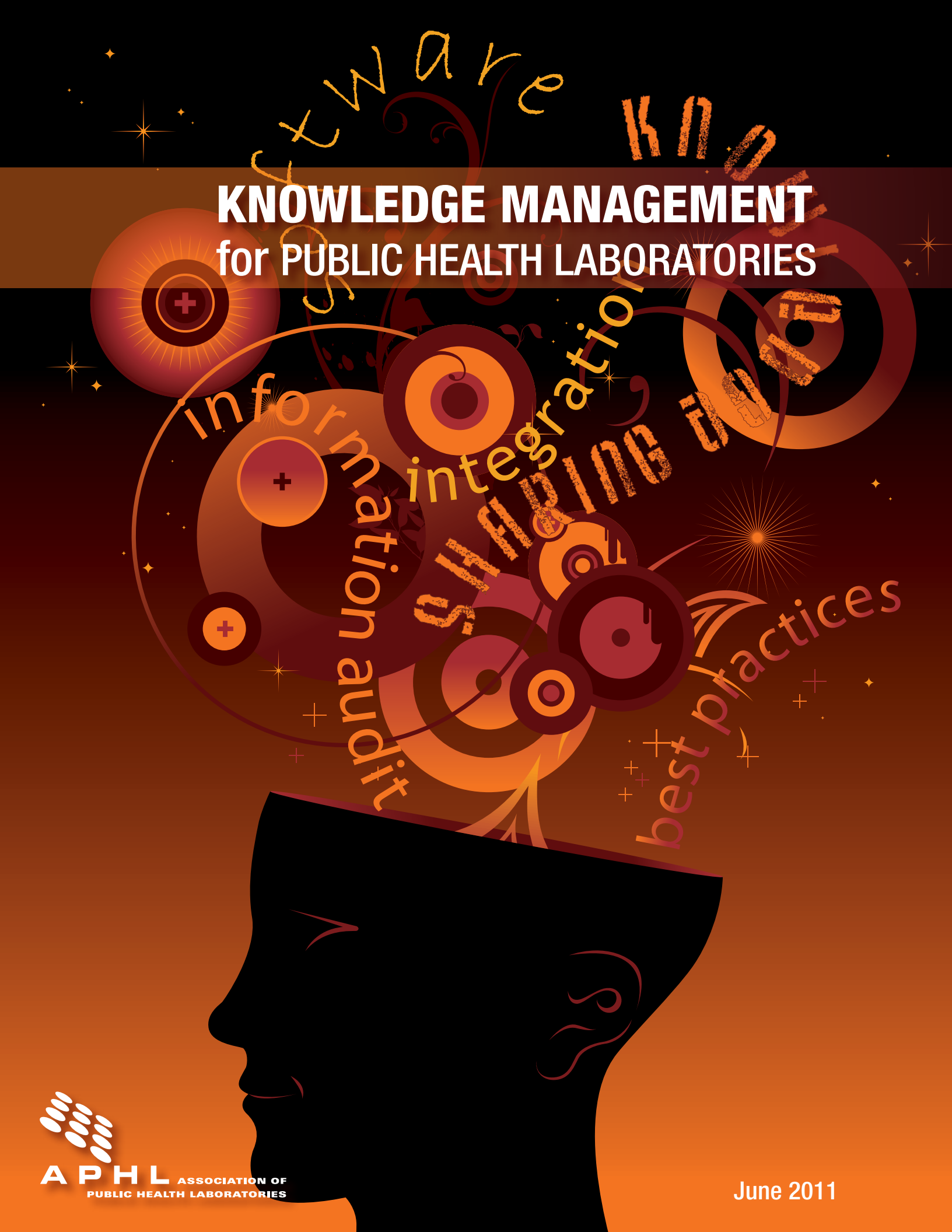




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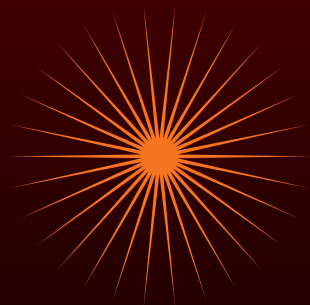
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This document provides an introduction to knowledge management for public health laboratory professionals. Many public health laboratories are increasingly relying on digital information to conduct business, but not all laboratory data and information is digital. The ability to collect, analyze and share data and information has become troublesome, even with rapidly changing technologies. This document describes basic knowledge management concepts, tracking the evolution of data to knowledge and identifying key components of knowledge management.

This report also relates the concepts of knowledge management to public health laboratory activities and goals and describes activities that contribute to implementing a knowledge management approach.

This publication was developed in collaboration with the APHL Knowledge Management Committee:

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Knowledge Management: An Introduction

As organizations and individuals increasingly suffer from “data glut” and information overload resulting from new technologies and requirements to gather and maintain data, it is vitally important to manage and organize this new knowledge. Knowledge Management is a concept that addresses a series of processes by which an organization deploys knowledge. It is becoming apparent that public health laboratories can be improved by leveraging data and information that are gathered, organized, managed and, most importantly, shared. Much of this knowledge is scattered and often not easily recognizable or retrievable. The knowledge may be stored in a variety of places and is not always easily accessible for analysis and decision-making.

Knowledge management in the laboratory system involves numerous specific activities such as developing performance standards, establishing and maintaining appropriate practices and procedures, extracting and storing tacit knowledge from the organization’s workforce, and making use of appropriate technologies. Most importantly, however, is understanding how an organization plans to meet its mission and strategic plan, how it collects and uses data to provide information, and the uses of the information. Managing knowledge as a part of the laboratory’s mission is likely to change various operations of the organization. The goal of knowledge management is to move from “not having knowledge” to “wisdom” and using that information to improve organizational effectiveness.

There are four components or characteristics of an organization that are often examined as part of the process of embracing a knowledge management system: **1) Culture**—understanding the organizational nature; **2) Content**—condition and availability of the content of the organization, (e.g., data, information, experiences); **3) Processes** that are used to collect, manage, and disseminate information; **4) Technology infrastructure** (e.g., facilities, hardware, software, networks).

- **CULTURE:**

The culture of an organization consists of shared beliefs, values, understandings, myths and “rituals” within the organization. Culture is manifested in how an organization envisions, measures and carries out its responsibilities and mission. Culture can be characterized by many attributes including how information is communicated, the emphasis on teaming and sharing knowledge, attitudes toward change, and the incentives in place to reward performance. The culture in public health organizations, as in many other sectors, is a complex mix of behaviors that support or impede individual and group initiatives.



● CONTENT:

Organizations collect data, as well as develop and cultivate skills and expertise. Data, information, skills and expertise can be thought of as the “content” resources of the organization. The nature, amount, format, quality and accessibility of these resources contribute to their value. The content resources of an organization may be explicit or tacit. Many organizations generate content on an ad-hoc basis and then struggle to try to link pieces of information together. In the laboratory, content is presented in a variety of forms: numerical, textual and diagrammatic. In the context of the public health laboratory, content is determined by the laboratory and/or its clients, framed in standardized nomenclature and terminology. In these cases, content is rarely created and managed on an ad-hoc basis, making it easier for the laboratory’s client to access and interpret. The laboratory seeks to minimize content that may reside in places where it is not accessible to users (e.g., tacit in individual brains, or explicit on individual hard drives or filing cabinets) or in undocumented formats that make it impossible for others to use. In such cases, content management can benefit the laboratory greatly through planning and development, as well as understanding the bigger picture. Critical functions of knowledge management are to use tacit knowledge to help create and manage explicit knowledge, without inhibiting the further development of more tacit knowledge.

BUILDING BLOCKS SUMMARY

DATA—Data can be defined as unprocessed representations of raw facts, concepts, or instructions that can be communicated, interpreted, or processed by humans or automatic means. Data are a set of discrete, objective facts about events.

INFORMATION—Data become information when they are assigned meaning. Information is created when data are valued in some way. Information implies communication between parties, changing the receiver’s perception about something

KNOWLEDGE—Knowledge is information in context. Information becomes knowledge when critical thinking, evaluation, and structure are applied in order to support decisions or understand concepts. Knowledge differs from data or information in that new knowledge may be created from existing knowledge using logical inference. Knowledge evolves, while information accrues.

Knowledge is typically categorized in two ways: explicit knowledge and tacit knowledge. Explicit knowledge can be thought of as “book knowledge.” Tacit knowledge is understanding, insight, or instinct, built through experience and training. Tacit knowledge resides within the people of the organization and is not formalized into written or documented forms. It can only be made accessible for others’ benefit through conscious efforts such as interviews, documentation of decision-making, mentoring, and other means to gather insight on how individuals carry out their jobs.

The evolution of data to knowledge is a multi-step process. An organization must first understand the data it holds, and the data must be organized in some schema to make them more accessible. Explicit schema for the organization of data provides greater insight into potential relationships and relevance of other data sets. These actions help transform data into information. Transforming information to knowledge requires that pieces of information be linked in meaningful ways, that relevance to the problem at-hand is established, and that information is understood in a larger context.



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● PROCESSES:

Processes to manage data and information exist in all organizations in a variety of forms ranging from formal to informal. Formalized processes are critical to ensure the effectiveness of the creation, assessment, management, and dissemination of information. Ideally, processes add value that exceeds the burden of implementing the process. The ability to develop and implement processes to support knowledge management is dependent on the organizational culture and business drivers. At the same time, however, changing processes can assist in changing culture to create an environment that better supports knowledge management. Academic cultures, for example, might facilitate knowledge management by encouraging processes that ensure recognition of ideas and content, perhaps by rewarding contributions to shared data repositories. Similarly, the way an organization conducts its business through its administrative processes (e.g., tracking correspondence, archiving, financials and contract management) can also affect content, which can affect how data are subsequently used—or not used—for other purposes. For example, products from contract work may not be indexed, linked or stored for accessibility by others. In the laboratory, a non-standardized means of storing patient or client data among sections may prevent the easy access of these data for use in research studies, reporting and quality assurance.

● TECHNOLOGY:

Technology is the backbone of efficient data handling and information transfer in the public health laboratory. The nature and current use of

technology within the laboratory, including how effectively it is used, are important to understand when implementing knowledge management initiatives. Existing document and record management systems, e-learning, geographic information systems, situation/emergency management systems, query and search functions, and interoperable laboratory information management systems are examples of technology that will contribute to the success of knowledge management. The types of tools an organization uses successfully, levels of expertise in supporting technology use, and approaches to organizing and maintaining technology are important aspects of an organization's technology infrastructure. This infrastructure, and the organization's ability to use the infrastructure, require examination when initiating a knowledge management approach.

Defining these four components for the laboratory organization, as well as understanding their interrelationship, is important before undertaking a formal knowledge management program. In addition, they are the organizational elements most likely to change as a knowledge management approach is implemented. How successfully an organization uses technology is likely to be a function of content (including skills), processes and culture. Over time, however, successful use of technology may help drive the culture and processes in a way that will build a learning organization. Examples of the four components in a public health context and actions to implement a knowledge management approach based on these components are described in subsequent sections of this report.



Knowledge Management Activities and Resources at APHL

APHL has implemented a number of tools and practices to help foster an environment of knowledge sharing and collaboration among members, committees and staff. These include:

LISTSERVS AND BULLETIN BOARDS

Since e-mail is a comfortable environment and subscribers require only an e-mail client, these have proved to be popular among APHL members. Although membership requires approval by an administrator, activity is not moderated or edited. APHL has established eight LISERVS to foster knowledge sharing; these are equally divided between organization by function and by discipline.

A LISERV usually refers to an automatic mailing list server, which date back to the mid-1980s. When an e-mail is addressed to a LISERV mailing list, it is rebroadcast to all members on the list. The result is similar to a newsgroup or forum, except that the messages are transmitted as e-mail and are available only to individuals on the list.

The state laboratory directors' LISERV is being used extensively to exchange information and knowledge regarding operational, administrative, technical and other needs among peers in different states.

LISERVS AND BULLETIN BOARDS: WHAT'S BEING ASKED?

APHL operates eight LISERVS allowing active interchange among participants interested in improving practices and sharing knowledge. Some examples of such exchanges are as follows:

1. I am making another push to convince the legislature to restore my funding. How many states receive state support for operations?
2. Is there any need, interest or benefit in improving communication between states on what is happening locally at your state level and nationally with regards to Forensic Alcohol? I have a staff person who could help, through APHL, with a LISERV of interested parties.
3. We have been fielding a few inquiries from local health departments and some hospitals about whether our laboratory would consider offering the Quantiferon Gold In Tube test as a service to them. I have been reviewing literature on the test, and it certainly would present some challenges to our laboratory. I have a few questions:
 - a. Are you offering this test? How many a year?
 - b. Do you consider it a public health need?
 - c. How do you fund this (expensive) test?
 - d. What area of your laboratory performs the test, TB or Serology?
 - e. At what point do you receive the sample from the submitter, before or after incubation with the mitogens and peptides?
 - f. How many days a week do you perform the test?
 - g. Is it considered a STAT test?
4. We are looking for a way to objectively measure our laboratory personnel efficiency and productivity. Does anyone have, or know where to find, such a measuring system?
5. Who is continuing to test oral fluid? How is this being accomplished since the reagents are not available?



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WIKIS

A wiki is a collaboration software tool that allows multiple users to easily create, edit and link pages together on a Web server. One example of an APHL led wiki activity is within the informatics program. The APHL Informatics Committee has extensively used wikis to document the harmonization work being done for the Public Health Laboratory Interoperability Project (PHLIP). The PHLIP wiki documents development issues and solutions that have emerged during the process of developing a harmonized vocabulary for sending electronic laboratory data to CDC and receiving data from CDC.

MEMBER RESOURCE CENTER

At the request of its members, APHL in partnership with the Knowledge Management Committee has developed a dynamic database where members can turn to learn the experience of other laboratories rather than having to “recreate the wheel” or resorting to calling “friends and family” for suggestions. The APHL Member Resources Center (MRC) is a collection of documents, templates, protocols and any other information resources. This tool, which can be accessed from the APHL website’s main page, aphl.org, allows members to submit their applied ideas and current practices to share with others. The intent is to give members ready access to shared practices, communications, protocols, state newsletters, financial tools and any other resources that can help others improve their current activities. These resources are not necessarily endorsed by APHL, but all members are strongly encouraged to submit their information because its success is dependent on APHL membership to share their innovative practices, “how-to’s” and new programs. In order to encourage submissions during the site’s inauguration year, all APHL committees are being requested to enter a minimum of twelve submissions. To date, there have been over 250 submissions, ranging from costing tem-

plates and outbreak testing algorithms, to laboratory green practices. The site is searchable by topic, state or year and is continuously receiving new inputs from APHL members. This knowledge management tool is an example of a nationwide system that allows members to access potentially reusable tools created by other public health laboratories when developing new programs and processes. This allows just-in-time access to the depth of expertise and experience that exists within the APHL membership. The potential impact of this knowledge repository is enormous but is dependent on the APHL membership to participate and submit model practices and tools they develop.

SURVEY RESOURCE CENTER

The APHL Survey Resource Center (SRC) is an electronic, searchable database that allows public health laboratory directors’ access to the variety of survey data that has been collected over the past few years. The SRC allows the user to view the surveys that their particular agency has completed, the results to those surveys and a composite of all respondents for each survey question. Some of the features of the SRC are: the advance search capability, which allows users to refine their search by categories, laboratory type, survey year as well as other restrictions; the data comparability feature, which allows the user to compare their data against selected states as well as aggregate data; and the data exporting capability. The vision of the SRC is to make survey data easily accessible for member public health laboratories and key partners to use for trending, benchmarking and profiling across laboratories as well as individual data.

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A unique and additional feature of the SRC is the Laboratory Profiles (LP). The LP allows the user to view the profiles of every state and local public health member laboratory across the country. Similar to the concept of a “facebook for laboratories,” these profiles will provide a snapshot of critical information on every public health laboratory across the country, both at the state and local level. The LP allows the user to update their own profile with the goal of providing the most current information about their laboratory.

This knowledge management tool provides an easy to navigate and organized method to search and view data that agencies have submitted. It serves to update, maintain and gather historical as well as current data in one centralized location.

PORTALS AND COLLABORATIVE TOOLS

Organizations can easily (and relatively cheaply) create document sharing and collaboration sites structured around process-oriented tasks requiring document creation and versioning using tools that facilitate electronic collaboration. APHL has implemented Microsoft SharePoint to organize documents for accessibility and efficiency. Nearly all APHL Committees have workspaces in SharePoint to allow for document sharing as well as a central location for document development.

TEACHING BEST PRACTICES

The National Laboratory Training Network (NLTN) is a training system dedicated to improving laboratory practice of public health significance through continuing education. The NLTN has existed for over 20 years and has been responsible for maintaining the laboratory’s knowledge of laboratory practice; it works to keep public health laboratory practice current with technological and procedural advances.

RESEARCH AGENDA

APHL has a process for organizing current data as well as creating new knowledge. A taskforce (the Research Agenda Council) was convened and an environmental scan conducted to learn of APHL members’ and stakeholders’ interests in creating new information. Therefore, in addition to revisiting old data and improving the quality of data collected, APHL will seek opportunities to broaden the scope of information created through promotion of public health system and services research throughout the greater public health laboratory system.



Conclusion

Since knowledge management technologies focus on knowledge acquisition, storage, retrieval and maintenance, public health laboratories should strive to acquire knowledge management approaches that provide flexible, seamless means of capturing, organizing, storing and disseminating information. Data repositories and tools should support indexing of content to allow for ease of retrieval, search, analysis, visualization, reporting, sharing, notification and collaboration.

Laboratories should also leverage existing information technology system initiatives—such as directory services, public health databases, client management systems and laboratory information management systems—to avoid redundancy and ensure that systems are integrated and maximized for the greatest utility possible. Special emphasis may be made on processes that disseminate information, including target audience, websites, portals, e-mail, hard copy reports, tools for analyses, and table or mapping formats.



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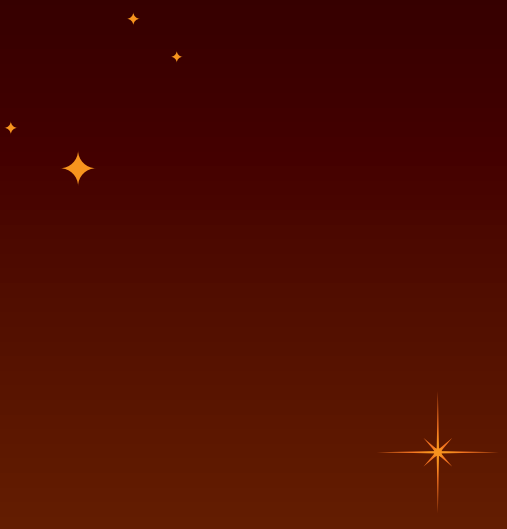
McNabb, D.E., Knowledge Management in the Public Sector: A Blueprint for Innovation in Government, M.E. Sharpe. Armonk, NY, 2006.

INTERNET RESOURCES

Knowledge Management at the Open Directory Project; over 1,000 links to knowledge management publications and articles online: http://www.dmoz.org/Reference/Knowledge_Management/

KM World: <http://www.kmworld.com/>

Rej, R. Knowledge Management for Public Health Laboratories: http://www.aphl.org/profdev/conferences/proceedings/Documents/2008_APHL_Annual_Meeting/019-Rej.pdf



The Association of Public Health Laboratories (APHL) is a national non-profit organization dedicated to working with members to strengthen governmental laboratories that perform testing of public health significance. By promoting effective programs and public policy, APHL strives to provide member laboratories with the resources and infrastructure needed to protect the health of US residents and to prevent and control disease globally.

