password.

By talking to your organization's IT staff, whether they be internal to your department or organization-wide, you can work to determine the best methods to secure your data system against data theft and other malicious activities.

Summary

There are a lot of pieces to having a data management system that will not only store accurate, current information, but will also be a tool to help your technology transfer office operate more efficiently and effectively. The challenges are many for every organization, whether you have two or fifty staff members. You may find that you need dedicated technical staff to administer the system as well as to assist other users with their needs.

In every case, your best resource may be the people in similarly sized technology transfer offices and other AUTM members. Find some peer institutions and make contacts there to talk about the systems and processes they are using. This chapter is a good guide for every organization, but there is invaluable anecdotal and experiential information to be had from other people. Networking with your technology transfer counterparts is a great resource for finding what works and what does not work.